Barangaroo Headland Park and Northern Cove Modification to Main Works Project Approval Re: HARBOUR CONTROL TOWER DEMOLITION

Statement of Heritage Impact - Appendices

Prepared for the Barangaroo Delivery Authority
November 2013

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Project RA 1309

Sydney Ports Corporation s170 Listing SHI Number 4560017

Sydney Ports Corporation Heritage Inventory

State Heritage Inventory

SHI Number 4560017 **Study Number**

Item Name: Port Operations and Communications Centre

Location: Merriman St, Millers Point [Sydney]

Address: Merriman St
DUAP Region: Sydney South
Suburb / Nearest Town: Millers Point
Historic region: Sydney
Local Govt Area: Sydney
Parish:
State: NSW
County:
Other/Former Names: Harbour Control Tower
Area/Group/Complex:
Group ID:
Aboriginal Area:
Curtilage/Boundary:
Item Type: Built
Group: Maritime Industry
Category: Control Tower
Owner: Sydney Ports Corporation
Admin Codes:
Code 2:
Code 3:
Current Use: control tower Port of Sydney
Former Uses:
Assessed Significance: State
Endorsed Significance: State

Statement of Significance:
The Port Operations and Communication Centre is significant in the history and operation of the Port of Sydney. Since 1790 the European settlers struggled to gain visual communication across the uneven topography of the harbour. These efforts culminated in the construction of the tower which provided, for the first time in over 150 years, visual oversight of major wharfage areas and the operations of Sydney Harbour. It is significant in its own right but also as an item in a collection of light towers and light stations which, together with the Communications Centre, provide evidence of the long process of establishing visual control and guidance over maritime operations in the Port of Sydney.

Historical Notes or Provenance:
Construction of the Tower at Darling Harbour in 1973-74 continued the quest by maritime authorities to provide awareness of shipping movements and to ensure that traffic flowed in and out of Port Jackson as efficiently and safely as possible. This quest started within two years of the first European settlement when a lookout was established at South Head to notify the settlement of approaching ships. On 10th February 1790 a flag was hoisted for the first time announcing the arrival of the brig "Supply". In 1793 the first recorded use of a navigation light occurred there when a signal fire was used to mark the Harbour entrance (See South Head Signal Station No4560011).

The first Harbour Master was appointed in 1811. Growing Port traffic and changing technology led to the establishment of an increasingly sophisticated system of signal stations, lighthouses, buoys and the pilotage service. Port control was also enhanced by the establishment of the Sydney Harbour Trust in 1890, then the Maritime Services Board in 1935-36. In 1952 the Board's Port Operations and Communications Centre opened at the then Head Office. When the time came to re-equip and expand the facility in the1970's, a

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priority was to provide operators with a good view of Port traffic and commercial wharves. A tower on MSB land at Millers Point was the solution.

The Tower was built on land cleared by the MSB in the 1960's -70's during conversion of the finger wharves at Darling Harbour into longshore roll-on/roll-off container terminals. Earlier it had been the site of the Dalgety's wool store. The building became operational in 1974 but it was not until 1992, when operations including visual surveillience of commercial shipping at the South Head Signal Station transferred to the Control Tower, that full centralisation was achieved.

Themes:

National Theme	State Theme	Local Theme
3. Economy	Communication	(none)
3. Economy	Transport	(none)

Designer:

Maker / Builder: Sabemo Pty Ltd

Year Started: 1973 **Year Completed:** 1974 **Circa:** No

Physical Description: To achieve proper surveillence of the Port area the Communication Tower was raised 87 metres above sea level overlooking Walsh Bay and Darling Harbour. It consists of a reinforced concrete column with an internal lift, topped by stainless steel and glass observation and operations areas. The reinforced concrete base of the tower is 7.6 metres in diameter by 2.9 metres deep with connected plant and pump rooms and emergency equipment storage. Foundations are embedded into rock and rock anchors penetrate 7.9 metres to provide adequate anchorage.

A circular reinforced concrete shaft 4.9 metres in diameter rose from the base; housing lift, stairs and ducting for services. The three upper floors are 10 metres in diameter and cantilever from the shaft, while the roof framework is 15.2 metres in diameter. Wind loading was a critical factor in designing the Tower. Potential problems of structural strength in high winds were overcome by switching from pre-stressed to reinforced concrete and increasing the weight of the building at the top (Include diagram from Ports brochure on file).

All ships must obtain radio clearance from the Port Operations and Communication Centre before entering the port or leaving their berth, also during their passage through the Harbour ships provide notice of their positions at certian points that can be accessed by all other ships. The new Tower had the advantage of providing visual sight of major wharfage areas and the entire port for the first time (Port of Sydney Vol 10 1973 p200).

Physical Condition: Excellent

Modification Dates:

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Location: Merriman St, Millers Point [Sydney]

Recommended Management:

Management:

Further Comments:

Criteria a) The Port Operations and Communication Centre is signifcant in the history and operation of the Port of Sydney. Since 1790 the European settlers struggled to gain visual communication across the uneven topography of the harbour. These efforts culminated in the construction of the Tower which provided visual oversight of major wharfage areas and the operations of Sydney Harbour for the first time in over 150 years.

Criteria b)

Criteria c) The Port Operations and Communications Centre is a prominant landmark and part of the skyline of Sydney Harbour. It is a significant element of the maritime landscape.

Criteria d)

Criteria e)

Criteria f)

Criteria g)

Integrity / Intactness:

References:

Author	Title	Year
	A Decade of Progress 1965 -75 - Port of Sydney Journal Vol 11 - 4	1975
	Port Operations and Communications Centre - brochure	1974
	Sydney's Modern Shipping Control Centre - Port of Sydney Journal Vol 11 - 3	1975
	News Briefs - Port of Sydney Journal Vol 10	1973

Studies:

Author	Title	Number	Year
Susan McIntyre-Tamwoy Heritage Consultants	Sydney Ports Corporation Heritage and Conservation Register		2004

Parcels:

Latitude: **Longitude:**

Location validity: **Spatial Accuracy:**

Map Name: **Map Scale:**

AMG Zone: **Easting:** **Northing:**

Listings:

Name:	Title:	Number:	Date:
Heritage Act - s.170 NSW State agency heritage register	Sydney Ports Corporation		1/07/2004

Sydney Ports Corporation s170 Listing SHI Number 4560017

Sydney Ports Corporation Heritage Inventory

State Heritage Inventory

SHI Number
4560017
Study Number

Item Name: **Port Operations and Communications Centre**

Location: **Merriman St, Millers Point [Sydney]**

Custom Field One:

Custom Field Two:

Custom Field Three:

Custom Field Four:

Custom Field Five:

Custom Field Six:

Data Entry: **Date First Entered:** 30/06/2004 **Date Updated:** 23/11/2009 **Status:** Basic

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Sydney Ports Corporation Heritage Inventory

State Heritage Inventory

SHI Number
4560017
Study Number

Item Name: **Port Operations and Communications Centre**

Location: **Merriman St, Millers Point [Sydney]**

Image:

Caption: Port Operations and Communications Centre
Copyright: Sydney Ports Corporation
Image by: Susan McIntyre-Tamwoy Heritage Consultants
Image Date:
Image Number: 1
Image Path:
Image File: 4560017b1.jpg
Thumb Nail Path:
Thumb Nail File:

Sydney Ports Corporation s170 Listing SHI Number 4560017

Sydney Ports Corporation Heritage Inventory

State Heritage Inventory

SHI Number
4560017
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Item Name: **Port Operations and Communications Centre**

Location: **Merriman St, Millers Point [Sydney]**

Image:

Caption: Port Operations and Communications Centre
Copyright: Sydney Ports Coporation
Image by: Susan McIntyre-Tamwoy Heritage Consultants
Image Date:
Image Number: 2
Image Path:
Image File: 4560017b2.jpg
Thumb Nail Path:
Thumb Nail File:

Sydney Ports Corporation s170 Listing SHI Number 4560017

Sydney Ports Corporation Heritage Inventory

State Heritage Inventory

SHI Number
4560017
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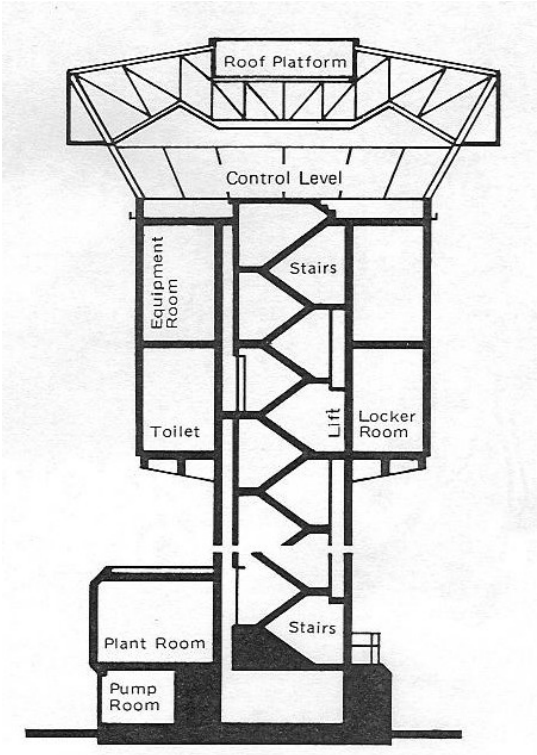
Item Name: **Port Operations and Communications Centre**

Location: **Merriman St, Millers Point [Sydney]**

Image:



Caption: Port Operations and Communications Centre

Copyright: Sydney Ports Corporation

Image by: Maritime Services Board

Image Date: 1/08/1974

Image Number: 3

Image Path:

Image File: 4560017b3.jpg

Thumb Nail Path:

Thumb Nail File:

Sydney Ports letter of notification regarding the transfer of SHI 4560017

SYDNEY PORTS
FIRST PORT, FUTURE PORT

26 July 2012

Petula Samios
Director – Heritage Branch
NSW Department of Planning
Locked Bag 5020
PARRAMATTA NSW 2150

Our Ref: S99/0221

Dear Ms Samios,

Transfer of Sydney Ports Corporation s170 Item to Barangaroo Delivery Authority

I write to inform you under s170A of the *Heritage Act 1977* (NSW) of the transfer of an item listed on the Sydney Ports Corporation (Sydney Ports) s 170 Heritage Register to the Barangaroo Delivery Authority.

The item in question is the Port Operations and Communications Centre (SHI Number 4560017 – also referred to as the Harbour Control Tower) located at Merriman Street, Millers Point. Sydney Ports assessed the item as being of state significance in late 2006 and this item was included in Sydney Ports' s170 Heritage Register when it was endorsed by the Heritage Office on 4 March 2009. Please find attached the inventory sheets for the sandstone wall.

The inventory sheets for the Port Operations and Communications Centre have been sent to BDA and are attached for your information.

Should you wish to discuss this matter further, please contact me on 9296 4672.

Yours sincerely,

Greg Walls
Environmental Planner

SYDNEY PORTS CORPORATION
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PO Box 25, Millers Point NSW 2000 Australia
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F: +61 2 9296 4742
www.sydneyports.com.au

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

Environment & Heritage

You are here: Home > Heritage sites > Searches and directories > NSW heritage search

Millers Point Conservation Area

Item details

Name of item: Millers Point Conservation Area
Type of item: Conservation Area
Group/Collection: Urban Area
Category: Townscape
Location: Lat: -33.8583312734 Long: 151.2043883580
Primary address: , Millers Point, NSW 2000
Parish: St Philip
County: Cumberland
Local govt. area: Sydney

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
	Millers Point	Sydney	St Philip	Cumberland	Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Department of Housing	State Government	20 Jan 99

Statement of significance:

Millers Point Conservation Area is an intact residential and maritime precinct of outstanding State and national significance. It contains buildings and civic spaces dating from the 1830s and is an important example of nineteenth and early twentieth century adaptation of the landscape. The precinct has changed little since the 1930s.

Date significance updated: 29 Oct 01

Note: There are incomplete details for a number of items listed in NSW. The Heritage Branch intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Physical description: An integrated port town developed between the 1810s and the 1930s and little changed since then; considered remarkable for its completeness and intactness. Its components include deep-sea wharves and associated infrastructure, bond and free stores, roadways and accessways, public housing built for port workers, former private merchant housing, hotels and shops, schools, churches, post office and community facilities.

This is the Department of Housing's Conservation Area only and only applies to Department of Housing property. Because of this, the Department's Conservation Area is not contiguous.

Physical condition and/or Archaeological potential: Good

Date condition updated: 17 Sep 97

Further All individual listings for Millers Point are an integral

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

Information: part of the whole precinct and are of the same level of State significance as the precinct. The area is generally in State Government ownership and most individual items are identified in s170 registers of owning authorities (mainly Department of Housing). All items sold to private ownership are protected by SHR listings; however, recent practice has been to retain State ownership and sell leasehold only. The Millers Point Conservation Area as defined in the City of Sydney LEP 1992 does not include the Walsh Bay precinct which is covered by an REP. However, as a heritage item, Millers Point and Walsh Bay are integral. For more detailed information on Walsh Bay see the entry for the Walsh Bay Wharves ('Wharves 1 to 9 & buildings & bridges etc.'). Millers Point area endorsed as an item of State and national significance by the Heritage Council on 15 December 1988.

Current use: Predominantly public housing, community facilities and residual port activities.

Former use: Housing, commercial and port

History

Historical notes: The area to the northwest of the City of Sydney was first settled in the early nineteenth century. It has a long history as a port with housing and other community facilities developed in association. The Area shows a cross-section of Australian urban development from 1810s to 1930s. It was resumed by government in 1900s and developed as a 'company town' by the port authorities.

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
2. Peopling-Peopling the continent	Ethnic influences-Activities associated with common cultural traditions and peoples of shared descent, and with exchanges between such traditions and peoples.	(none)-
2. Peopling-Peopling the continent	Migration-Activities and processes associated with the resettling of people from one place to another (international, interstate, intrastate) and the impacts of such movements	(none)-
3. Economy-Developing local, regional and national economies	Commerce-Activities relating to buying, selling and exchanging goods and services	(none)-
3. Economy-Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	(none)-
3. Economy-Developing local, regional and national economies	Events-Activities and processes that mark the consequences of natural and cultural occurences	(none)-
3. Economy-Developing local, regional and national economies	Fishing-Activities associated with gathering, producing, distributing, and consuming resources from aquatic environments useful to humans.	(none)-
3. Economy-Developing local,	Industry-Activities associated with the manufacture, production and distribution of goods	(none)-

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

regional and national economies		
3. Economy-Developing local, regional and national economies	Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	(none)-
3. Economy-Developing local, regional and national economies	Transport-Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	(none)-
4. Settlement-Building settlements, towns and cities	Accommodation-Activities associated with the provision of accommodation, and particular types of accommodation -- does not include architectural styles -- use the theme of Creative Endeavour for such activities.	(none)-
4. Settlement-Building settlements, towns and cities	Land tenure-Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal	(none)-
4. Settlement-Building settlements, towns and cities	Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	(none)-
5. Working-Working	Labour-Activities associated with work practises and organised and unorganised labour	(none)-
6. Educating-Educating	Education-Activities associated with teaching and learning by children and adults, formally and informally.	(none)-
7. Governing-Governing	Defence-Activities associated with defending places from hostile takeover and occupation	(none)-
7. Governing-Governing	Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities.	(none)-
7. Governing-Governing	Welfare-Activities and process associated with the provision of social services by the state or philanthropic organisations	(none)-
8. Culture-Developing cultural institutions and ways of life	Creative endeavour-Activities associated with the production and performance of literary, artistic, architectural and other imaginative, interpretive or inventive works; and/or associated with the production and expression of cultural phenomena; and/or environments that have inspired such creative activities.	(none)-
8. Culture-Developing cultural institutions and ways of life	Religion-Activities associated with particular systems of faith and worship	(none)-
8. Culture-Developing cultural institutions	Social institutions-Activities and organisational arrangements for the provision of social activities	(none)-

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

and ways of life		
9. Phases of Life-Marking the phases of life	Persons-Activities of, and associations with, identifiable individuals, families and communal groups	(none)-

Assessment of significance

SHR Criteria a) [Historical significance]

Significant in the evolution and pattern of the history of New South Wales.

1.1 Miller's Point provides a geographically encapsulated portrayal of the evolution of Australian urban life prior to the mid twentieth century.

1.2 It demonstrates a complex layering of activities and events, ranging from early colonial merchant and official enterprise to twentieth century corporate port town and setting for social planning.

1.3 Its demonstrative capacity is heightened by the completeness and originality of its fabric which represents particularly strongly every decade between 1820 and 1930 and by the experiences and memory of its long term community.

1.4 Its public housing and its development into a Government corporate town were probably the first such developments in Australia (apart from first settlement) and may be of international significance.

1.5 It features virtually intact residential areas, port and stevedoring works created by the Sydney Harbour Trust, 1900 1930, in response to the Sydney plague and the requirements of maritime trade at that time.

1.6 Its associations include personalities encompassing a wide spectrum of New South Wales society:

.early millers such as John Leighton, the original `Jack the Miller';

.colonial merchant class, represented by the Campbell family of Bligh House, 43 Lower Fort Street;

.later merchant class who invested in major warehouses (Towns and Parbury);

.prominent Sydney citizens of the mid nineteenth century such as John Fairfax of the Sydney Morning Herald who enjoyed the proximity to the town. (The relatively modest scale of the houses at Miller's Point, and the relative importance of its pre 1870 inhabitants reflects the economic circumstances and the aspirations of the citizens of the town of Sydney);

.1880s property investors who built substantial rows of terrace houses of which 1 19 Lower Fort Street is the finest in Miller's Point, and the grandest surviving terrace in New South Wales;

.publicans, as key civic figures, for example, the Armstrong family of the Palisade Hotel;

.the Irish community, as a major social group, the men generally employed as waterside workers;

.nineteenth century street life : urchins, larrikins and prostitutes, colouring the otherwise

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

respectable nature of the district pre 1900;

.significant architects and their work:

H. Ginn & E. Blacket : Holy Trinity Church;

W. L. Vernon : Post Office;

A. Dawson : Observatory;

J. Watts and M. Lewis : Fort Street School (also H. Robertson);

M. Lewis : Richmond Villa, Kent Street (moved from Domain c.1975);

J. Verge : 39 41 Lower Fort Street;

G. McRae : 1910s workers' housing;

V. Parkes : proposals c.1910 to Sydney Redevelopment Advisory Board for new hygienic tenaments between Argyle Place and Windmill Street;

W. Wardell : Grafton Bond Store,

.significant engineers and their work:

H.D. Walsh : Walsh Bay Port structures and works;

N. Selfe : advice on new wharf facilities c.1910,

. significant maritime figures: John Irving (boat builder), James Munn (ship builder), John Cuthbert (Cuthbert's Patent Slip);

.members of the Sydney Harbour Trust Board;

.artists, and the discovery of the pictorial qualities of Australia including urban squalor, waterfront incident and the harbour bridge:

Prout and Rae 1840s in Sydney Illustrated;

S. Elyard 1860s;

Lindsay family c.1900;

W. Hardy Wilson c.1910;

Cazneaux c.1920;

Dorrit Black c.1930.

SHR Criteria c)
[Aesthetic significance]

Significant in possessing, or contributing to, creative or technical accomplishment in New South Wales.

2.1 It demonstrates technical and creative excellence of the period 1820 1930, including wharfage, warehousing, civic facilities and landscaping, the observatory, hotels, public housing and its support facilities, colonial housing and the Garrison Church buildings.

2.2 It documents the workings of a technologically advanced early twentieth century shipping port, developed specifically to accommodate new mechanised transportation technology (engine driven vessels and motor lorries), and strongly retains and demonstrates the physical character of a port.

2.3 It demonstrates characteristic dramatic harbourside topography, human modified and utilised in strata for relevant functions (Observatory, fortifications, elevated housing for the colonial gentry, multi level

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

warehousing/wharfage and deepwater berthing).

2.4 It is unified as an area in materials, form and scale and is clearly defined by the Harbour Bridge and Bradfield Highway, Walsh Bay and Darling Harbour.

SHR Criteria d) [Social significance]

Significant through associations with a community in New South Wales for social, cultural or spiritual reasons.

3.1 It is occupied in part by descendants of its earlier communities and retains a strong community spirit.

3.2 It demonstrates, with relatively minor change to its physical character and the social composition of its population, the life of inner Sydney in the early twentieth century.

3.3 Following its resumption in 1900 it became the setting for a pioneer programme of public housing and social improvement, demonstrated by development of a company port town by the Sydney Harbour Trust. This encompassed construction of purpose designed workers' housing and support services and improvement of existing buildings and services.

3.4 It remains predominantly a public housing area and retains the presence and activity of the port authority.

3.5 It retains largely working evidence of early social improvement through education (Lance Kindergarten, St. Brigid's school and the Fort Street schools).

3.6 It contains institutions strongly associated with the religious life of the community:

.Holy Trinity Church, the church of the Anglican establishment and the military garrison;

.St. Brigid's church and school, the oldest extant Catholic establishment in Australia and a focal point of the local Irish working class community.

SHR Criteria e) [Research potential]

Significant for the potential to yield information contributing to an understanding of the history of New South Wales.

4.1 Its long term residents provide a rich resource of oral evidence contributing to an understanding of the history of the place and the Sydney waterfront.

4.2 Its layered fabric, both in terms of structures and archaeology, has had relatively little disturbance since intervention by the Sydney Harbour Trust and has the potential to provide valuable evidence about the place and its community.

SHR Criteria f) [Rarity]

Significant in possessing rare, endangered or uncommon aspects of the history of New South Wales.

6.1 Its unity, authenticity of fabric and community, and complexity of significant activities and events make it probably the rarest and most significant historic urban place in Australia.

6.2 Its Walsh Bay wharves and associated port structures are unique in Australia and, when associated with the whole port-town, may be of international significance.

6.3 It contains rare examples of early colonial architecture, of which the Sydney Observatory may be unique.

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

SHR Criteria g) [Representativeness]: Significant in demonstrating the characteristics of a class of cultural places or environments in New South Wales.

7.1 It contains good examples demonstrating the evolution of domestic and commercial buidings in Australia, including a comprehensive illustration of Australian terrace-house development, from "the Ark" (1820s) to Edwardian terraces (1910s).

7.2 Its individual components illustrate in detail the various characteristics and phases of development of the place.

Integrity/Intactness: A complete government port town remarkable for its intactness. Very good condition.

Assessment criteria: Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Recommended management:

Conservation Policy and State control

Procedures / Exemptions

Section of act	Description	Title	Comments	Action date
57(2)	Exemption to allow work	Standard Exemptions	SCHEDULE OF STANDARD EXEMPTIONS HERITAGE ACT 1977 Notice of Order Under Section 57 (2) of the Heritage Act 1977 I, the Minister for Planning, pursuant to subsection 57(2) of the Heritage Act 1977, on the recommendation of the Heritage Council of New South Wales, do by this Order: 1. revoke the Schedule of Exemptions to subsection 57(1) of the Heritage Act made under subsection 57(2) and published in the Government Gazette on 22 February 2008; and 2. grant standard exemptions from subsection 57(1) of the Heritage Act 1977, described in the Schedule attached. FRANK SARTOR Minister for Planning Sydney, 11 July 2008 To view the schedule click on the Standard Exemptions for Works Requiring Heritage Council Approval link below.	Sep 5 2008
57(2)	Exemption to allow work	Heritage Act - Site Specific Exemptions	HERITAGE ACT 1977 ORDER UNDER SECTION 57(2) TO GRANT SITE SPECIFIC EXEMPTION FROM APPROVAL Millers Point Conservation Area Millers Point (SHR No. 884) I, the Minister for Heritage, on the recommendation of the Heritage Council of New South Wales, in	Jan 18 2013

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

pursuance of section 57(2) of the Heritage Act 1977, do, by this my order, grant an exemption from section 57(1) of that Act in respect of the engaging in or carrying out of any activities described in Schedule C by the owners described in Schedule B on the item described in Schedule A.

The Hon Robyn Parker, MP
Minister for Heritage

Sydney, 17th Day of December 2012

SCHEDULE A

The item known as Millers Point Conservation Area, situated on the land described in Schedule B.

SCHEDULE B

All those pieces or parcels of land as shown on the plans catalogued HC 1921 and HC 2282 in the office of the Heritage Council of New South Wales.

SCHEDULE C

All works and activities that, in the opinion of the relevant local government authority approval body, do not materially affect the

significance of the item, according to the definition and explanations of 'material affectation' in the NSW Local Government Heritage Guidelines published by the NSW Heritage Office 2002, pages 25-30.

This Exemption does not apply to works affecting historical archaeological 'relics' within the meaning of the NSW Heritage Act, 1977. Works which affect 'relics' must still be submitted for approval by the Heritage Council of NSW or its Delegate.

Standard exemptions for works requiring Heritage Council approval

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		00884	02 Apr 99	27	1546
Heritage Act - s.170 NSW State agency heritage register					
Local Environmental Plan	CSH LEP 4		07 Apr 00		
Within a conservation area on an LEP					
Archaeological zoning plan					
Within a National Trust conservation area					

NSW Environment & Heritage Listing for the Millers Point Conservation Area SHI 5001049

Register of the National Estate

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Department of Housing s170 Register	1998		Brooks & Associates		Yes
Millers Point Conservation Policy	1989		Kate Blackmore Associates		No

References, internet links & images

Type	Author	Year	Title	Internet Links
Written	A Prescott	1995	Statement of Significance for the Heritage Council	
Written	Fitzgerald, S and Keating, C	1991	Millers Point	
Written	Howard Tanner and Associates	1987	Millers Point	

Note: internet links may be to web pages, documents or images.

(Click on thumbnail for full size image and image details)

Data source

The information for this entry comes from the following source:

Name: Heritage Office
Database number: 5001049
File number: S90/03340; 10/03465

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Director General's Requirements MP10_0048 MOD4; 9 September 2013

Director General's Requirements

Section 75W of the *Environmental Planning and Assessment Act 1979*

Application Number	MP10_0048 MOD 4
Project	Barangaroo Headland Park & Northern Cove – Main Works
Modification	Demolition or adaptive re-use of the Harbour Control Tower
Location	Barangaroo, Sydney
Proponent	Barangaroo Delivery Authority
Date modified	9 September 2013

General requirements	The modification application must include:
	• An executive summary.
	• A description of the existing and surrounding environment.
	• A thorough description of the proposal, including:
	  o the need for the demolition or adaptive re-use of the control tower;
	  o alternatives considered; and
	  o interaction with other activities at the Barangaroo site.
	• Consideration of any relevant statutory provisions (see below).
	• A detailed assessment of the key issues specified below, including:
	  o a description of the existing environment;
	  o an assessment of the potential impacts of the removal or adaptive re-use of the control tower, including direct, indirect and cumulative impacts must be considered, and any other existing and proposed development/activities; and
	  o a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of either option.
	• An amendment to the approved Statement of Commitments, outlining environmental management, mitigation and monitoring measures to be implemented to minimise any potential impacts.
	• A conclusion justifying both options, taking into consideration environmental impacts, the suitability of the site, and whether or not the proposal is in the public interest.
	• A signed statement from the author of the application certifying that the information contained in the report is neither false nor misleading.

Key Issues	The section 75W modification application must address the following key issues:
	
	1. Relevant EPIs, Policies and Guidelines
	• Address the provisions of State environmental planning policies that would apply as if those provisions applied to the carrying out of the project, including the following:
	  o State Environmental Planning Policy (State & Regional Development) 2011;
	  o State Environmental Planning Policy (Major Development) 2005;
	  o State Environmental Planning Policy No 55 – Remediation of Land;
	  o Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005;
	  o NSW 2021; and
	  o Draft Metropolitan Plan for Sydney to 2031, Metropolitan Plan for Sydney 2036 and the draft Sydney City Subregional Strategy.
	
	2. Barangaroo Concept Plan
	• Demonstrate consistency with the terms of approval of the Concept Plan MP06_0162 (as modified).

Director General's Requirements MP10_0048 MOD4; 9 September 2013

Demolition Works

1. Heritage

- Prepare a statement of heritage impact which identifies why the item is of heritage significance, what impact the proposed works will have on its significance, what measures are proposed to mitigate negative impacts, and why more sympathetic solutions are not viable.
- An archaeological assessment of the likely impacts of the proposal on any Aboriginal cultural heritage, European cultural heritage and other archaeological items and outline proposed mitigation and conservation measures.
- An interpretation strategy that includes the provision for interpretation of any archaeological resources uncovered during the works.

2. Landscaping

- Detail the proposed landscaping, grading and finished levels to be provided on site.

3. Visual

- Photomontage images are to be prepared to demonstrate the visual impacts/improvements before and after demolition from key vantage points including, but not limited to, McMahons Point (Blues Point), Pyrmont, Balmain East, Darling Harbour, Walsh Bay and Millers Point).

4. Noise

- Assess the noise impacts associated with the demolition of the control tower, including cumulative noise associated with other construction related activities on site.
- The assessment needs to carefully consider noise and vibration impacts from machinery being used at elevated levels in close proximity to residences on Merriman Street.

5. Air and Odour

- Assess the potential air and odour impacts associated with the demolition of the control tower and outline measures to mitigate these impacts.
- Particular emphasis should be in relation to dust management (fine particle emissions) as works will be done at elevated positions in close proximity to residences.

6. Water Quality

- Outline the water quality management measures that focus on the potential impacts of contaminants from the works entering Sydney Harbour, including stormwater management.

7. Traffic

- Prepare a Traffic Impact Assessment that evaluates the daily and peak traffic movements likely to be generated by the demolition of the control tower and cumulative impacts associated with other construction related activities on the Barangaroo site.
- Prepare a Demolition Traffic Management Plan.

8. Waste

- Outline construction and demolition waste classification, including waste likely to be generated, its storage, treatment, and its disposal/transport or re-use. Refer to EPA brochure titled: *Know your responsibilities: managing waste from construction sites*.
- Outline how waste will be managed with particular focus on asbestos management (works at elevated positions need to be assessed and carefully conducted).

9. Contamination and Remediation

- Prepare an amended Remedial Action Plan (RAP). The amended RAP must be prepared in accordance with the contaminated land planning guidelines under section 145C of the

Director General's Requirements MP10_0048 MOD4; 9 September 2013

Environmental Planning and Assessment Act 1979 and relevant guidelines produced or approved under section 105 of the *Contaminated Land Management Act 1997*.

- If an amended RAP is not required, confirmation from an EPA accredited certifier must be provided.

Note: The current guidelines under section 145C of the *Environmental Planning and Assessment Act 1979* are the guidelines *"Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land" 1998*

10. Infrastructure

- Detail the existing infrastructure on site and identify any works or possible impacts on any such infrastructure.
- Detail measures to mitigate the impacts of the proposal on any infrastructure items, including proposed relocation.

Adaptive Re-Use

1. Use and Urban Design

- Outline the specific use and scope of works associated with the adaptive re-use of the control tower, including its immediate surrounds.
- Outline the design with specific consideration to the proposed uses' needs in terms of its layout, primary elements, façade, rooftop, mechanical plant, articulation, materials, colours, lighting, landscaping, safety and compatibility with the surrounding environment.
- Outline hours of operation and proposed plan of management.
- Details of publicly accessible areas associated with the use.
- Provide a Building Code of Australia Report which outlines the proposed works and which confirms that the control tower is suitable for the proposed use.

2. Heritage

- Prepare a statement of heritage impact which identifies why the item is of heritage significance, what impact the proposed works will have on its significance, what measures are proposed to mitigate negative impacts, and why more sympathetic solutions are not viable.
- An archaeological assessment of the likely impacts of the proposal on any Aboriginal cultural heritage, European cultural heritage and other archaeological items and outline proposed mitigation and conservation measures.
- An interpretation strategy that includes the provision for interpretation of any archaeological resources uncovered during the works

3. Public Domain

- Detail the proposed changes to the public domain surrounding the site, including any impacts on Clyne Reserve and Merriman Street.
- Detail the proposed/or approved linkages to the Harbour Control Tower from the Headland Park, future cultural space, and surrounding streets.
- Detail street furniture, lighting and other materials and finishes (if proposed).
- Outline any wayfinding signage or signage (if proposed).

4. Access

- Detail the upgrades required for access to the control tower and how workers and visitors will access the control tower and leave the site.

Director General's Requirements MP10_0048 MOD4; 9 September 2013

	5. Visual • A visual impact assessment is to be provided to identify the visual changes of the control tower when viewed from key vantage points (including, but not limited to, McMahons Point (Blues Point), Pyrmont, Balmain East, Walsh Bay and Millers Point). • Photomontage images are to be prepared to demonstrate the impact of the proposed works. **6. Traffic and Transport** • Prepare a Traffic Impact Assessment (TIA) that: o Evaluates daily and peak traffic movements likely to be generated by the development (construction & operation); o Evaluate the cumulative impacts and potential conflict with traffic movements generated by the Barangaroo site; and o Includes details on parking demand and parking provision. **7. Noise** • Assess the noise impacts associated with the adaptive re-use (construction & operation) of the control tower, including cumulative noise associated with other construction/operational related activities on site. **8. Air and Odour** • Assess the potential air and odour impacts associated with the works and use and outline measures to mitigate these impacts. **9. Waste** • Assess the waste impacts associated with the adaptive re-use (construction & operation) of the control tower. **10. Infrastructure and Utilities** • In consultation with relevant agencies, assess the existing capacity and augmentation requirements of the development for the provision of infrastructure and utilities. **11. ESD** • Outline the ESD measures that would be implemented on site to service the adaptive re-use of the control tower. **12. Consultation** • Undertake an appropriate and justified level of consultation in accordance with the department's *Major Project Community Consultation Guidelines October 2007*. In particular, you should consult with the Heritage Branch of the Office of Environment and Heritage, and City of Sydney Council.
Deemed Refusal Period	40 days

Director General's Requirements MP10_0048 MOD4; 9 September 2013

Plans and Documents to accompany the Application

Plans and Documents	The following plans, architectural drawings, diagrams and relevant documentation shall be submitted (where relevant): 1. An **existing site survey plan** drawn at an appropriate scale illustrating; • The location of the land, boundary measurements, area (sqm) and north point. • The existing levels of the land in relation to buildings and roads. • Location and height of existing structures on the site. • Location and height of adjacent buildings and private open space. • All levels to be to Australian Height Datum. 2. A **Site Analysis Plan** must be provided which identifies existing natural elements of the site (including all hazards and constraints), existing vegetation, footpath crossing levels and alignments, existing pedestrian and vehicular access points and other facilities, slope and topography, utility services, boundaries, orientation, view corridors and all structures on neighbouring properties where relevant to the application (including windows, driveways, private open space etc). 3. A **locality/context plan** drawn at an appropriate scale should be submitted indicating: • Significant local features such as parks, community facilities and open space and heritage items. • The location and uses of existing buildings, shopping and employment areas. • Traffic and road patterns, pedestrian routes and public transport nodes. 4. **Architectural drawings** at an appropriate scale illustrating: • The location of any existing building envelopes or structures on the land in relation to the boundaries of the land and any development on adjoining land. • Detailed floor plans, sections and elevations of the proposed buildings. • Elevation plans providing details of external building materials and colours proposed. • Fenestrations, balconies and other features. • Accessibility requirements of the Building Code of Australia and the Disability Discrimination Act. • The height (AHD) of the proposed development in relation to the land. • The level of the lowest floor, the level of any unbuilt area and the level of the ground. • Any changes that will be made to the level of the land by excavation, filling or otherwise. 5. **Other plans (where relevant)**: • **Stormwater Concept Plan** - illustrating the concept for stormwater management. • **Erosion and Sediment Control Plan** – plan or drawing that shows the nature and location of all erosion and sedimentation control measures to be utilised on the site. • **Geotechnical Report** – prepared by a recognised professional that assesses the risk of Geotechnical failure on the site and identifies design solutions and works to be carried out to ensure the stability of the land and structures and safety of persons. • **Landscape plan** - illustrating treatment of open space areas on the site, screen planting along common boundaries and tree protection measures both on and off the site.
Documents to be submitted	• 1 copy of the section 75W report plans and documentation for the Test of Adequacy. • 12 hard copies of the section 75W report (once the report has been determined adequate). • 12 sets of architectural and landscape plans to scale, including one (1) set at A3 size (to scale). • 1 copy of the section 75W report and plans on CD-ROM (PDF format), not exceeding 5Mb in size.

Structural Assessment Report:- Harbour Control Tower by RobertBirdGroup

RobertBirdGroup

Structural Assessment Report

Barangaroo Delivery Authority (BDA) – Harbour Control Tower

Issue: A

Prepared For: **Mr Phil Paris**
Barangaroo Delivery Authority

Project No.: 12831

21st December 2012

ISO 9001:2008
FS 520893

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Structural Assessment Report:- Harbour Control Tower by RobertBirdGroup

Structural Assessment Report
BDA – Harbour Control Tower
Issue: A

Project No. 12831
21st December 2012

Report Amendment Register

Issue	Section & Page No.	Issue/Amendment	Author/ Initials		Project Engineer	Reviewer/ Initials		Date
A	All	Draft	TK		TK	CP		21.12.2012

ISSUE ACCEPTED BY:

AUTHOR:

TONY KEAN
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 21st December 2012

REVIEWER:

CHRIS POTTER
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 21st December 2012

Structural Assessment Report:- Harbour Control Tower by RobertBirdGroup

Structural Assessment Report
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Structural Assessment Report
BDA – Harbour Control Tower
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1. Introduction

1.1 The purpose of this report is to inform the BDA of the relevant criteria that need to be considered when assessing potential adaptive re-use schemes for the existing tower on the north eastern part of the Barangaroo Headland Park site.

1.2 The proposed review is split into the following stages:-

Stage 1 – Desktop Study

- Perform a desktop study of the information available on the structure and the proposed scheme to adaptively re-use the building. RBG have received what we believe to be a full set of structural, architectural and services drawings for the building.

Stage 2 – Structural Materials Condition Audit

- A condition audit of the structural materials of all structural elements and fixings will be conducted.
- RBG will prepare a scope for materials testing by a specialist material testing consultant. The purpose of this testing will be to gain an understanding of the condition of the concrete and steel elements and foundation fixings of the existing structure, particularly with regards to the effect of chloride levels and corrosion risk to reinforcement.

Stage 3 – Present Structural Capacity Assessment

- An assessment of the structural adequacy of the existing structure for current design loads, (vertical and lateral), will be conducted.
- This assessment will account for the results of the materials conditions audit; stage 2.
- This assessment will also set a baseline design level for which RBG can assess and recommend future development opportunities.

Stage 4 – Wind Load Assessment

- Determine of the structural response to wind loads based on a wind engineering desktop study. We propose a Wind Engineering Specialist Consultant is engaged to provide the required information to complete this. The aim of the wind engineering desktop study is to identify the tower acceleration levels at the 'top deck' to understand the effects of this to the tower under potential re-use schemes.

Stage 5 – Potential Structural Options

- Development of a 'top deck' floor usage matrix will be tabled which will identify various potential new 'top deck' floor functions. RBG will include assessments of what can be achieved with minimal alterations and what would be possible and feasible with structural alterations.
- These proposals will account for the results obtained from the previous stages.

1.3 This report presents the results of Stage 1 of the review as outlined above.

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2. Brief History of the Structure

2.1 The Sydney Ports Harbour Control tower sits at the north eastern end of the Barangaroo Headland Park development site between Merriman Street and Darling Harbour. The control tower began functioning as the Sydney Ports operation centre in 1974. The tower is no longer in use with the port operations facilities having been moved to Port Botany.

2.2 The control tower is a cylindrical concrete walled structure in the form of a tube and is topped with a steel framed façade and roof system. There are 3 floor levels at the upper most portion of the tower providing facilities for the functioning of the operations centre. These levels include;

- The Amenities level; Housing the lunch room, locker rooms, toilets, showers etc
- The Equipment level: Housing Plant Facilities
- The Control level; Housing facilities for Harbour control
- Roof top platform

2.3 The tower has a single lift and stair access from ground level to the amenities level and control room respectively.

3. Existing Structure

3.1 A review of the existing drawings notes that the architectural design was completed by Edwards, Madigan, Torzillo and Briggs Architects and the structural design was completed by P.O Miller, Milston and Ferris Consulting Engineers. Extracts of the drawing sets are provided in Appendix A and B respectively for reference.

3.2 The main vertical structure consists of a reinforced concrete tube having an outer diameter of 16 ft (4.9m) utilising 1ft (300mm) thk walls. This tubular structure extends from ground level to approximately 254ft high (77.5m). Refer Appendix A4 for typical details. This main tube sits upon a larger diameter, 20 ft, (6m) reinforced concrete footing system that is anchored to the rock foundations using MacAlloy Bars. Refer Appendix B2 for typical details.

3.3 The 3 floor levels are located at 227 ft(69m), 240ft(73m) and 254ft high (77.5m) respectively. These floors cantilever from the main structural walls and are cylindrical in plan. The outer diameter of these floors is approximately 33 ft (10.1m); thus the floors typically cantilever approximately 8.5ft (2.6m). Refer Appendix A3 for typical details. The floors are 1ft thk (300mm) reinforced concrete slabs. The amenities level consists of a reinforced concrete slab with the addition of radial steel encased concrete beams and secondary ring beams. Refer Appendix B4 for typical details.

3.4 Each of the 3 floor levels have a documented design live load capacity of 80 psf (3.8kPa). In addition to this the amenities level appears to have a documented “alternate” design live load capacity of 350psf (16.5kPa). This was probably designed as such to prop the upper 2 reinforced concrete levels during construction. Refer Appendix B3 for typical details.

3.5 The amenities level and equipment levels have perimeter wall girt framing that support stainless steel cladding that is continuous from the amenities level to the control level. Refer Appendix A6 for typical details.

3.6 On top of the control level sits a steel framed structure that provides for the window framing, roof framing and subsequent support for the roof and stainless steel cladding. The main elements of the roof are 8 similar half span trusses that are connected to a central point (central to the cylinder) and extend outwards in a radial pattern to the perimeter. This, in effect, creates 4 similar trusses with an overall length of approximately 50ft (15.25m). The support framing to these roof trusses extends to and through the control level, the equipment level and appears to be ultimately supported on the amenities level. Refer Appendix A7 and B6 for typical details.

4. Dynamic performance

4.1 The dynamic performance of the Tower has previously been studied on at least 2 separate occasions. The following sub-sections explain these studies;

4.1.1 In 1994 a paper was published entitled “The Wind-Induced Dynamic Response Of An 84 M High Control Tower”. This was prepared as part of an Engineering master’s thesis by Roy O. Denoon.[1]

The abstract from the report is as follows;

An 84 m high concrete control tower of circular cross-section was instrumented to measure its dynamic response to wind loadings. Reliable full-scale data on this type of structure is very sparse and this thesis details both the instrumentation and the results obtained. The data is then used as a basis for comparison with predictions using current design methods.

The tower is located close to the central business district of Sydney and experiences very different upwind terrain types depending on the wind direction. This was found to have little effect on the tower response in the range of wind speeds encountered. Neither was there any firm evidence of the vortex shedding peak of response normally associated with circular cylindrical type structures.

The accelerations experienced in the tower under strong wind conditions were found to be unacceptable with reference to the latest human comfort acceptability criteria. Indeed, there is anecdotal evidence of employee absence due to motion in strong winds. The predictive methods used to estimate the tower's wind-induced dynamic response were AS1170.2-1989, Vickery (1992) and ESDU 85039. These were found in most cases to provide a conservative prediction for design purposes.

4.1.2 In September 2000 a paper was published entitled “Field Experiments to Investigate Occupant Perception and Tolerance of Wind-Induced Building Motion Research Report No R803” by Roy O. Denoon BEng ME(Res), Richard D. Roberts BA PhD, Christopher W. Letchford[2] BE DPhil, Kenny C.S. Kwok BE PhD. [2]

This report studied 3 towers, Brisbane and Sydney Airport Control Towers and the Sydney Ports Control Tower (POCC). The abstract from the report is as follows;

Field measurements were conducted at three control towers to determine occupant reaction to wind-induced building motion. The towers used were Brisbane Airport Control Tower, Sydney Airport Control Tower and the Port Operations & Communications Centre in Sydney. Occupants at Brisbane and Sydney Airport Control Towers were provided with push-buttons on which they could register motion perception and/or tolerance. Surveys were conducted with occupants in Sydney Airport Control Tower and the Port Operations & Communications Centre.

Motion perception was found to be dependent on peak accelerations. It was found that the factors affecting motion tolerance are: magnitude of motion leading to fear and alarm; and the frequency of occurrence of perceptible motion. Education and habituation was found to increase tolerance of wind-induced motion.

Additionally the study reported the following;

The thresholds of perception of wind-induced motion at the POCC are slightly higher than those found at Brisbane and Sydney Airport Control Towers. This is consistent with the lower natural frequency at the POCC and the findings of numerous researchers in human response to vibration who have shown frequency dependence in perception thresholds.

4.2 RBG have conducted a preliminary dynamic analysis of the Control Tower and have established that the first mode natural frequency to be 0.40Hz. This concurs with the figure established by Denoon, being 0.39Hz. These previous studies suggest that in high wind conditions the structure responds in such a way that presents unfavourable conditions to human comfort. The effects of this and how this could be mitigated to allow adaptive reuse will be studied as part of the future stages.

5. Constraints to Adaptive Re-use

5.1 Possible adaptive re-use schemes include;

5.1.1 Schemes that fit within the current structural limits of the tower to accommodate the imposed loads and do not require the tower to be structurally modified, and

5.1.2 schemes that do not fit within the current structural limits of the tower to accommodate the imposed loads and hence require the tower to be structurally modified.

5.2 Schemes that do not impose loads to the tower that are greater than the present design loads could be accommodated relatively easily. This would include schemes that are similar in size, shape, and mass to the present structure. Further structural analysis of the tower would identify the "spare" capacity of the tower (if any), and define the maximum structural capacity of the tower that would ultimately determine the maximum limits of size, shape, location, mass of adaptive re-use schemes. These schemes could include minor structural modifications to suit the design and function of the scheme.

5.3 Alternatively schemes that do not fit within the current structural limits of the tower to accommodate the imposed loads would require the tower to be structural modified in some manner.

5.4 Various constraints to the adaptive re-use schemes are:

5.4.1 Current Structural Condition:

The current condition of the structure to accommodate the imposed loads needs to be assessed. Future stages of the assessment will identify the condition of all the structural materials, required fixings, connections and details.

This assessment will determine what, if anything needs to be completed for the structure to perform its intended re-use function.

The below assessments of vertical and lateral load carrying capacity are based on the present structural condition to be sound and that the tower can perform its intended function as per the original design criteria.

It is to be stressed that the building was built in the early 1970's and thus it is nearing the end of it probable design life. The actual design life of the building is as yet unknown.

5.4.2 Adapting the Tower to Present Day Codes of Practice Requirements:

The above examples are based on estimating the imposed loads to the structure to fit within the current design limits of the tower and do not reflect what could be achieved by determining the maximum capacity of the structure. This could be achieved by further structural analysis of the tower. In general however, there appears to be large flexibility with possible adaptive re-use schemes with respect to accommodating lateral and vertical loads.

5.4.5 Inertial Load Carrying Capacity:

The likely governing lateral force would be from the effects due to wind however the effects of both wind and earthquake actions will need to be assessed. Adaptive re-use schemes that add additional area and mass, especially at the top of the structure, will increases its adaptive re-use load carrying requirements. The previous example however identifies that a significant amount of structure would need to be added to exceed the current mass at the top floor and thus create adverse effects.

The reduction of mass however may have a negative effect on the already unfavourable dynamic performance of the structure; refer below.

5.4.6 Lateral Dynamic Performance

Previous studies have suggested that in high wind conditions the structure responds in such a way that presents unfavourable conditions to human comfort. The mitigation of these effects are likely to be expensive. The possibilities to mitigate these effects include installing active or passive dampening to the structure, i.e. adding a tuned mass damper or the addition of extra mass.

The reduction of mass in an adaptive re-use scheme may have a negative effect on the dynamic performance of the structure. There is anecdotal evidence that extra mass has been added to the top floor slab during construction to “dampen” the structure and improve its dynamic performance. It is not know if this is the case or additionally, if it is, how effective this procedure has been.

Consideration must be given to the very nature of the proposal and the users of such. The previous studies suggest that the tower has a poor dynamic performance and that education and habituation serve to increase the tolerance. These options will not be practicable and designers and end users will need to be cognisant of the possibilities that the structure may cause discomfort.

5.4.7 Safety in Design

The consideration of safety in the design process is paramount. Safety concerns must be addresses during design, construction, and the life of the building in its intended use including maintenance.

5.4.7.1 Some aspects of safety for consideration include:

- Protection of the public from falling objects
- Recognising that it could be a potential site for self harm
- Recognising the poor dynamic performance and preparing for potential user discomfort and illness
- Provision of safety barriers
- Safety whilst on the tower with respect to environmental conditions
- Establishing means of egress in an emergency
- Provision of safety and maintenance equipment

5.4.8 Constructability

The constraints of the construction of an adaptive re-use scheme need to be considered.

5.4.8.1 Some examples of these constraints include;

To adequately certify an adaptive re-use scheme the whole structure will need to be assessed and brought in line with present day codes of practice and standards. The assessment of the current condition and the required codes of practice will determine what, if anything needs to be completed to achieve this.

Some example of these standards and code of practice that would need to be assessed include;

5.4.2.1 Standards / Codes

- AS 117Structural Design Actions
  - Part 0 - General Principles
  - Part 1 - Permanent, Imposed and other actions
  - Part 2 - Wind actions
  - Part 3 - Snow & Ice actions
  - Part 4 - Earthquake actions in Australia
- AS 1657 Fixed Platforms, Walkways, Stairs and Ladders - Design, construction and installation
- AS 360Concrete Structures
- AS 370Masonry Structures
- AS 410Steel Structures
- AS 460Cold-formed Steel Structures

5.4.2.2 The Building Code of Australia

5.4.3 Vertical Load Carrying Capacity:

Noting the above constraints, the current preliminary assessment has identified that this would not present itself as a significant concern.

The present structure accommodates 3 floors cantilevering approximately 2.6m from the tower walls. The top floor is continuous over the walls and has an area of approximately 80m$^{2.}$ Refer Appendix B4 for details.

A “top-floor” only adaptive re-use scheme (that requires the removal of the lower 2 floors) could double the present floor area to 160m^2 and fit within the current vertical load carrying capacity. This in effect would result in a top-floor diameter of approximately 14.5m (increased from the current 10.1m)

A preliminary estimate of the maximum area that could be adopted is 190m^2, i.e. a top-floor diameter of approximately 15.5m.

These examples mimic the current plan profile of the tower, i.e circular, as a comparison only and do not preclude options that propose other profiles, i.e. square.

5.4.4 Lateral Load Carrying Capacity:

The current projected area, above the top floor, exposed to wind, (the likely governing lateral force) is approximately 72m^2.

Adopting the above example, if the “top-floor” area were to increase to 160m^2, i.e., allowing a 14.5m top-floor diameter, then the current design could accommodate a 5m high wall/roof structure. If this were to be the case however the vertical loads of this structure would need to be reassessed.

Additionally, the current design has an additional projected area below the top-deck of 80m^2 that captures wind loads. A preliminary estimate of the maximum area that could be adopted is therefore 152m^2. Using the above example again, could result in a 14.5m top-floor diameter design accommodating a 5m high wall above an below the top deck.

The above examples are based on estimating the imposed loads to the structure to fit within the current design limits of the tower and do not reflect what could be achieved by determining the maximum capacity of the structure. This could be achieved by further structural analysis of the tower. In general however, there appears to be large flexibility with possible adaptive re-use schemes with respect to accommodating lateral and vertical loads.

5.4.5 Inertial Load Carrying Capacity:

The likely governing lateral force would be from the effects due to wind however the effects of both wind and earthquake actions will need to be assessed. Adaptive re-use schemes that add additional area and mass, especially at the top of the structure, will increases its adaptive re-use load carrying requirements. The previous example however identifies that a significant amount of structure would need to be added to exceed the current mass at the top floor and thus create adverse effects.

The reduction of mass however may have a negative effect on the already unfavourable dynamic performance of the structure; refer below.

5.4.6 Lateral Dynamic Performance

Previous studies have suggested that in high wind conditions the structure responds in such a way that presents unfavourable conditions to human comfort. The mitigation of these effects are likely to be expensive. The possibilities to mitigate these effects include installing active or passive dampening to the structure, i.e. adding a tuned mass damper or the addition of extra mass.

The reduction of mass in an adaptive re-use scheme may have a negative effect on the dynamic performance of the structure. There is anecdotal evidence that extra mass has been added to the top floor slab during construction to “dampen” the structure and improve its dynamic performance. It is not know if this is the case or additionally, if it is, how effective this procedure has been.

Consideration must be given to the very nature of the proposal and the users of such. The previous studies suggest that the tower has a poor dynamic performance and that education and habituation serve to increase the tolerance. These options will not be practicable and designers and end users will need to be cognisant of the possibilities that the structure may cause discomfort.

5.4.7 Safety in Design

The consideration of safety in the design process is paramount. Safety concerns must be addresses during design, construction, and the life of the building in its intended use including maintenance.

5.4.7.1 Some aspects of safety for consideration include:

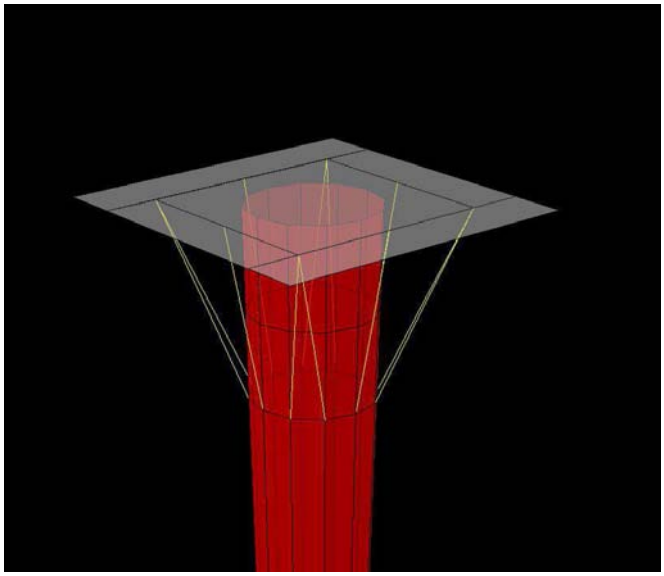
- Protection of the public from falling objects
- Recognising that it could be a potential site for self harm
- Recognising the poor dynamic performance and preparing for potential user discomfort and illness
- Provision of safety barriers
- Safety whilst on the tower with respect to environmental conditions
- Establishing means of egress in an emergency
- Provision of safety and maintenance equipment

5.4.8 Constructability

The constraints of the construction of an adaptive re-use scheme need to be considered.

5.4.8.1 Some examples of these constraints include;

- Site Access: Methods of entry and egress
- Working at Heights
- Crane positioning
- Dynamic stability during construction
- Suitable Working Platform: The amenities level could be adopted to accommodate props to support the construction of a “top-floor” scheme. A method such as this could also be adopted as permanent prop to an adaptive re-use scheme. Refer below.



Propping from amenities level to “top-floor” example

5.4.9 Maintenance

A maintenance program would need to be established to ensure the tower is maintained fit for purpose during its intended design life

6. Recommendations

It is recommended that the additional works, as outlined in stages 2 to 5, be completed. This work will enable a full assessment of the present condition of the structure and also, importantly, determine exactly what can and cannot be achieved for adaptive re-use schemes.

7. Reference

1. “The Wind-Induced Dynamic Response Of An 84 M High Control Tower”. This was prepared as part of an Engineering master’s thesis by Roy O. Denoon.

2. Field Experiments to Investigate Occupant Perception and Tolerance of Wind-Induced Building Motion Research Report No R803” by Roy O. Denoon BEng ME(Res), Richard D. Roberts BA PhD, Christopher W. Letchford² BE DPhil, Kenny C.S. Kwok BE PhD

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Appendix A
Selected Architectural Drawings

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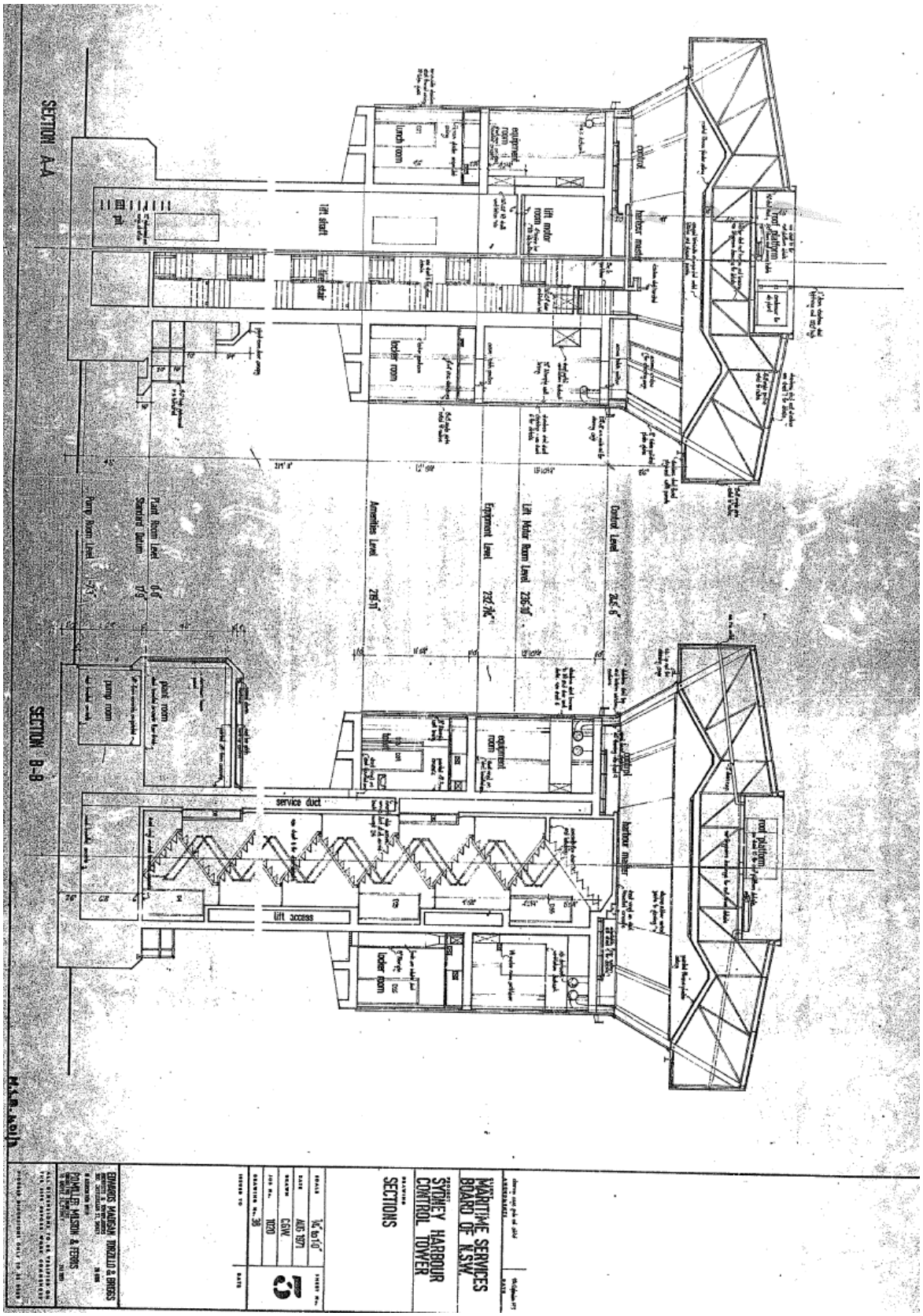

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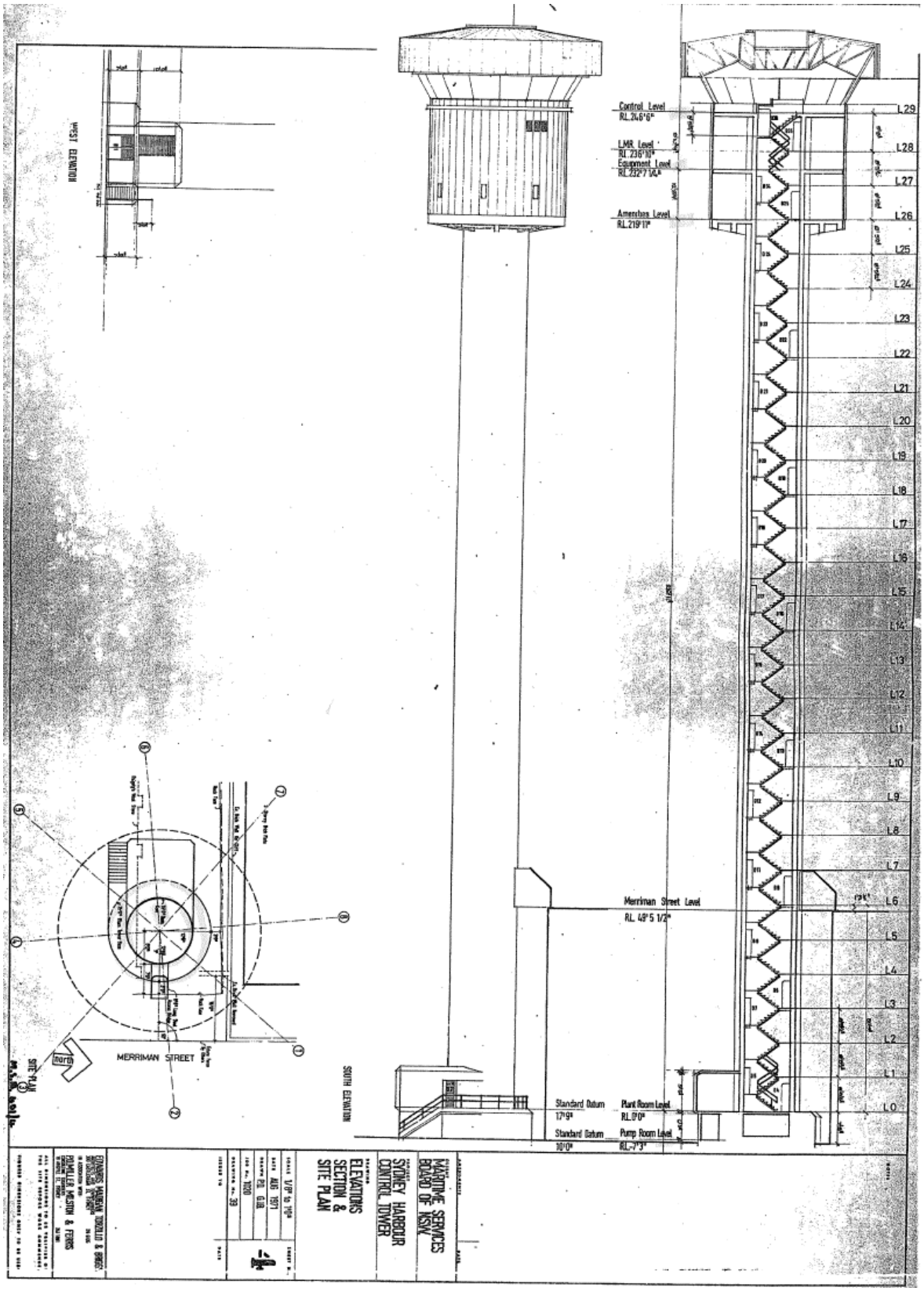

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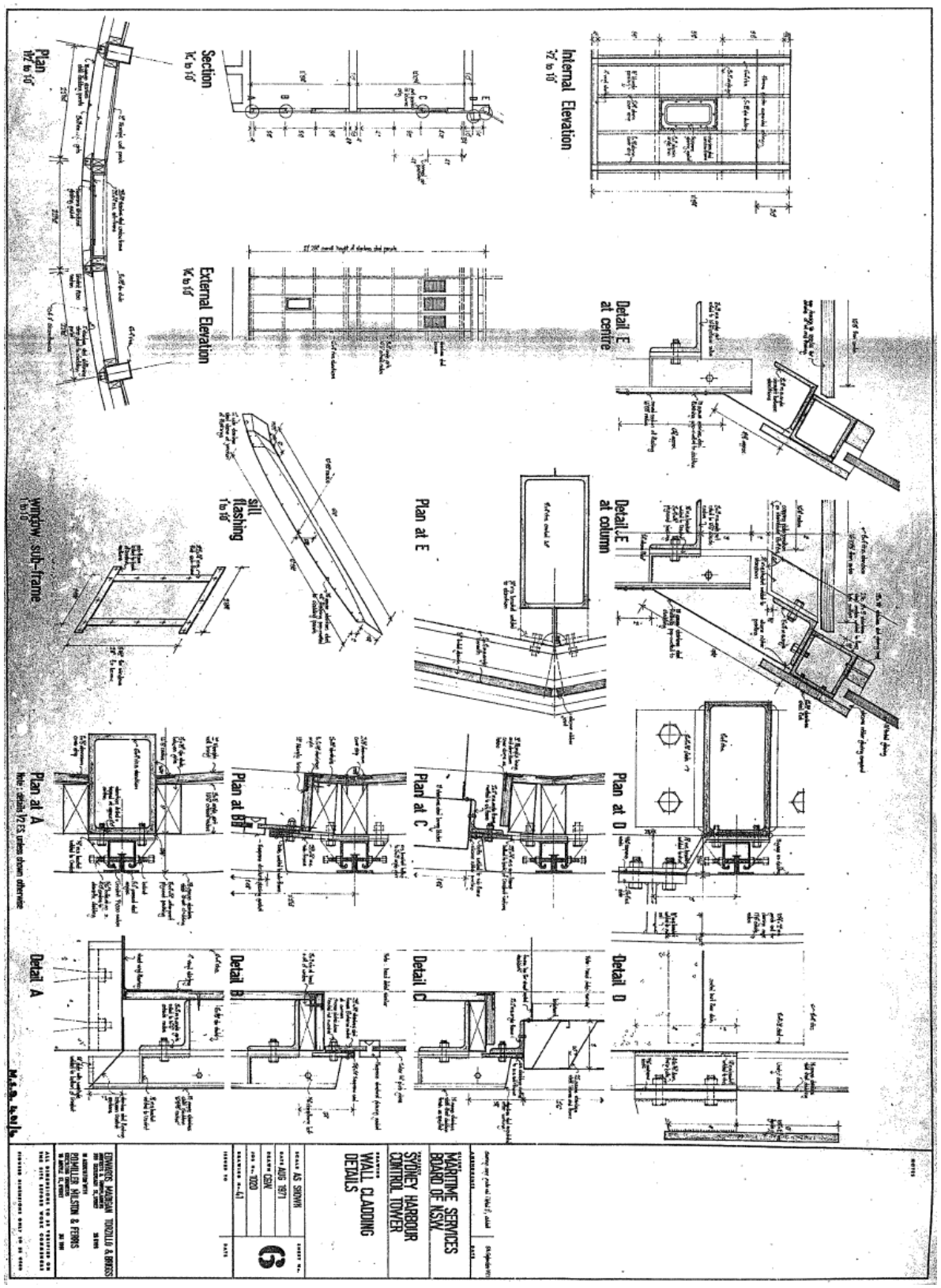

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Issue: A

Project No. 12831
21st December 2012

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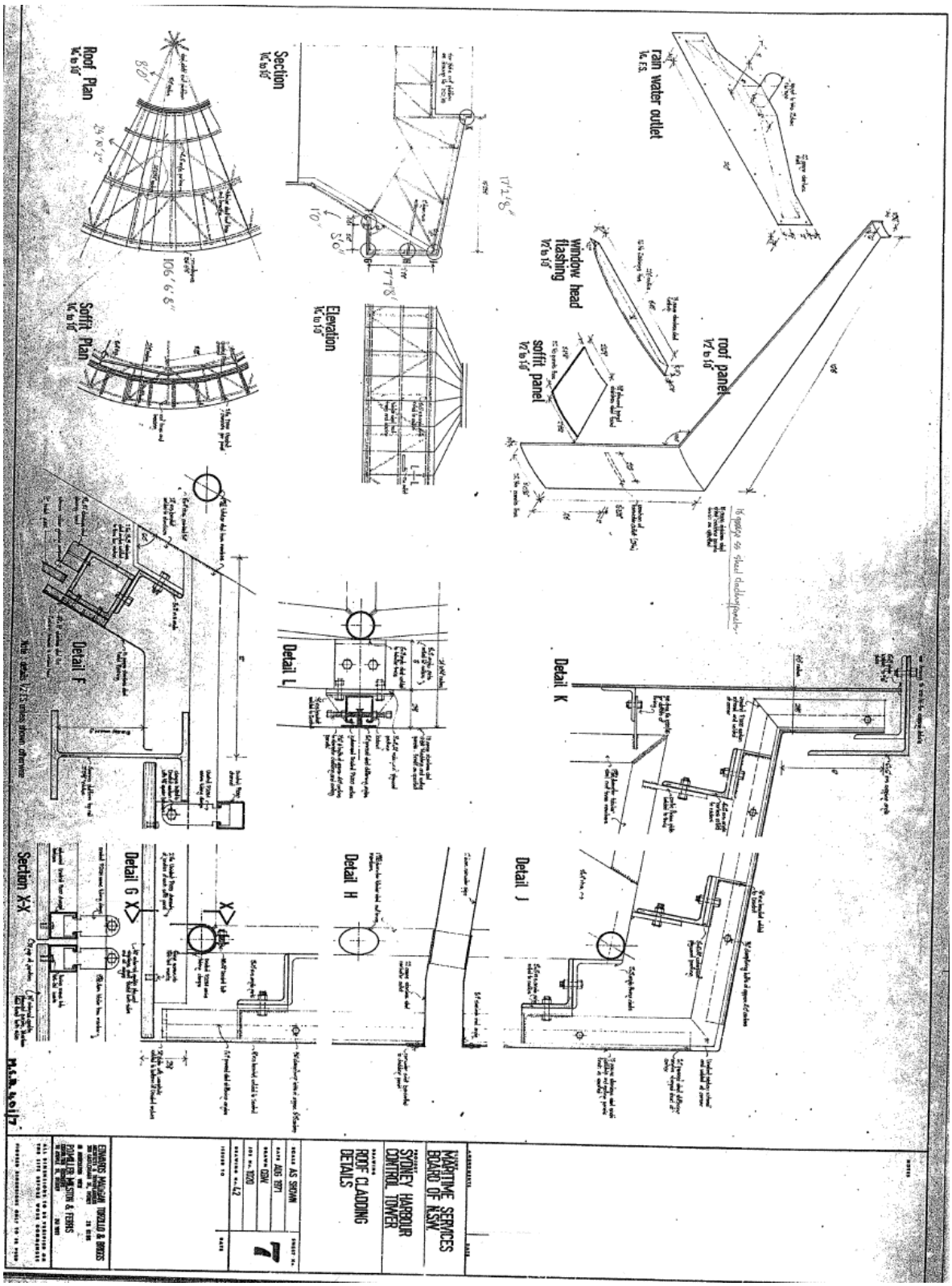

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Appendix B
Selected Structural Drawings

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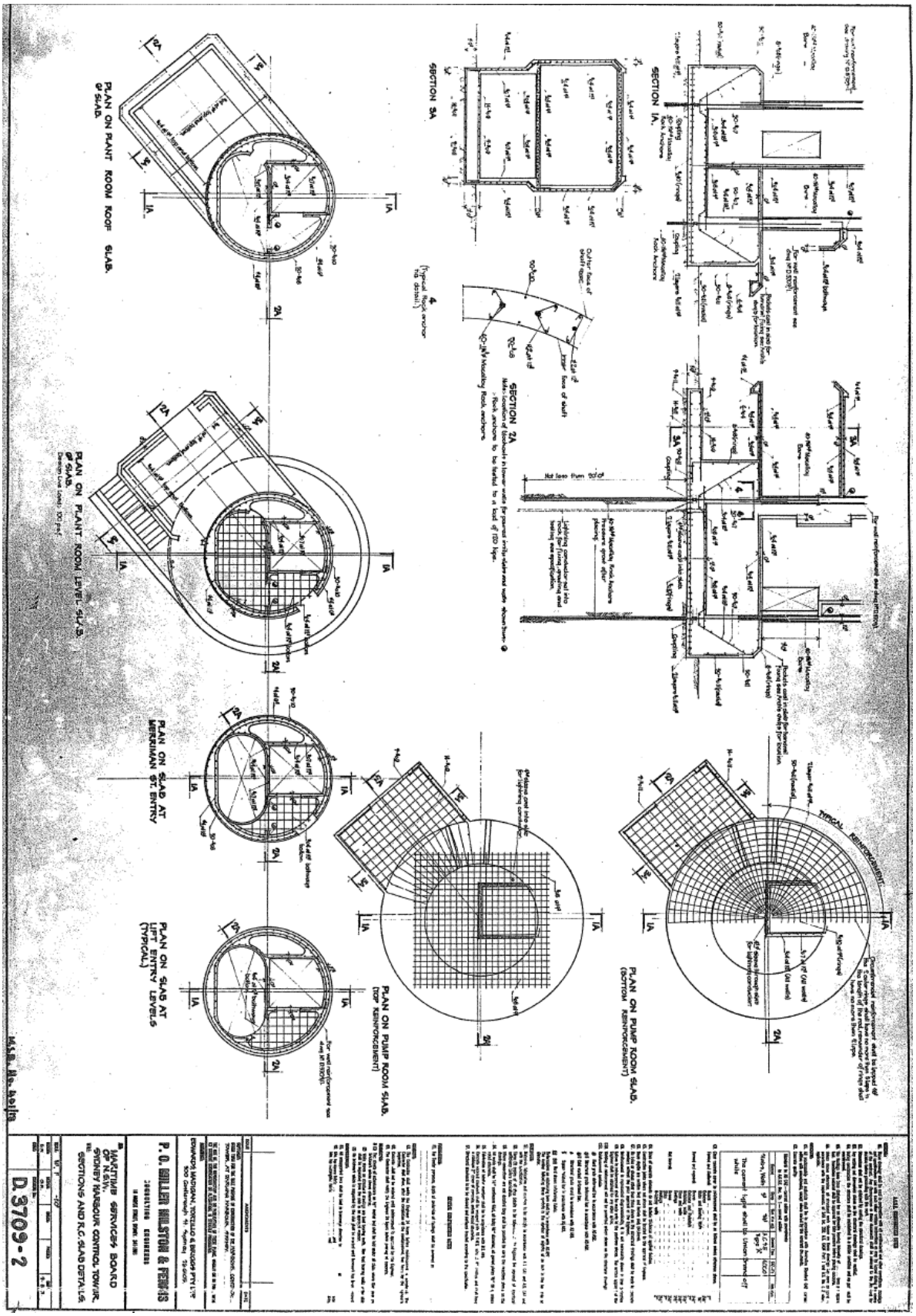

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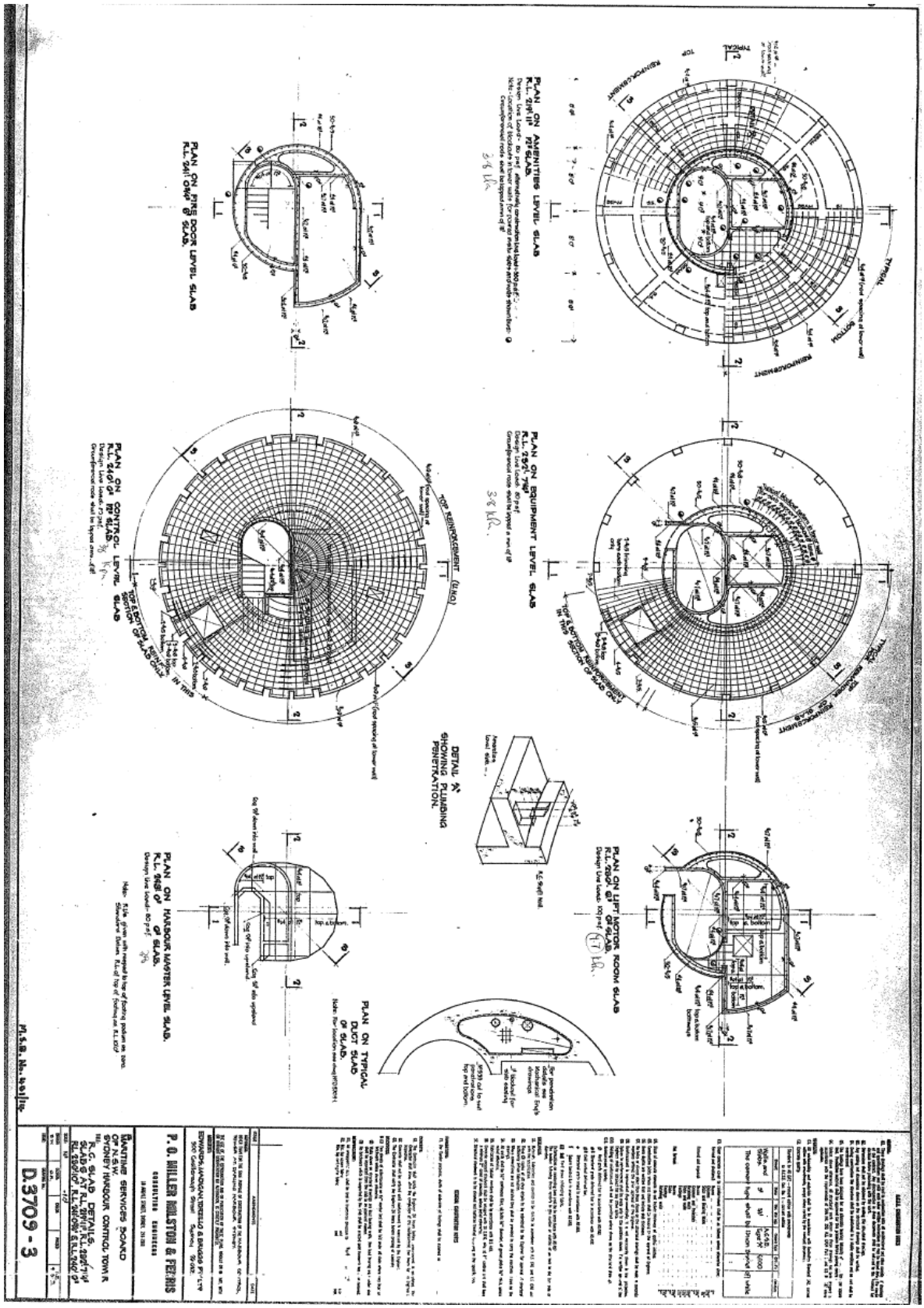

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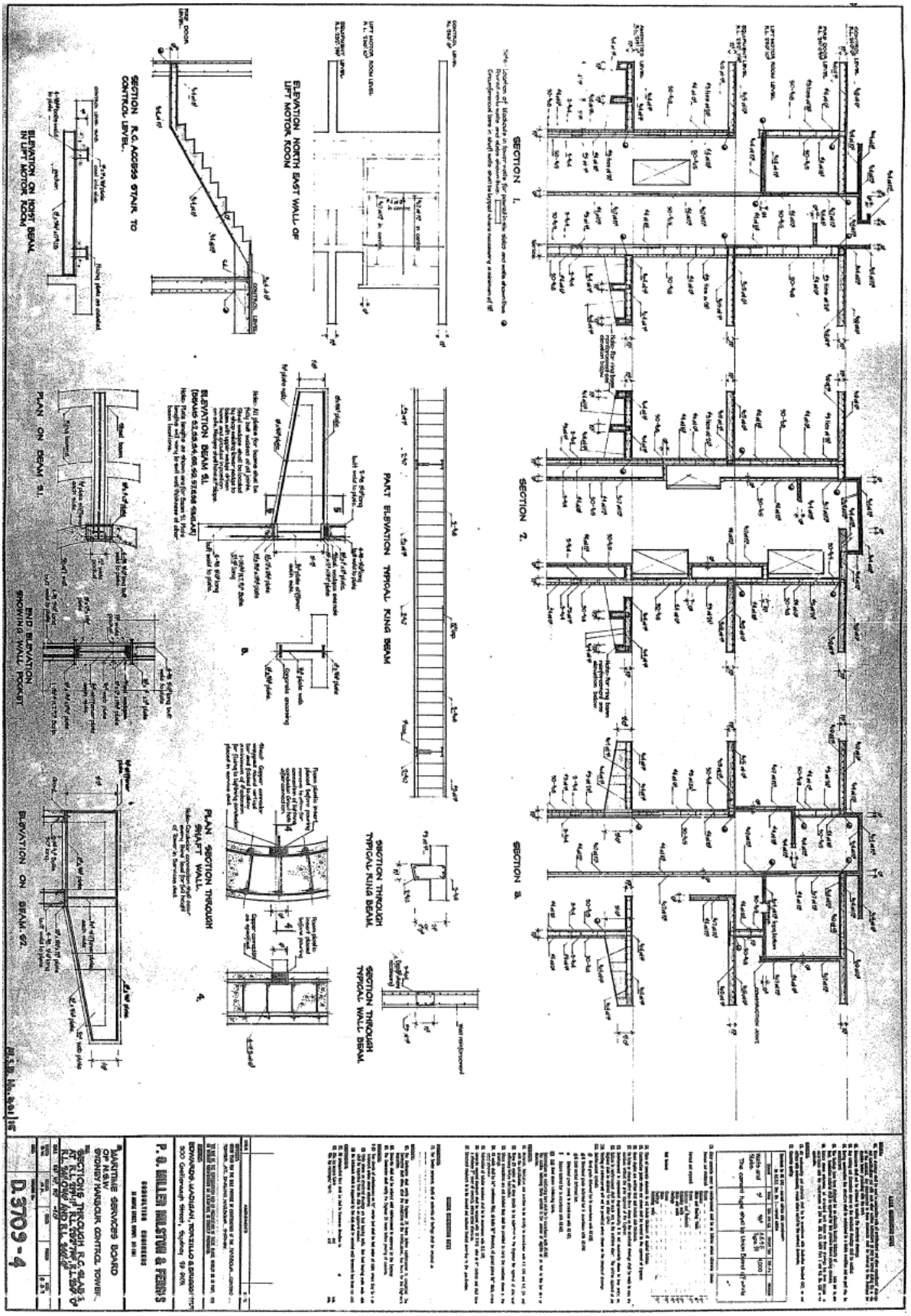

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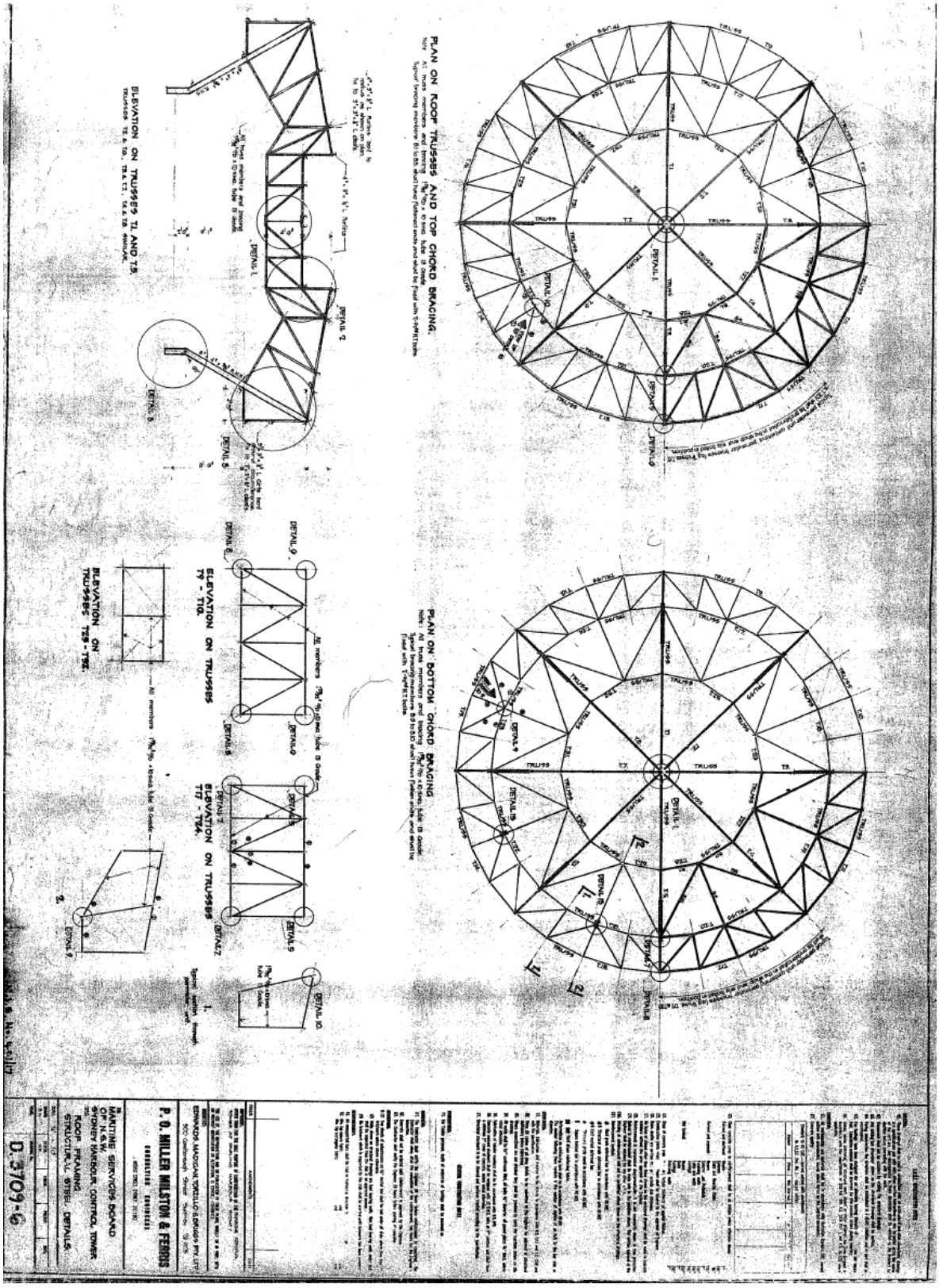

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