



**SYDNEY AIR
TRAFFIC CONTROL
TOWER NO. 5**

HERITAGE
MANAGEMENT PLAN
AA-PLAN-ENV-0014

September 2020

prepared for



prepared by

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Cover image:

View of Sydney ATC tower no. 5 from ground level looking
north-west (2016)

SYDNEY AIR TRAFFIC CONTROL TOWER NO. 5
Sydney Airport, General Holmes Drive, Kyeemagh

HERITAGE MANAGEMENT PLAN

Prepared for
Airservices Australia

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EXECUTIVE SUMMARY

This Heritage Management Plan (HMP) for Sydney Air Traffic Control (ATC) tower no. 5 at Sydney Airport was commissioned by Airservices Australia, which owns the building and leases the land on which it is located. Sydney ATC tower no. 5 is included in the Commonwealth Heritage List (CHL ID: 106116), which is established under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This HMP has been prepared in accordance with Schedule 7A of the *Commonwealth Environment Protection Biodiversity Conservation Regulations, 2000*: ‘Management Plans for Commonwealth Heritage Places’. The overarching objective of Schedule 7A of the EPBC Act is to provide frameworks to inform the future conservation and management of the cultural heritage values of places included in the Commonwealth and National heritage lists. This document also follows the principles and processes set out in best practice guidelines, including the *Burra Charter* (2013).

Overview of the asset

Sydney ATC tower no. 5 was designed in 1993, built in 1994-95 and commissioned on 6 January 1996. It comprises a cable-stayed concrete shaft to which an external lift is attached by steel fly braces. The amenities and equipment level cantilevers from the top of the shaft, and is carried on a steel platform which resembles a cloverleaf in plan. The circular control cabin is above the amenities and equipment level. The cabin floor is 38.5 metres above ground level; 42.85 metres to the cabin roof. A spiral escape staircase sweeps around the concrete shaft, and comes to ground to the north-east of the circular single-storey base building. The shaft rises from the approximate centre of the single-storey, circular base building which accommodates services, office space and amenities. The building is largely intact as built, including equipment and fittings. The Airservices Australia compound is located in the south-east sector of Sydney Airport, close to General Holmes Drive (M1). It has unimpeded lines of sight over the apron and runways at the airport.

The Airservices Australia compound at Sydney Airport is owned by the Commonwealth Government, through Sydney Airport Corporation Ltd (SACL). Airservices’ 40-year lease expires in 2033. The ATC tower itself is owned by Airservices Australia.

Findings

The assessment of significance undertaken for this HMP has found that Sydney ATC tower no. 5 is of aesthetic (CHL criterion ‘E’) and technical /creative significance (CHL criterion ‘F’) to Australia.

In the context of ATC tower design in Australia, Sydney ATC tower no.5 is an anomaly. As compared to earlier post-World War II ATC tower typologies, which typically prioritised function over form, Sydney no.5 was consciously designed as a landmark. The external expression of the tower was a creative interpretation of the standard brief for control towers, adapting conventional control tower forms to explore the potential presented by its prominent site, next to the M1.

Sydney ATC tower no.5 is an assured and resolved design by a prominent award-winning architect, Ken Woolley of Ancher, Mortlock & Woolley Pty Ltd. Its predecessors in the Australian context were either utilitarian structures based on standardised models (1950s-1980s), or tall but comparatively restrained forms comprised of slender concrete columns surmounted by amenities/services with cabins above (late-1960s to present). Australian towers built subsequent to Sydney ATC tower no. 5 have been variations on the column-and-pod model. A number of ATC towers built overseas since the mid-1990s have been designed as landmarks. In this sense, Sydney ATC tower no. 5 is an early example of an international trend.

Sydney ATC tower no.5 is a well-known local landmark. It is a tall building in a low-lying landscape. It also has eye-catching design attributes, including the external spiral staircase that wraps around the shaft and the clover-leaf plan of the services level – respectively these features have been referred to colloquially as the ‘slide’ and the ‘beer cans’.

Sydney ATC tower no.5 embodies a number of new ideas, both architectural and technical. It is the only cable-stayed control tower in Australia, and one of few internationally. The cabin roof, carried on a single central column, was another Australian ‘first’ – the central column avoids interruption to sightlines by external columns. It was the first Australian tower with a circular cabin, and first to be fitted with a peripheral console, an established format internationally and the preferred future form in Australia. Sydney 5 was also the first tower in Australia to employ computer screen-based technology for its control consoles, derived from the ‘fly-by-wire’ concept used in modern aircraft. The touch-screen consoles give controllers ready access to radar, communication and meteorological data displays. It is the formal appearance of Sydney ATC tower no. 5, however, that is of greatest interest from a heritage perspective.

Recommendations

The core recommendations of this HMP are summarised below.

Conservation

Conservation objectives for Sydney ATC tower no.5 include:

- Maintaining the external presentation of the control tower including: the cable-stayed concrete shaft; the steel-framed external lift which is attached to the shaft by fly braces; the spiral staircase; the amenities and equipment level, which cantilevers from the top of the shaft and is carried on a steel platform which resembles a cloverleaf in plan; and the circular control cabin, with canted windows.
- Maintaining the internal components that distinguish Sydney ATC tower no. 5, including the column that supports the cabin roof.
- Maintaining views of the tower from the public realm, including the M1 (General Holmes Drive) and within the airport complex.

Management

- Airservices should comply with all applicable legislation in the management of the ATC tower's Commonwealth heritage values, including the EPBC Act and the Airports Act 1996.
- In the event that Sydney Airport were to be sold by the Commonwealth, Sydney ATC tower no. 5 should be nominated for inclusion in the NSW State Heritage Register.
- Programs of priority maintenance, remedial works and cyclical maintenance should continue to form the basis for on-going care of the significant building fabric at Sydney ATC tower no. 5.
- A training program should be instigated to raise awareness of the heritage significance of Sydney ATC tower no.5 among Airservices Australia and SACL staff.
- In the event of disposal by Airservices Australia it can be anticipated that physical change will be required to support a new use for Sydney ATC tower no. 5. The element with the greatest potential for change without undue impact on the building's CHL values is the base building, which might reasonably be contemplated for extension and/or alteration. Subject to impacts on views of the tower, there may also be potential for the introduction of new development to the east and west of the ATC tower compound.

Table 1 Table of
abbreviation and acronyms

Abbreviation/acronym	Full name/title
ATC	Air traffic control
Airports Act	<i>Airports Act, 1996</i>
Burra Charter	<i>Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013</i>
CAB	Civil Aviation Branch of the Department of Defence
CAHS	Civil Aviation Historical Society
CHL	Commonwealth Heritage List
DCA	Department of Civil Aviation
SACL	Sydney Airport Corporation Ltd
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Australia)
HMP	Heritage Management Plan
ICAO	International Civil Aviation Organisation
NCC	National Construction Code
RNE	Register of the National Estate
VHF	Very High Frequency

1.0 INTRODUCTION

This Heritage Management Plan (HMP) has been prepared for Airservices Australia. It addresses the Air Traffic Control (ATC) tower at Sydney Airport (Sydney no. 5), located on General Holmes Drive, Kyeemagh, New South Wales. The ATC tower is owned by Airservices Australia, and is located on land leased from the Sydney Airport Corporation Limited (SACL). Sydney Airport is Commonwealth-owned land. The ATC tower is included in the Commonwealth Heritage List (CHL) as Place ID: 106116. It was gazetted by the Commonwealth Environment Minister for inclusion in the CHL on 24 November 2015, and satisfies Commonwealth Heritage list criterion 'F- Technical Achievement'.

This HMP has been prepared in accordance with Airservices' *Heritage Strategy 2018-2020*. The Strategy provides a framework for Airservices to meet its obligations under the *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The EPBC Act establishes the CHL, a list of places with heritage values which are managed or owned by the Australian Government and affords them statutory protection.

Over the years, Sydney Airport has been known by a number of names, including Mascot Aerodrome, Sydney-Mascot and Kingsford Smith Airport. It is generally referred to here as Sydney Airport. Sydney ATC tower no. 5 is identified as Building 496 by SACL.

1.1 Background and brief

This report follows a heritage assessment of ATC towers throughout Australia undertaken by Lovell Chen for Airservices Australia in 2007 (Stage 1) and 2009 (Stage 2). Stage 1 comprised a desktop review of the 28 control towers either owned or leased by Airservices Australia to determine whether any of the towers had potential heritage values, and the nature, extent and level of those values (local, state/territory, Commonwealth and/or national). Of the towers assessed, 13 were identified as having heritage values of a nature and level indicative of Commonwealth Heritage Value. Further detailed assessment of the 13 ATC towers was undertaken as Stage 2 of the project. The Detailed Heritage Assessment for the Sydney ATC tower no. 5 concluded that the tower met the CHL criteria at a level that is indicative of Commonwealth heritage value in relation to demonstrating creative or technical achievement (criterion f). The Sydney ATC tower no. 5 was included in the CHL in January 2016.

The primary objectives of this HMP are to:

- Establish the cultural heritage significance of Sydney ATC tower no. 5
- Provide appropriate policies for the conservation of the building and site as a whole, taking into account both the care of significant fabric, the appropriate management of hazardous materials and the ongoing use and management of Sydney ATC tower no. 5
- Provide a framework to inform future management of the place, including guidance on new works and development

1.2 Identification of the place

Sydney (Kingsford Smith) Airport is located approximately 8km south of Sydney's central activities district. It is the busiest capital city airport in Australia. In 2017, the airport handled a total of 348,056 air movements.¹

The Sydney ATC tower no. 5 is located on the north side of General Holmes Drive, east of the north-south runway at Sydney Airport (Figure 1).

The airport, which covers an area of 907ha, is located close to residential areas. It is subject to a curfew that restricts movements between 11pm and 6am.

Figure 1 Location plan of Sydney Airport with the ATC tower no. 5 indicated.

Source www.street-directory.com.au



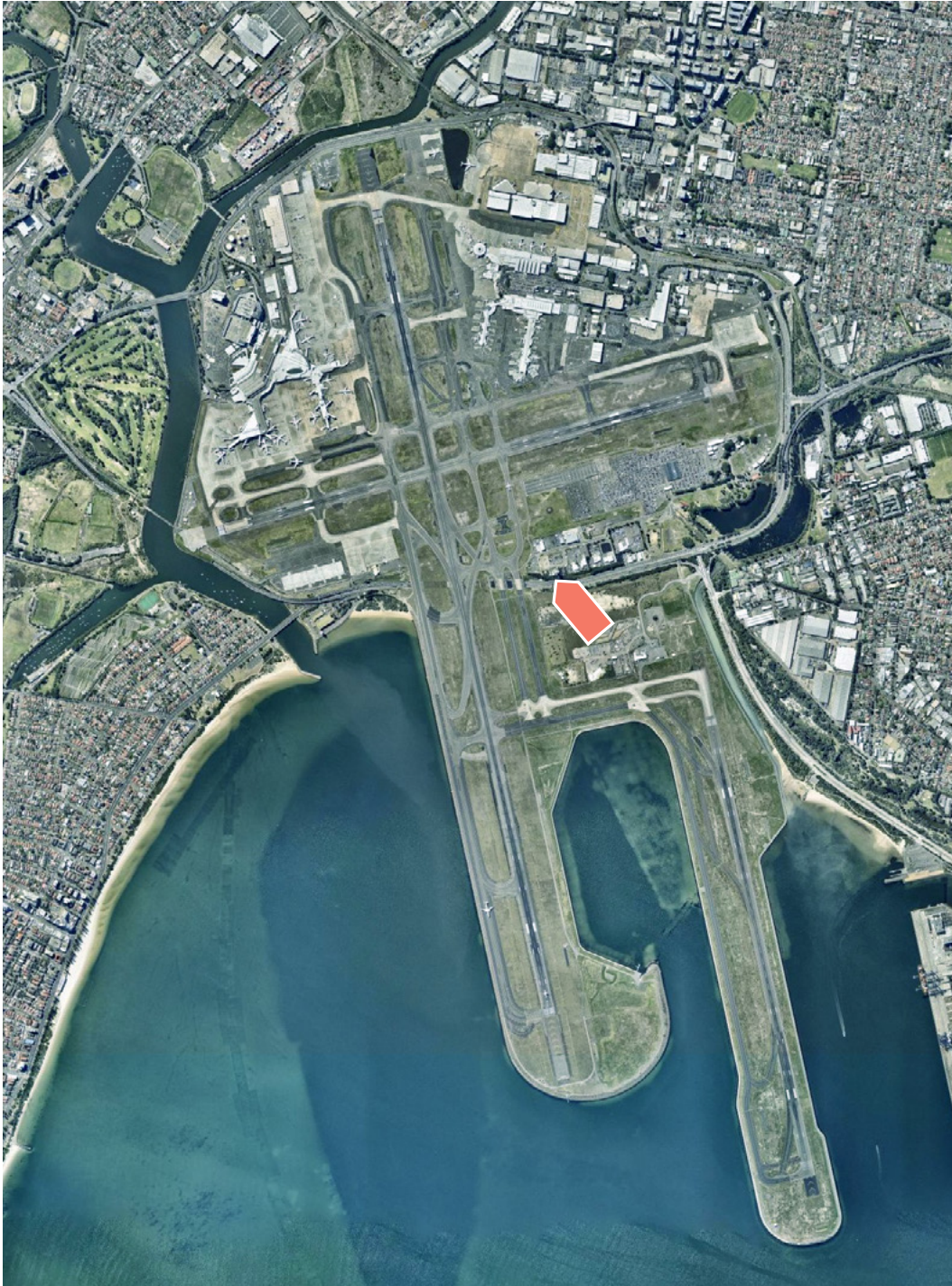


Figure 2 Aerial view of Sydney Airport with the location of the ATC tower indicated

Source www.nearmap.com, April 2016

Figure 3 Detail view (aerial) of the south-east sector at Sydney Airport: the approx extent of the airtservices lease is indicated

Source www.nearmap.com, April 2016



1.3 Methodology

This HMP broadly follows the principles and processes set out in the *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013* and its Practice Notes. The Australia ICOMOS *Burra Charter, 2013* establishes a standard of practice for those involved in assessing, managing and undertaking works to places of cultural significance.

Specifically, the report has been prepared in accordance with Schedule 7A of the *Commonwealth Environment Protection and Biodiversity Conservation Regulations, 2000*: 'Management Plans for Commonwealth Heritage Places'. As a Commonwealth Heritage place, a Heritage Management Plan must be prepared for Sydney ATC tower that addresses a range of issues identified in the Regulations to the EPBC Act, at Schedules 7A and 7B. The purpose of these issues is to ensure that the place meets the Commonwealth Heritage Management Principles set out in the Regulations.

Table 1 below sets out the EPBC Act Regulation requirements for management plans, and provides comment about how the requirements are satisfied in the present HMP.

EPBC Act Regulations, 2000, Schedule 7a	Relevant section(s) of this HMP
(a) establish objectives for the identification, protection, conservation, presentation and transmission of the Commonwealth Heritage values of the place; and	Objectives to identify and conserve the cultural heritage significance of Sydney ATC tower no. 5 are informed by best practice guides, including the <i>Burra Charter</i> . These objectives are discussed at Section 1.3, and Chapters 5 and 6 of this HMP.
(b) provide a management framework that includes reference to any statutory requirements and agency mechanisms for the protection of the Commonwealth Heritage values of the place; and	Statutory requirements and agency mechanisms for the protection of the Commonwealth Heritage values of Sydney ATC tower no. 5 are identified in Chapter 5, with particular reference to the <i>EPBC Act</i> and the <i>Airports Act, 1996</i> (Airports Act).
(c) provide a comprehensive description of the place, including information about its location, physical features, condition, historical context and current uses; and	A description of Sydney ATC tower no. 5 as it exists is at Chapter 3.
(d) provide a description of the Commonwealth Heritage values and any other heritage values of the place; and	An assessment of significance, including a description of the Sydney ATC tower no. 5's Commonwealth Heritage values, is at Chapter 4.
(e) describe the condition of the Commonwealth Heritage values of the place; and	Condition (built fabric) is addressed at Chapter 3 and Section 5.5 and Section 6.3.
(f) describe the method used to assess the Commonwealth Heritage values of the place; and	The assessment of the Commonwealth Heritage values of Sydney ATC tower no. 5 was based on an understanding of the place (site history, Chapter 2 and physical description, Chapter 3).
(g) describe the current management requirements and goals, including proposals for change and any potential pressures on the Commonwealth Heritage values of the place; and	The operation of the place as a control tower, and issues arising in relation to anticipated change at the place are addressed in Chapter 5 (Section 5.1) and Chapter 6 (Policies 14 and 15).
(h) have policies to manage the Commonwealth Heritage values of a place, and include in those policies, guidance in relation to the following:	A suite of conservation policies and management guidelines have been prepared to manage the identified Commonwealth Heritage values of Sydney ATC tower no. 5 (see Chapter 6).
(h-i) the management and conservation processes to be used;	See 'General policies', Section 6.2.

Table 2 EPBC Act
Regulation requirements for
management plans

EPBC Act Regulations, 2000, Schedule 7a	Relevant section(s) of this HMP
(h-ii) the access and security arrangements, including access to the area for indigenous people to maintain cultural traditions;	See Policy 18, Chapter 6.
(h-iii) the stakeholder and community consultation and liaison arrangements;	See Policy 6, Chapter 6.
(h-iv) the policies and protocols to ensure that indigenous people participate in the management process;	See Policy 6, Chapter 6.
(h-v) the protocols for the management of sensitive information;	See Policy 6, Chapter 6.
(h-vi) the planning and management of works, development, adaptive reuse and property divestment proposals;	See Policies 14, 15 and 17, Chapter 6.
(h-vii) how unforeseen discoveries or disturbance of heritage are to be managed;	See Policy 21, Chapter 6.
(h-viii) how, and under what circumstances, heritage advice is to be obtained;	See Policies 4 and 12, Chapter 6.
(h-ix) how the condition of Commonwealth Heritage values is to be monitored and reported;	See policies 12 and 22, Chapter 6.
(h-x) how records of intervention and maintenance of a heritage places register are kept;	See Policy 16, Chapter 6.
(h-xi) the research, training and resources needed to improve management;	See Policy 19, Chapter 6.
(h-xii) how heritage values are to be interpreted and promoted; and	See Policy 20, Chapter 6.
(i) include an implementation plan; and	Strategies for the implementation of policies are included in Chapter 6.
(j) show how the implementation of policies will be monitored; and	See 'Implementation plan', Section 6.6.
(k) show how the management plan will be reviewed.	See Policy 8, Chapter 6.

1.4 Statutory heritage controls

1.4.1 *Environment Protection and Biodiversity Conservation Act 1999*

Sydney ATC tower no.5 is included in the Australian Heritage Council's Commonwealth Heritage List as a Listed Place (Place ID: 106116), and is identified as having heritage values relating to creative and technical achievement. The citation is included at Appendix A.

The ATC tower is the only element (or area) at Sydney Airport which is included as a 'Listed Place' in the CHL. Sydney (Kingsford Smith) Airport Group is an 'Indicative Place' in the CHL. Indicative Places have not been subject to a formal nomination, and the Department has not prepared all the data necessary for a nomination.

The provisions of the *EPBC Act* provide protection of the Commonwealth Heritage values of all places which are either entirely within a Commonwealth area or are owned or leased by the Commonwealth or a Commonwealth Authority, including but not limited to places which are included in the CHL. Under the *EPBC Act*, actions that have, or are likely to have, a significant impact on a matter of national environmental significance, including Commonwealth Heritage values, require approval from the Australian Government Minister for the Environment (the Minister). The Minister will decide whether assessment and approval is required under the *EPBC Act*².

Heritage places at federally-leased airports are required to comply with both the *EPBC Act* and its regulations, and the *Airports Act 1996* (see discussion at Chapter 5).

Prior to the preparation of this HMP, Airservices fulfilled its obligation to manage and conserve Sydney ATC tower no. 5 by providing a 'User Guide' for the tower to all relevant contractors and staff (see Appendix C). The User Guide was drafted by Airservices, and informed by the outcomes of the Detailed Heritage Assessment prepared by Lovell Chen in 2009 as part of the national assessment of ATC towers. The User Guide provides guidance to contractors and staff about obligations relating to the management of the tower's heritage values and attributes. It was updated following the completion of this HMP.

1.4.2 *Heritage Act 1977*

Sydney ATC tower no. 5 is not included in the NSW State Heritage Register, maintained by the Heritage Council of NSW under the *NSW Heritage Act 1977* (NSW).

1.4.3 *Environmental Planning and Assessment Act, 1979*

Sydney ATC tower no. 5 is not listed by Rockdale Council under the *Environmental Planning and Assessment Act, 1979* (NSW).

1.5 Limitations

1.5.1 Aboriginal cultural heritage

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Department of Planning, Industry and Environment (DPIE), is the primary legislation for the protection of Aboriginal cultural heritage in NSW. Under Part 6 of the *NPW Act*, the Director General of DPIE is responsible for the protection and conservation of Aboriginal objects and places³. Under the provisions of the *NPW Act*, it is an offence to knowingly harm or desecrate an Aboriginal object or place. If development is proposed to take place in the vicinity of an Aboriginal place, the potential impacts of the development on the Aboriginal place must be assessed⁴.

Consideration of Aboriginal cultural heritage within the Sydney ATC tower no.5 and Sydney Airport generally for this HMP was limited to a desktop assessment of known Aboriginal Places included on the State Heritage Inventory. This revealed that the ATC tower is not located within an identified Aboriginal Place.

Despite the limited potential for the ATC tower to be of significance to Aboriginal people as related to maintaining cultural traditions, it is recommended that the local Registered Aboriginal Party be consulted as a stakeholder in the event that significant change is proposed at the subject site (see Policy 6, Chapter 6). This recommendation complies with EPBC Act Regulations, 2000, Schedule 7a (h) (iv).

1.5.2 Social values assessment

No formal appraisal of social values, as might be informed by a community consultation process, was undertaken in the course of preparing this HMP. The ATC tower is, however, a prominent and eye-catching structure, and there exists potential for the building to be valued by the community for its design qualities.

2.0 HISTORY

Sydney ATC tower no. 5 was constructed between 1993 and 1995. It was designed by architect Ken Woolley of the architectural practice Ancher, Mortlock and Woolley. It is the fifth ATC tower to have been built at Sydney Airport.

2.1 Development of Sydney Airport

Sydney Airport has been in continuous use since 1919, making it one of the world's oldest continually-operating major airports.⁵ Associations between the immediate area and air travel go back even further, to 5 May 1911, when Joseph Hammond, a New Zealand national and pioneer of air travel, made the first flight over Sydney. Flying a Bristol Box Kite, he took off from and landed at Ascot Racecourse, at the end of the present east-west runway.⁶

2.1.1 The establishment of an airfield (1919)

Australia's first aircraft manufacturing venture began in 1919 when Harry Broadsmith, an engineer with the Manchester-based aircraft manufacturing firm, A V Roe, secured the rights to establish an Australian agency.⁷ Broadsmith, together with Lieutenant Walter Warneford and Nigel Love, formed the Australian Aircraft and Engineering Company (AA & E Co), and signed an agency agreement with Avro to assemble, manufacture and sell Avro 504K aircraft in Australia.⁸ Before production could begin, a suitable location was required and following a tour of potential sites, the company established their business at a bullock paddock at Mascot which they leased from the Kensington Racing Club. Love's first impressions of the site were positive:

The surface was flat, so much so that it appeared to be reclaimed land... It was covered by a pasture of buffalo grass...

...its approaches on four sides had virtually no obstruction. On the southern side were the banks of the Cooks River, thence Botany Bay itself. On the western side was the Cooks River beyond which lay the Bonnie Doon golf links. On the eastern border was the Ascot Racecourse and the northern area was bounded by Chinamen's Gardens...what better do you require than that?⁹

The airfield's first buildings, a store and a caretaker's residence, were constructed from recycled timber packing cases that had been used for carrying aircraft from England. The first hangar was a small canvas-covered structure.¹⁰ The following year, a large Richard's patented hangar, which could accommodate four planes, was sent from England.

The historic first flight from Mascot occurred in November 1919 when Love circled the airport and on 9 January 1920, the aerodrome was 'officially' opened. Love enthusiastically recalled the event:

With our aerodrome selected, our workshop established and our aircraft in operation, we were at last in the aviation business.¹¹

2.1.2 The Government assumes control (1921)

On 16 December 1920, the Civil Aviation Branch of Defence was formed to give effect to the Government's decision to foster and control the development of private and commercial aviation.¹² In October the following year, the Commonwealth acquired the 66 hectares (163 acre) site at Mascot from the AA & E Co for £15,500 and began to transform the character of the aerodrome from its previously informal operation to a more organised airport with safety regulations and airport maintenance. The decision to assume control of the Mascot aerodrome followed an investigation by the Superintendent of Aerodromes, Captain E Johnston, of sites suitable for a Sydney airport. After the review of locations, Johnston concluded that:

The only suitable site within a convenient distance of Sydney is that land at Mascot now used by the AA & E Co and known as Mascot Aerodrome...As [this is] the only suitable site within reasonable distance of the G P O, I would strongly recommend that it be procured even if this necessitates resumption. The land in question comprises 161 acres, 3 roods, 4½ perches.¹³

The Commonwealth's purchase of the Mascot aerodrome signalled the end for AA & E Co. The Government was unwilling to support local manufacturing, instead opting for aircraft imported from Britain, claiming it was cheaper. AA & E Co struggled to maintain production, going bankrupt in 1922 before being forced into voluntary liquidation in 1923.¹⁴

2.1.3 Early developments at the Mascot Aerodrome (1920s)

The original access route from Mascot Aerodrome to the city was via trams which ran along Botany Road. Access was improved in 1922 when a road from Ross Smith Avenue was constructed. Surrounding scrub was cleared at the same time too and by 1923, a Government report described the surface, approaches, drainage and all the buildings except the hangar as good.¹⁵ The original Richard's patent hangar purchased by the AA & E Co was blown away in a storm and by the mid-1920s the Government had replaced the hangar with a permanent structure, which was used by the NSW Branch of the Aero Club.¹⁶ By 1927, a workshop and clubhouse, DCA offices, three small hangars for single aircraft with folded wings, a hangar for the Airtravel Company and a house for the groundsman, had also been erected (Figure 4 and Figure 5). A second Government hangar was built in 1928.¹⁷

Even with these developments, problems at the aerodrome persisted. Throughout 1928 and 1929, Aero Club members criticised the aerodrome's 'boggy and undrained condition' which made it 'unsuitable as a landing place for the larger aircraft now being constructed', and its lack of hangar space and traffic control.¹⁸ As a result, in 1929, the Parliamentary Standing Committee on Public Works investigated the development of the aerodrome at Mascot; ultimately deciding that Mascot was superior to any alternative site, and securing Mascot's position as Sydney's primary aerodrome. This decision led to improvements in facilities to cope with the increased demands of air travel and included: landing areas to provide all-weather surfaces, roads and footpaths, public parking areas, acquisition of land to expand aerodrome's size, and the appointment of an aerodrome control officer.¹⁹

2.1.4 Expansion and improvement (1930s)

In 1930, a report by the Parliamentary Standing Committee on Public Works stated that:

It is now represented that civil aviation activities at Mascot have developed to such an extent that it is essential that the aerodrome be improved to provide facilities for this increased development.

Accordingly, negotiations began on acquiring residential land in proximity to the aerodrome to enable expansion of operations. Eight acquisitions of land were made and on 13 May 1930, Federal Cabinet approved the construction of a gravel runway, 457m long and 22.8m wide.²⁰ During this period, several more hangars were built, as well as a refreshment kiosk. By the late-1930s six companies were operating passenger services and the site also accommodated aero clubs and other flying and training organisations.

Works involved construction of new runways, lengthening of the existing east-west runway, the installation of lighting facilities for night flying, the construction of an administration building and the airport's first control tower (see Section 2.2.1).²¹ In 1936, the aerodrome was renamed Kingsford Smith Airport (KSA), in honour of Charles Kingsford Smith who had disappeared on a flight near Burma in 1935.



Figure 4 Aerial view of Mascot aerodrome, 1928

Source National Library of Australia



Figure 5 Mascot aerodrome, 1930

Source National Library of Australia

2.1.5 World War II developments (1939-1945)

During World War II, the airfield at Mascot was largely given over to military operations, including the assemblage of a large number of combat aircraft as well as Tiger Moths for training purposes. By September 1940, the RAAF had acquired the private flying schools at Sydney Airport.²²

The increase in air traffic brought on by RAAF training operations led to the decision to develop Bankstown as a secondary aerodrome to relieve congestion at Sydney Airport and to allow for the improvement of landing facilities at Mascot.²³ In April 1940, a number of the old weatherboard buildings at Sydney Airport were demolished to make way for the extension of the runway, which would provide increased lengths of approximately 914m (3,000ft), and cater for the development of modern aircraft.²⁴ The contract for the extension and widening of the runway was let in March 1940 to T H Rudd.²⁵

Even with the demands placed on the aviation industry during World War II, commercial development continued at the airport. In April 1938, the Government announced its approval to build a terminal building for ANA and Airlines of Australia. Construction begun in 1939 and 'with the steady development on the plans laid down, Mascot can be made an airport adequate and suitable for the requirements of Sydney for many years to come'.²⁶ The main building, including reception area and control tower, was completed in 1940 and upon opening was proclaimed 'the most modern in Australia' (see Section 2.2.2).²⁷

2.1.6 International airport (1940s-1950s)

As the war drew to its conclusion in 1945, Cabinet approved the development of Sydney Airport as an international airport. The chief engineer for the project was Dr K Bradfield, who was the son of J J C Bradfield, the chief engineer who supervised the construction of Sydney Harbour Bridge.

Bradfield was certain that the rapid development of civil aviation was inevitable and that expansion at Mascot was necessary to cope with the unavoidable increase in air traffic. As aviation at Sydney grew exponentially, a debate regarding possible alternative sites for Sydney's international airport was precipitated. Two other sites besides Mascot were considered: the Bankstown aerodrome, and a new site at Towra Point. Both these sites however had a number of disadvantages, including restricted space and difficult approaches over hills. They were also inconveniently located, being 15 and 12 miles respectively from the GPO.²⁸ In the case of Towra Point, one major problem was the site's proximity to large, shifting sand hills to the south and south-east.

It was ultimately decided that the airport at Mascot, as an established airport conveniently located only 6 miles from the city centre, would remain as Sydney's international airport. The first stage of expansion commenced in June 1947 and concluded in 1954 (Figure 6 and Figure 7). It commenced with a number of land acquisitions including that of the North Brighton Golf Links, a cricket ground, the Kyeemagh Polo Ground, the NSW Gun Club, and the Bonnie Doon Golf Links. The Mascot Granite Work and an ink factory were acquired in the ensuing years.²⁹ The expansion of Sydney Airport was originally intended to include four runways but due to wage increases and the introduction of the forty hour week that reduced output and increased cost, only two runways were realised. The works also involved diverting the course of the Cook's river and constructing a new bridge over General Holmes Drive.³⁰ In 1951, Sydney Airport carried more traffic than any other airport in the world outside the United States, exceeding even that of London's Heathrow Airport.³¹



Figure 6 The airport at Mascot, Sydney in 1946

Source *Construction*, 4 September 1946, p.2



Figure 7 Illustration in *Construction*, showing the proposed development of Sydney Airport in accordance with plans prepared by Dr Bradfield, 1946

Source *Construction*, 4 September 1946, p.2

The expansion plans for Sydney Airport had been greatly influenced by the DCA's approach to the introduction of a new era of aviation administration based on international protocols for air safety and management. The acceleration in technological accomplishment and the expansion of air traffic volume brought about by World War II required international co-operation in air traffic control. This led to the establishment of the International Civil Aviation Organisation (ICAO) in 1947, a specialised agency of the United Nations charged with regulating and coordinating international air travel. The organisation established the rules of airspace, safety and aircraft registration and introduced a series of standardised principles for the international stage.³² The first new ATC tower in Australia following World War II was commissioned at Sydney Airport in 1953. It was a brick structure, with an integrated fire station (see 2.2.3).

2.1.7 Australia's largest airport development program (1960s and 1970s)

In April 1965 the Minister for Civil Aviation announced Australia's largest airport development program to date. As part of the program, Sydney Airport was to receive a new international terminal. The terminal took five years to build and cost \$26,000,000. It was officially opened on 3 May 1970 by HM Queen Elizabeth II.³³

Other projects undertaken during the 1960s expansion works included apron extensions, a powerhouse for lighting along the north-south runway, and the completion of hangar areas.³⁴ The 1960s works also involved the replacement of the 1953 control tower (Sydney no. 3) with a new six-storey tower building to the south-west of the airport complex (see Section 2.2.4).

2.1.8 Late twentieth century developments (1980s-2000s)

From as early as the 1950s and into the following decades, long debates ensued about Sydney Airport's adequacy as Sydney's principal airport, even with the extensive expansion underway.³⁵ With a new generation of faster, heavier and larger aircraft, significantly longer runways were required, which seemed to be more than Sydney's capacity, and the growing complexity of air traffic management prompted various inquiries about how long the airport could handle the increase and development in air traffic.³⁶ Newspapers advocated for the closure of Sydney Airport and the construction of a new international airport elsewhere, citing problems of aircraft noise and lack of space.³⁷ Throughout the 1970s, debates raged about the retention or disposal of the airport with the concept of a parallel runway contended at length.

Finally, in 1989, the Federal Government announced its decision to build a third runway at Sydney. Its construction, which involved further land reclamation from Botany Bay, was the focus of controversy and protest from its inception in 1989 to its completion in 1994.³⁸ The construction of a new runway necessitated the requirement for a new ATC tower, which was to become a landmark feature of the newly modernised airport (see Section 2.3).³⁹

In 2002, the Australian Government privatised the airport. It is now owned and managed by Sydney Airports Corporation Limited (SACL), which has undertaken a number of refurbishment and development works, including upgrading terminals, car parks, runway lighting, aircraft parking and runway safety.⁴⁰

2.2 Control towers at Sydney Airport

ATC towers provide elevated vantage points from which controllers manage the movements of aircraft on the ground and in controlled air space within and around airports. The provision of unimpeded sightlines from control towers to all runway and apron areas is the primary factor that determines the height and siting of a tower. The development of control towers from the 1920s to today has been influenced by advances in the aviation industry, related both to the speed and capability of aircraft, and advances in en route control, such as two-way radio and radar. The present control tower at Sydney is the quintessential product of these developments, superseding four previous control towers whose designs and locations variously reflected the demands of their eras. It is also one of three extant towers at the airport (Figure 8).



Figure 8 Sydney Airport locations of ATC towers 1-5

Source www.nearmap.com.au

Key

- | | |
|---|------------------------------------|
| 1 | 1937 (temporary tower, demolished) |
| 2 | 1938 |
| 3 | 1953 (demolished) |
| 4 | 1972 |
| 5 | 1996 |

2.2.1 Sydney ATC tower no. 1

Sydney Airport had been operating for almost ten years before the site received its first air traffic control tower. In the early years of aviation, flying was on a small scale and there were few demands for serious safety and air traffic management.

From the mid-1930s, following a series of crashes and with air traffic volume increasing, the Australian Government began looking at ways to improve air safety.⁴¹ In March 1937 the Department of Civil Aviation (DCA) appointed Aerodrome Control Officers to regulate and control aircraft in the vicinity of Parafield (Adelaide), Archerfield (Brisbane), Essendon (Melbourne) and Mascot airports and 'to give all assistance and advice necessary for the safe operation of aircraft flying locally or on cross-country flights to or from other aerodromes'.⁴² This also involved the construction of a temporary control tower for the regulation of aircraft taking off and landing at Sydney Airport. The *Sydney Morning Herald* reported on the plan for the control tower:

A temporary control tower to regulate aircraft movements on and off the ground is to be erected shortly at the Kingsford Smith Aerodrome, Mascot. The tower will probably be used until the proper control tower incorporated into the proposed administrative block has been completed. Work on these buildings has not begun.

The temporary tower will be built on top of the weatherboard office occupied by the Civil Aviation Department's officers.⁴³

Sydney's first ATC tower was completed in mid-1937 and was a small timber-framed cabin, similar to the first control tower at Melbourne-Essendon (Figure 9). Contact with aircraft was purely visual, using simple devices including flags, flares and cane spheres mounted on a rooftop flagstaff.⁴⁴ Almost as soon as it was commissioned, the temporary control tower was considered insufficient, being 'a cheap wooden addition to the previously, and still inadequate, weatherboard administration building'.⁴⁵

2.2.2 Sydney ATC tower no. 2

The first air traffic control tower at Sydney was replaced with a flat-roofed cabin integrated into a larger passenger terminal and airport management complex (Figure 10).⁴⁶

The Integrated Operations and Administration building (Ops and Admin), was Australia's first standardised control tower model; and the outcome of a review of procedures carried out in 1938. It was based on overseas precedents, including the American prototype introduced at Newark International Airport in 1934. Almost identical 'Ops & Admin' facilities were built at Archerfield (Brisbane) and Parafield (Adelaide) prior to the outbreak of World War II.⁴⁷ In Australia, the model consolidated a range of activities in one three-storey Streamline Moderne building, including a weather bureau, Flight Checking Department, accommodation for pilots, a restaurant, lounge and roof terrace. The air traffic control cabin was located on the roof: the small flat-roofed cabins featured steel-framed windows with curved windows facing the apron. They were fitted with radio facilities to co-ordinate with other operational positions on the ground and to communicate with airfields locally and on routes between airfields, but communication with aircraft remained almost exclusively visual.⁴⁸ Sydney ATC tower no. 2 was superseded in 1953. However, parts of the 'Ops & Admin' building survive, integrated into the terminal complex.



Figure 9 Sydney ATC tower
no. 1, pre-1940

Source Civil Aviation
Historical Society



Figure 10 Sydney ATC tower
no. 2, 1941

Source State Library of NSW

2.2.3 Sydney ATC tower no. 3

The changed post-war civil aviation environment resulted in multiple implications for air traffic control towers. Two of the most significant factors were the introduction of standardised communications, navigation and signalling systems which demanded sizeable storage spaces for equipment and power houses; and the increasing speed of aircraft, which demanded larger airstrips and taller control towers.⁴⁹ Sydney ATC tower no. 3, commissioned in 1953, was associated with the post-World War II phase of airport development at Mascot and responded to the new requirements of air traffic safety.

The establishment of the tower at Sydney was also in large part a result of the Convention on International Civil Aviation, which had taken place in Chicago in 1944. It was at this convention that the ICAO was established. The document was signed on 7 December 1944 by 52 signatory states, including Australia, and came into effect in April 1947.⁵⁰ As part of this document, ICAO issued a series of annexures which established uniform standards to be observed by member states. The ATC tower at Mascot was therefore based on international standards following the guidelines devised by ICAO. In Australia, the Department of Civil Aviation had been working on a standard approach to the design of control towers from at least 1948, with the ultimate ambition to improve safety standards.⁵¹ Three years later, in June 1951, the *Civil Aviation Journal* (CAJ) reported that:

New control towers of standard design to be built at Essendon, Mascot [in Sydney] and Eagle Farm [in Brisbane] should add greatly to the efficiency and traffic handling capacity of these busy airports...

...Special attention has been given to the siting of the new towers which will command a full view of all runways. They will be built near the instrument runway threshold, so that the safe interval between instrument landings can be reduced to a minimum...

At the time, the location of the No. 3 tower at the intersection of runways, rather than near the main terminal building, was considered a significant development. The tower, like the attached fire station, was sheathed in red brick, and designed in a Moderne style reminiscent of the work of Dutch architect Willem M Dudok (Figure 11). The square cabin with outward canted windows surmounted a three-storey square base.⁵² The building has been demolished.



Figure 11 Sydney ATC tower
no. 3, 1957

Source National Archives of
Australia

2.2.4 Sydney ATC tower no. 4

The period from the late-1960s witnessed the first significant shift in approaches to the design of control towers since the end of WWII. Factors behind this included the increasing volume of civilian air traffic; by the end of the decade, air travel had superseded cruise liners as the predominant means of long-distance and international travel, making the civilian air industry a major international force. The speed of jet aircraft had also continued to increase, requiring larger airports and taller towers.⁵³ One response to this was the development of ATC towers with cabins on top of slender reinforced concrete columns. These were tall towers, typically located at primary airports in state or national capital city airports.⁵⁴

Sydney's fourth control tower was designed from 1966 and commissioned in September 1972.⁵⁵ It was constructed as part of the major expansion of facilities at Sydney Airport. The new air traffic control tower was constructed as part of a suite of new facilities, which were collectively known as the Sydney Airport Airways Operations Centre. In addition to the control tower, this complex also included a two-storey operations building – to which the tower was connected by a bridge at second floor level- and a free-standing services building. The buildings were co-located because of their related use (i.e. different aspects of air traffic control) but also for reasons of economy.⁵⁶

The tower and associated buildings were located on the foreshore of Botany Bay, adjacent to the mouth of the Cooks River and 457m (1,500ft) west of the north-south runway extension (Figure 12). As noted by the Sydney Morning Herald, the 'site of the tower would enable the air traffic controller to see all the airport, including the extension of the north-south runway into Botany Bay, within an arc of 180 degrees. It is essential that he has a clear vision of the whole of the aircraft movements area of the airport'.⁵⁷

The six-storey tower, octagonal in plan, was surmounted by an octagonal half-height equipment and duct space, with the control cabin (also octagonal) above (Figure 9) and linked to the operations centre by a passageway from the first floor. The new operations building housed workshops, air traffic control, communication, teletype and automatic data processing equipment on the ground floor, with approach and area control on the first floor⁵⁸.

Sydney ATC tower no.4 was superseded by Sydney ATC tower no.5 in 1995, when the third runway was completed. ATC tower no.4 can provide a limited ATC service should Sydney ATC tower no. 5 become inoperable.



Figure 12 Sydney ATC tower no. 4 and the DCA Operations Building, early 1970s, viewed from the west

Source Civil Aviation
Historical Society



Figure 13 Inside Sydney ATC tower no. 4, 1989

Source Civil Aviation
Historical Society

2.3 The subject site: Sydney air traffic control tower no. 5

Sydney ATC tower no.5 was conceived when Government approval was granted for the new parallel north-south runway at Sydney Airport, a development which meant Sydney no. 4 tower would no longer have visual access to all areas of the runways and aprons.⁵⁹

Sydney no. 5 (commissioned on 6 January 1996) was innovative in that it was the first ATC tower in Australia designed by a prominent architect, Ken Woolley of the notable Sydney practice Ancher, Mortlock & Woolley (AMW). It was constructed between 1993 and 1995. The engineer for the tower was Arup and it was built by Amacon Constructions.⁶⁰

2.3.1 Ken Woolley, architect

Ken Woolley was born in Sydney, studying architecture at the University of Sydney where he graduated with the University Medal, the Sulman Medal and the Stephenson & Turner Medal. He worked as a trainee in the office of the NSW Government Architect until 1963, where he designed the Chapel of St Margaret's Hospital, Darlinghurst (1955-8), the Chemistry School (1956-8) and the Fisher Library (1962) at the University of Sydney.⁶¹

In 1964, he joined Ancher Mortlock & Murray as a partner, becoming a director in 1969 when it became Ancher Mortlock Murray & Woolley. From 1983-2005 he was chairman and design directory of AMW, before becoming the director of Woolley Consulting in 2006.⁶²

Renowned for his domestic-scaled works, Woolley was one of the first Australian architects to work closely with the housing development industry, producing designs for the project houses of Pettit & Sevit. Examples of his larger-scale works include: the State Library of Victoria extensions (1985-2003); the Commonwealth Law Courts at Parramatta (1986); the Park Hyatt Hotel at Campbell's Cove (1986-90); the Children's Medical Research Institute at Westmead Hospital (1990); and the Exhibition Hall (1996) and Hockey Stadium (1998) at the Homebush Olympic Games site. Woolley's one overseas commission was the Australian Embassy at Bangkok (1973-8).⁶³

2.3.2 Design and construction

Sydney's ATC tower no. 5 comprises a cable-stayed pre-cast concrete shaft with a steel and glass passenger lift attached. A cranked spiral stair sweeps around the concrete shaft. The amenities/equipment level adopts an unusual clover-like plan form (series of circular pods) and is cantilevered out from the top of the shaft, with the circular control cabin above this; both use distinctive faceted blue tinted glazing (Figure 14). The cabin roof is 42.85m above ground level.⁶⁴ The glass for the cabin, 20mm thick, was specially manufactured in Melbourne and all of the construction was intended to be lightweight, prefabricated and weather-resistant.⁶⁵

The tower was designed and built to a tight time-frame and cost \$13 million. Construction began in August 1993, and the tower was commissioned on 6 January 1996. Personnel who worked on the project were, 'terribly proud of it...everybody was somehow devoted to this project. It was a lifetime opportunity to do something that was so highly visible and unique'.⁶⁶

The tower was originally scheduled to open in March 1994, but this was delayed by the availability of software and technical displays.⁶⁷ The \$4 million antenna had to be rebalanced after it caused the whole tower to vibrate, and the computer software controlling communications into and out of the control tower had to be replaced.⁶⁸ Once fixed, ghosting procedures (where the new control tower controls operations while the old control tower continues to listen in) were put in place on 16 December 1995. It ended on 6 January 1996 when Sydney 4 completed its final shift following two decades of operation.⁶⁹

Upon opening, the tower was manned by five teams of seven controllers.⁷⁰ Once fully operational, the new control tower allowed the full use of the parallel runways – previously, aircraft could only take off from the third runway, not land. This change effectively enabled the airport to operate at a near-maximum capacity of 80 aircraft movements per hour in clear weather. Prior to this, the airport operated at between 60 and 65 movements per hour, dependent on weather conditions and demand.⁷¹

According to the Civil Aviation Authority, the increased visibility afforded by the 42.85 metres-high tower, the sophisticated computer equipment complete with colour-coded readouts, and the new radar operating from the top of the tower, all combined to substantially increase air traffic safety at Sydney Airport.⁷²

2.3.3 A landmark

Sydney ATC tower no. 5, an elaborated version of the cabin-on-column tower type, which has been the international standard in the design of air traffic control towers since the 1970s was conceived as a landmark (Figure 15). The eye-catching design of the new tower, developed by a notable architectural firm, was conspicuously different from all preceding towers both in Australia and overseas. Speaking in 2009, Ken Woolley recalled the commission as follows:

The design evolved through discussions with the Civil Aviation Authority. The location of the building, next to General Holmes Drive, meant that it was going to be a landmark anyway ... but was it going to be a good landmark? The notion [of developing a building with landmark qualities] was well supported [by the Civil Aviation Authority].⁷³

Its form and appearance consciously ‘challenged conventions’ in ATC tower design, being neither a ‘squat brick tower’ nor a ‘concrete shaft with a large bubble on top’. This was an outcome of Woolley’s response to the Civil Aviation Authority brief, existing control tower forms and the possibilities presented by the prominence of the site which is located adjacent to a main road in a low-lying landscape.⁷⁴

In 1995 the tower was awarded a high commendation in the Australian Steel Design Award for Buildings by the Australian Institute of Steel Construction (New South Wales). It also received the 1995 NSW Excellence in Construction Awards in the \$2.5 to \$8 million public buildings category, was a finalist in the BHP Australian Steel Awards, and was entered in the 1995 Concrete Institute of Australia Excellence in Concrete Awards.⁷⁵ The Civil Aviation Authority described the Sydney tower as ‘a 21st century lighthouse’⁷⁶ and a ‘new signature for Australia’s major gateway and an addition to the city’s skyline’.⁷⁷

Figure 14 Section through
Sydney Air Traffic Control Tower
no. 5 (Section A-A/Part Elevations
(9925- 04) 12 August 1993, Rev B

Source Ancher Mortlock &
Woolley Pty. Ltd.

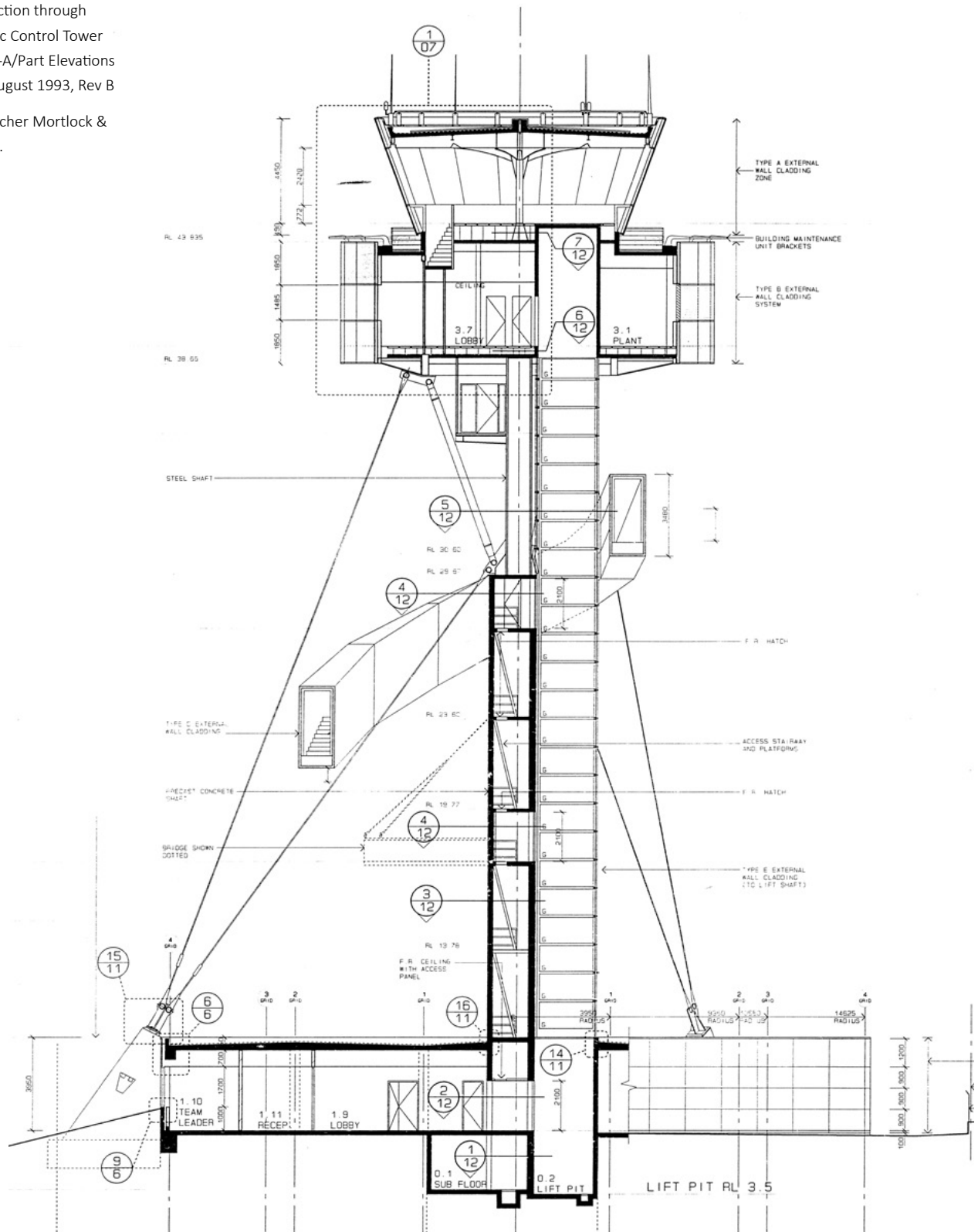




Figure 15 Sydney ATC tower
no. 5, 2016, view from the east

3.0 PHYSICAL ANALYSIS

The following provides a description of the Sydney ATC tower no. 5. A key objective of the physical analysis is to identify alterations to the building as commissioned in 1995.

A site visit was conducted on 27 May 2016. Documentation referenced in the preparation of this analysis included the following architectural drawings prepared by AMW Pty Ltd:

- Floor Plans (9225-02), 12 August 1993, Rev A & Rev B
- Roof/Reflected Ceiling Plans (9225-03), 21 June 1993, Rev A
- Section A-A/Part Elevations (9225-04), 12 August 1993, Rev B
- Stair 2 & 3, Main Deck Toilets (9225-09), 21 June 1993, Rev A
- Main Deck and Cabin Level Details (9225-10), 21 June 1993, Rev A
- Base Building and Lift Enclosure Details (9225-11), 21 June 1993, Rev A
- Central Core, Major Services Co-ordination (9225-12), 21 June 1993, Rev A
- Stair 4 (9225-13), 21 June 1993, Rev A
- Miscellaneous Details (9225-14), 21 June 1993, Rev A
- Landscape Plan (9225-15), 21 June 1993, Rev A

Copies of these drawings are included at Appendix B.

Structural drawings (construction issue) prepared by Ove Arup & Partners Consulting Engineers (1993, various dates); documentation prepared by Arup Façade Engineering (1993, various dates); and a Structural and Building Fabric Report prepared by Woolacotts Consulting Engineers, dated 8 August 2014 were also reviewed in the preparation of this report.

All photography is by Lovell Chen unless otherwise stated.

3.1 Site description

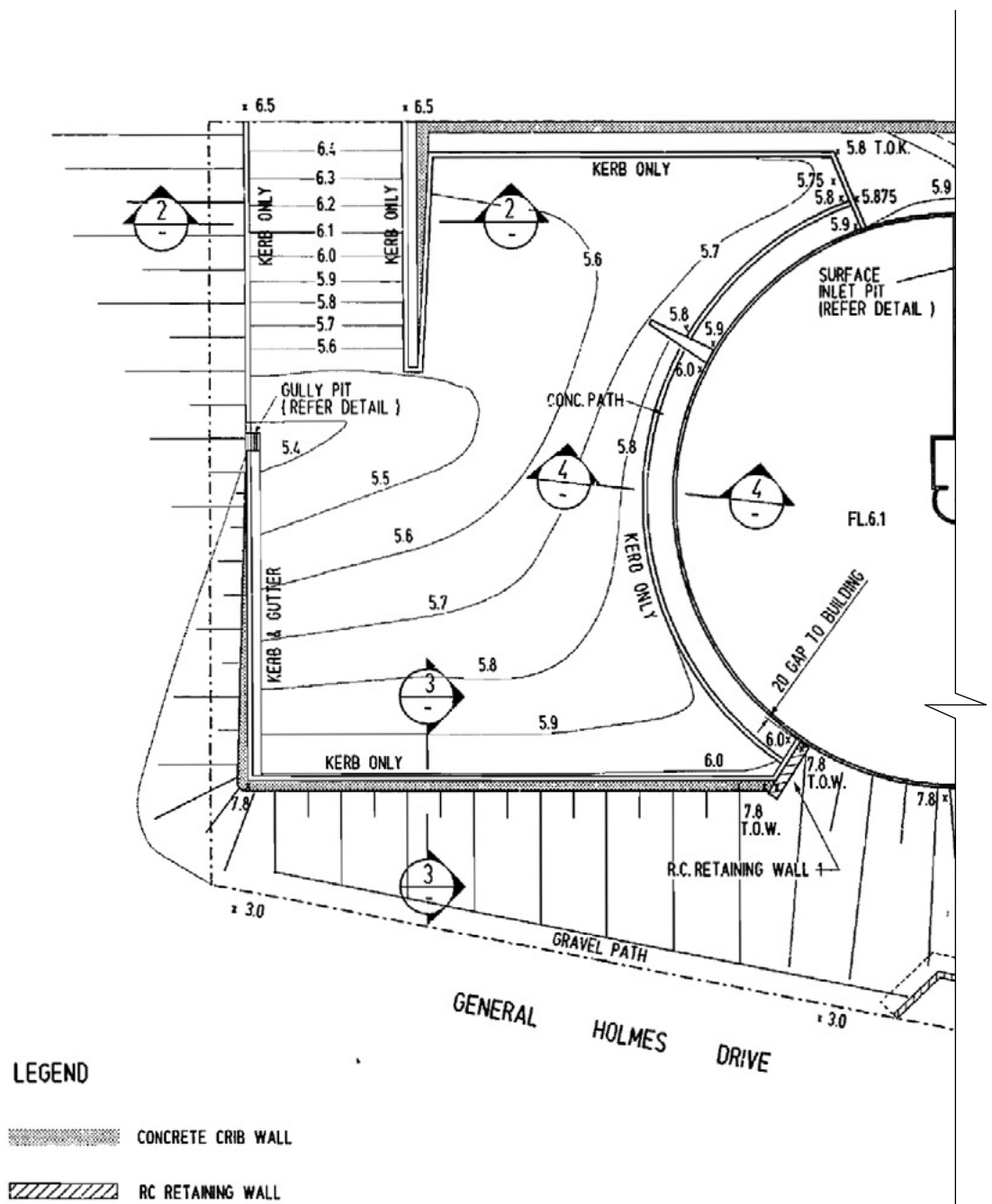
Sydney ATC tower no. 5 is located in the south-east sector of Sydney Airport, close to General Holmes Drive (M1). It has unimpeded lines of sight over the apron and runways at the airport. The RL of the cabin roof is 49.1m⁷⁸, and the building has a high level of visibility both within the airport, and from the public domain (see discussion of views at Section 3.4).

The control tower is located on a reserve (approximately 3,700 square metres) that is leased by Airservices Australia (Figure 16). The reserve is enclosed to all sides by a tall chain link fence. A guard house is located next to the car park entry at the north of the compound.

Sydney no. 5 is unusual for its landscaped setting. The treatment was specified by AMW, and includes a variety of native shrubs, grasses and low-growing trees; generally, species with a maximum anticipated trunk length of 10m (Figure 2 and Figure 3). See Landscape Plan (9225-15) at Appendix B.

Figure 16 Airservices Australia
ATC compound at Sydney Airport

Source Arup, Civil Works
Layout & Details, S 12.01 Rev A, job
no. 7288, 21 June 1993



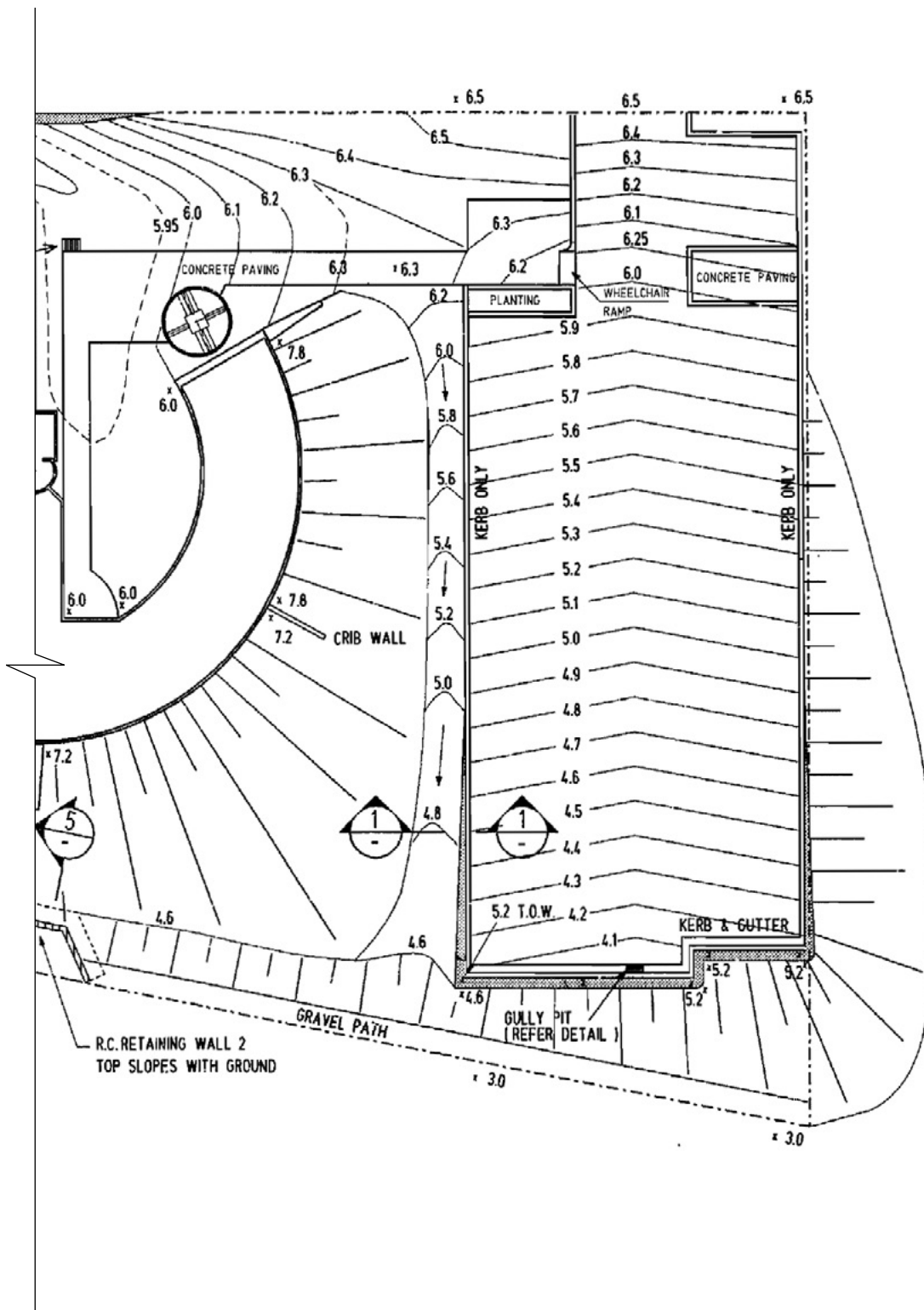




Figure 17 Landscape treatment
to the entrance courtyard



Figure 18 View of the base building from the south

3.2 Exterior

Sydney ATC tower no. 5 comprises a cable-stayed concrete shaft to which an external lift is attached by steel fly braces to the north (Figure 19). The amenities and equipment level cantilevers from the top of the shaft, and is carried on a steel platform which resembles a cloverleaf in plan. The circular control cabin is above the amenities and equipment level. The cabin floor is 38.5 metres above ground level; 42.85 metres to the cabin roof. A spiral escape staircase sweeps around the concrete shaft, and comes to ground to the north-east of the circular single-storey base building. The ATC tower is carried on reinforced concrete piles.

The unusual design concept was described by architect Ken Woolley in 1995:

The geometry of the design is based on an equilateral triangle or tri-star plan with a slim pre-cast central column in which services run, supporting a steel strutted and cantilevered platform and braced by post-tensioned steel rods to three points on the base building. This ensures the most rigid, sway-free structure with the advantage of prefabrication for rapid construction.⁷⁹

The sequence of construction is indicated at Figure 20.

Access to the base building is via a paved pathway from the north-east of the Airservices compound, which leads to an entrance lobby at the south of a sheltered courtyard (Figure 17). The lobby was extended into the courtyard in the late 1990s to create a larger reception area.⁸⁰

The concrete-framed base building is sheathed in glass and aluminium panels. Concrete columns carry the roof slab, which is finished in a waterproof membrane with pre-cast concrete panels above. This arrangement is used for all roof areas at the ATC complex, including the cabin. A steel awning cantilevers from the concrete roof slab at the south-west of the base building, at the entrance to the main equipment room (Figure 21).



Figure 19 Detail view from the north-east

STEP 1

Construct base building;
buttress and concrete core
shaft.

STEP 2

Assemble upper shaft and
tripod on ground then lift
and bolt onto core shaft.

STEP 3

3a. Preassemble ring
beam and other slabs,
including bondek and
reinforcement. Lift into
place and bolt radial beam
and strut connections.

3b. Remove temporary
ties and install inner
steelwork and bondek to
main deck level.

STEP 4 + 5

4a. Install stays- lower
stays first.

4b. Use turnbuckles
to set correct lengths to
buttress connecting plate.

4c. Use lifting beams to
support stays during lift.

5a. Take up slack in stays.

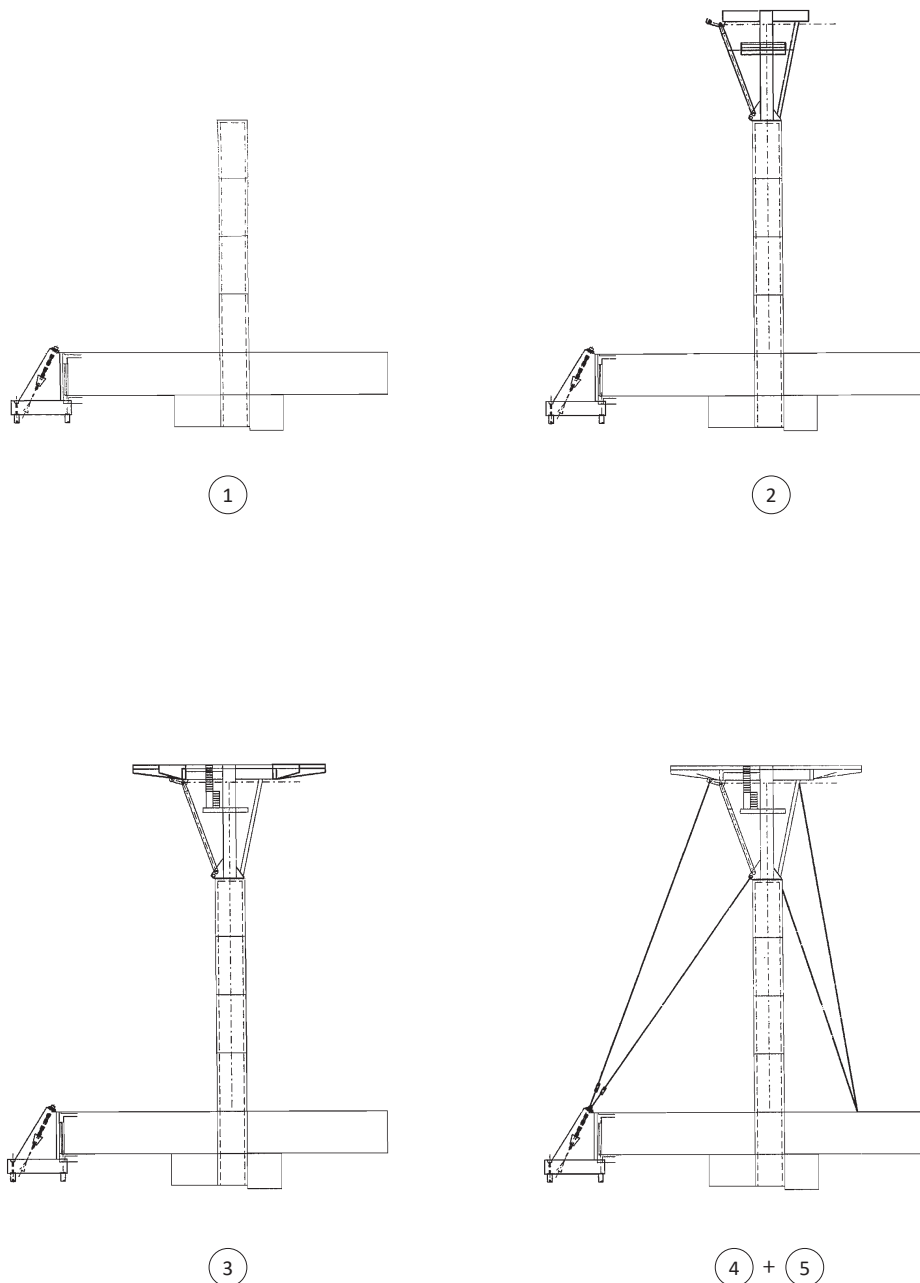
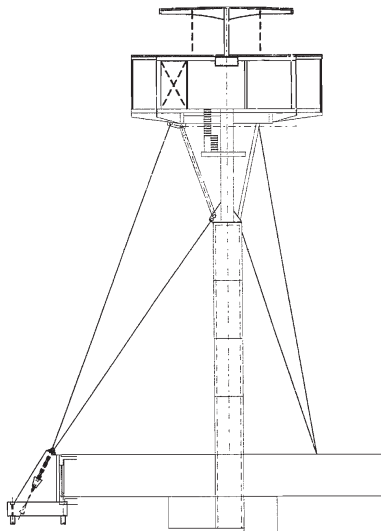
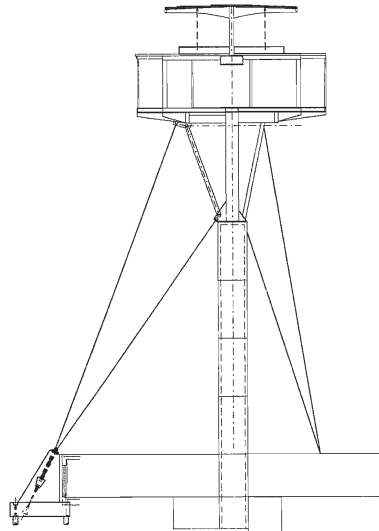


Figure 20 Sydney ATC tower
no. 5: sequence of erection, stages
1-9

Source Amended from Arup,
S1.02 Rev A, 21 June 1993, job,
7288



6



7

STEP 6

- 6a. Install cabin level and roof steelwork.
- 6b. Provide six temporary tie downs to roof beams.

STEP 7

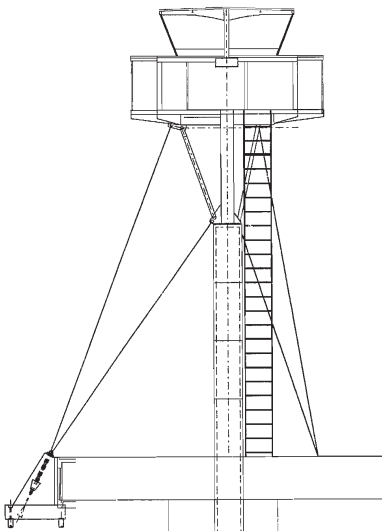
- 7a. Concrete upper level decks.
- 7b. Stress stays to full load by use of jacking nuts.

STEP 8

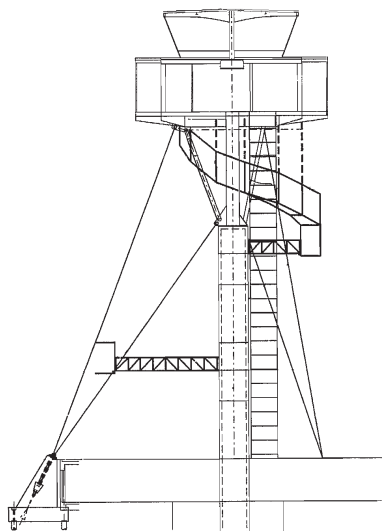
Install lift enclosure framing and stress ties.

STEP 9

- 9a. Install bridges.
- 9b. Install spiral stair segments from top down.



8



9

The off-white segmental concrete shaft is 2.5m in diameter and 20m high, with a flat face to the north to which the lift is attached by steel fly-braces. Service risers are accommodated in the hollow shaft (Figure 22). The limited dimensions of the shaft are an impediment to the introduction of new and replacement cabling. A metal column rising from the top of the concrete shaft carries the steel cloverleaf platform above. The lift shaft has a metal frame, painted yellow, with translucent glass panels. The lift terminates at the amenities/service level.

The steel platform for the amenities/services level was lifted from the ground in one piece – the third stage of a nine-phase erection sequence (Figure 20). It is restrained by six tensioned steel cables, brought down to three concrete piers at the edge of the base building. The platform has a cloverleaf plan of six bays formed by radiating steel ribs. The perimeter of the platform is supported by steel rectangular hollow section beams bolt fixed to the main I beams. The six bays, nicknamed ‘beer cans’ by Airservices staff, are clad in reflective blue-tinted glass panels. The circular cabin has 18 panels of outward canted frameless glass.

The 12m-diameter cabin roof is carried on a central column rising through the cabin. Stainless steel rods outside the joints of the frameless 25mm-thick glass provide stability. The cabin roof accommodates surface movement radar and warning lights, as well aerials and lightening conductors.

The spiral staircase is a rectangular tube of 18 cranked facets in aluminium panels punctuated by small porthole windows. Two diagonally trussed steel walkways provide stability and access to the concrete shaft. These are both painted blue. The spiral staircase extends from the roof of the base building to a deck below the platform for the amenities/services level. This deck provides access to a small north-facing observation platform, open to the elements. A return flight of stairs inside a single-storey concrete cylinder provides access from ground level to the bottom of the spiral staircase.

The building is almost entirely intact as built, and generally in good condition. There is localised corrosion to steel panels throughout, a consequence of exposure to sea air and aviation fuel. In some areas the protective paint coating is extensively failed. Further comment on the external condition is at Chapter 5. See also Structural and Building Fabric Report prepared by Woolacotts Consulting Engineers, dated 8 August 2014.

Figure 21 View of the base building from the west: the cantilevered awning outside the equipment room is visible to the rear





Figure 22 Two bridges provide access to the services riser within the concrete shaft

3.3 Interior

The base building includes equipment and services, generally located to the west of the circular plan, and administration and staff amenities, to the east of the plan. Finishes throughout are utilitarian, hard wearing and consistent with the mid-1990s period of the construction (Figures 23-25). The lift lobby is lined with profiled sheet metal (Figure 25). Alterations to the base building since construction include the extension of the lobby (late 1990s, Figure 26), and modifications to the planning of the east wing to accommodate additional office space and a new galley kitchen.

The floors at ground level are reinforced concrete, carpeted in the central lobby and stand-down areas; exposed in the air conditioning plant and equipment rooms. Ceilings in the lobby and stand-down areas are lined with perforated metal acoustic panels with recessed vents and lighting. Door furniture throughout both the amenities/services level and the base building is stainless panels with yellow signage and stainless steel door handles. Skirtings are vinyl. Paint throughout is generally light coloured.

The six bays that comprise the amenities and plant-room level are arranged in three pairs with differing functions. The two bays to the north accommodate air-conditioning plant (Figure 27); the two bays to the south-east are staff stand-down areas, including a galley (Figure 29); the two bays to the south-west accommodate equipment racks and services. Toilets are to the west of the central lift lobby and circulation space, with staircases extending to the cabin above and the escape stair below.

The cabin, accessed via a carpeted curving staircase, is arranged around a central steel column, from which six cantilevers splay at the top to support the cabin roof (Figure 28). This arrangement has the advantage of avoiding interference to sightlines by external columns, and also facilitates the use of peripheral consoles (Figure 30), which abut the edge of the circular cabin (diameter 7.5m) to the east, north and west. The cabin managers' desk is to the south (rear). The consoles use touch-screen technology of the type used in modern aircraft, giving controllers access to situational radar, communication and meteorological data displays. The consoles were modified in 2014. Shading to the 18 windows is by pull-down blinds.

The cabin ceiling is lined with perforated metal acoustic panels. The cabin roof is accessed by a drop ladder to the south of the cabin ceiling. The concrete floor is carpeted. Storage space is limited. Cabinetry has been installed around the base of the central column and to the south-facing wall.

The risers and treads of the spiral escape staircase are steel, painted white.



23	
24	25
26	

Figure 23 Equipment room,
ground level

Figure 24 Corridor to the east
of the base building

Figure 25 Lift lobby, ground
level

Figure 26 Reception, ground
level



Figure 27 Air-conditioning plant on the amenities and plant room level



Figure 28 Cabin interior: the central column allows unimpeded view lines to all sides





Figure 29 Galley/stand-down area, on the amenities and plant room level



Figure 30 The arrangement of the perimeter console was modified in 2014

3.4 Views

As noted, the ATC tower is highly prominent and visually striking. As a tall structure, it is visible ‘in the round’ (Figures 31-33). It is a well-known and widely recognised landmark. (These issues are addressed in greater detail in Chapter 4.).

Figure 31 View from the east:
Sydney no. 5 from Ross Smith Drive



Figure 32 View from the west:
Sydney no. 5 (pictured right) from
the mouth of Cooks River, with
Sydney no. 4 in the foreground



Figure 33 View from the south:
Sydney no. 5 from General Holmes
Drive (M1)



4.0 ASSESSMENT OF SIGNIFICANCE

This chapter provides an assessment of cultural heritage values associated with Sydney ATC tower no. 5 against the Commonwealth Heritage criteria. The assessment (Section 4.2), which draws on evidence presented in chapters 2 and 3, is preceded by a comparative analysis of Sydney no. 5. A Statement of Significance is at Section 4.3.

4.1 Comparative analysis

The following considers Sydney ATC tower no. 5 in the context of ATC towers in Australia, and internationally. It draws on the typological study of ATC towers prepared by Lovell Chen as part of the Stage 2 *National Control Towers Heritage Assessment* (2007-2009).

4.1.1 ATC tower development in Australia (1920s-1990s)

The first ATC towers were square timber structures raised only slightly off the ground. Contact with aircraft was purely visual, through devices including flags, flares and cane spheres mounted on a rooftop flagstaff. Towers of this type were introduced in Australia from the mid-1920s.

Following a review of air safety standards in 1938, Australia's first standardised control tower model, the Integrated Operations and Administration building (Ops & Admin Buildings), was developed. This model was based on overseas precedents and comprised a three-storey Streamlined Moderne building with the air traffic control cabin located on the roof. The small flat-roofed cabins featured steel-framed windows with curved windows facing the apron, and although they were fitted with radio facilities, communication with aircraft was still almost exclusively visual. Three of these Ops & Admin facilities were built in Australia, at Archerfield Aerodrome, Brisbane (Figure 34), Parafield Aerodrome Adelaide (Figure 35) and Mascot, Sydney (Chapter 2, Figure 10). Others were planned for Essendon Airport, Melbourne, Cambridge Aerodrome, Hobart and Maylands, Perth, but were not constructed because World War II intervened.

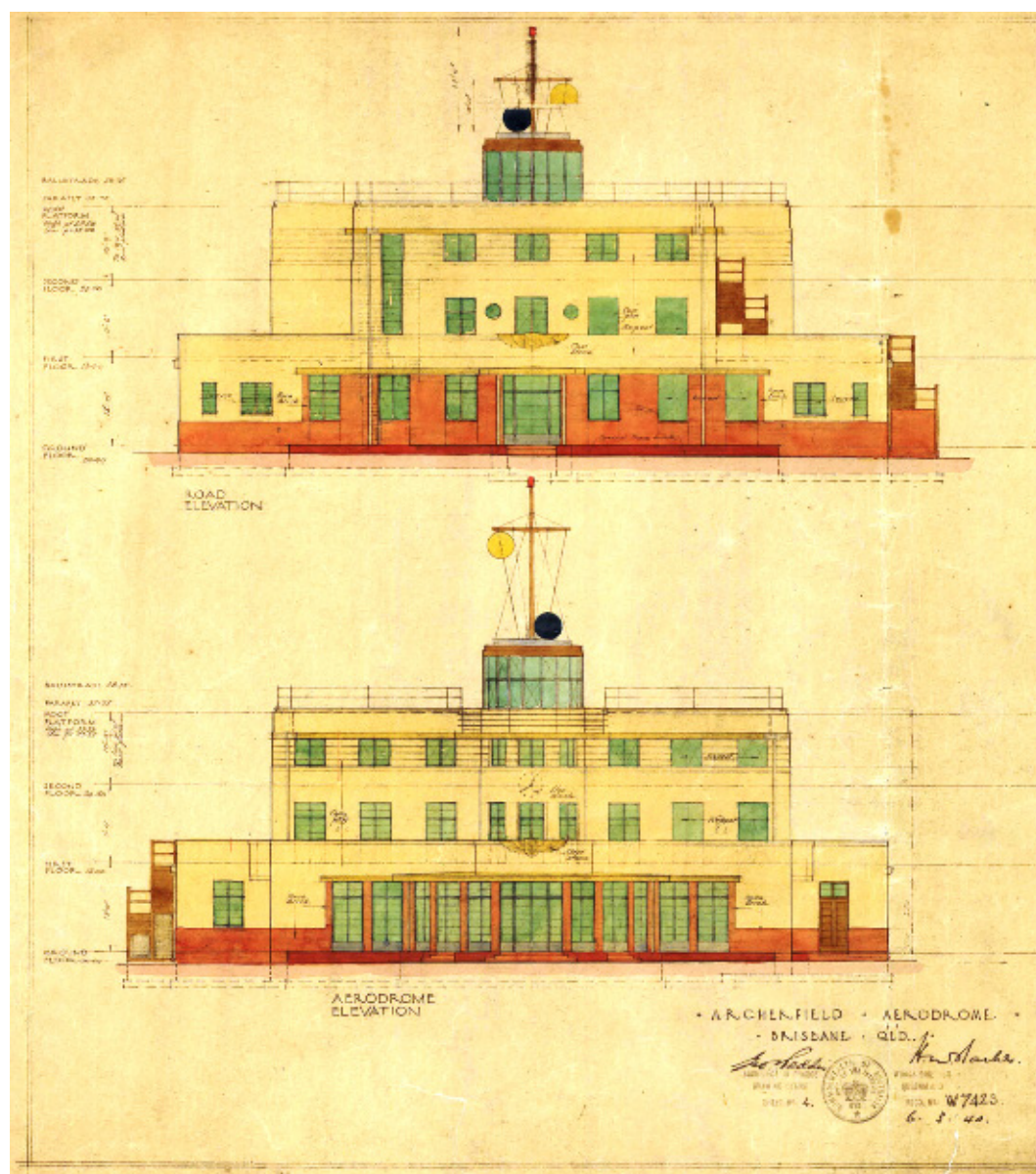
In the post-war period, international cooperation in air traffic control was initiated (see Chapter 2). In Australia a number of different approaches were tried in the design of control towers, including the use of different construction materials and tower forms. By the early-1950s, a standard control tower format had emerged. It consisted of a square base, typically of between two and four storeys, below a perimeter walkway, also in reinforced concrete, around an octagonal cabin with sloping glass panels fixed in steel mullions. Depending on the nature of the airport, the cabins were fitted with two, three or four-person consoles, and featured a range of noise abatement and cooling devices. Examples of this type of tower were constructed in Sydney (1953), Melbourne (Essendon, 1956), Adelaide (1957), Hobart (1958), Launceston (1958, Figure 36), Darwin (1959), Brisbane (1959) and Tamworth (1959).

The 1960s was a period of considerable advances in the size and speed of aircraft and affordability of air travel. During this period the number of airports with control towers increased dramatically, and there were also major advances in terms of the equipment used to manage aircraft. However, the control towers themselves barely changed from the format of the 1950s. Towers based on this model, but refined and improved over time, continued to be built throughout Australia until well into the 1970s.

In the late 1960s and 1970s, two new control tower models were developed. This period saw a number of experiments in the design of low-cost ATC towers, including modular pre-cast concrete towers and towers carried on steel frames. In Australia, a standardised low-cost tower, comprising an exposed steel frame base in a triangular plan and small single-glazed cabins, was introduced generally (but not exclusively) at general aviation or secondary airports transportable version of the model was also developed (Figure 37). Until the late-1980s, this model of low-cost, perimeter-frame tower, with minor refinements and modifications, was constructed at airports across Australia and may be the most widely built control tower type in Australia.

Figure 34 Elevations of
Archerfield (Queensland)
Operations and Administration
building, 1939

Source National Archives of
Australia



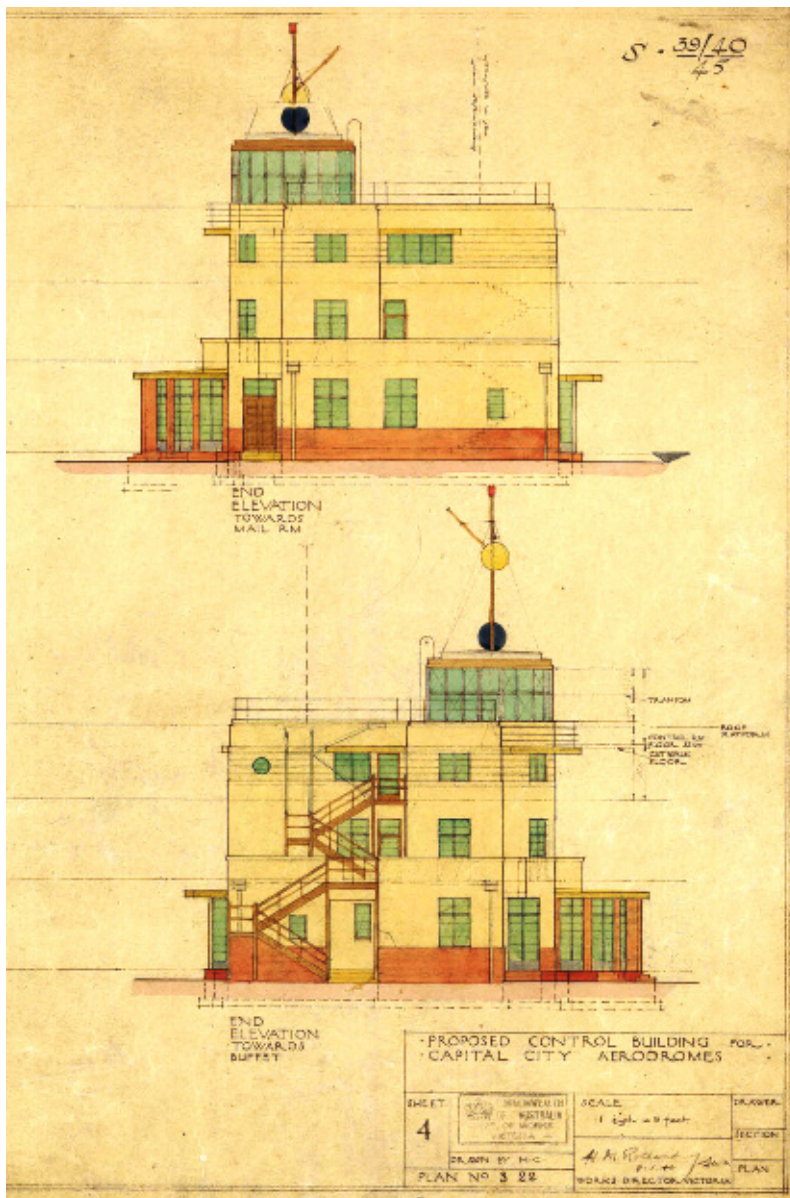


Figure 35 Parafield Operations and Administration Building, image date 1940

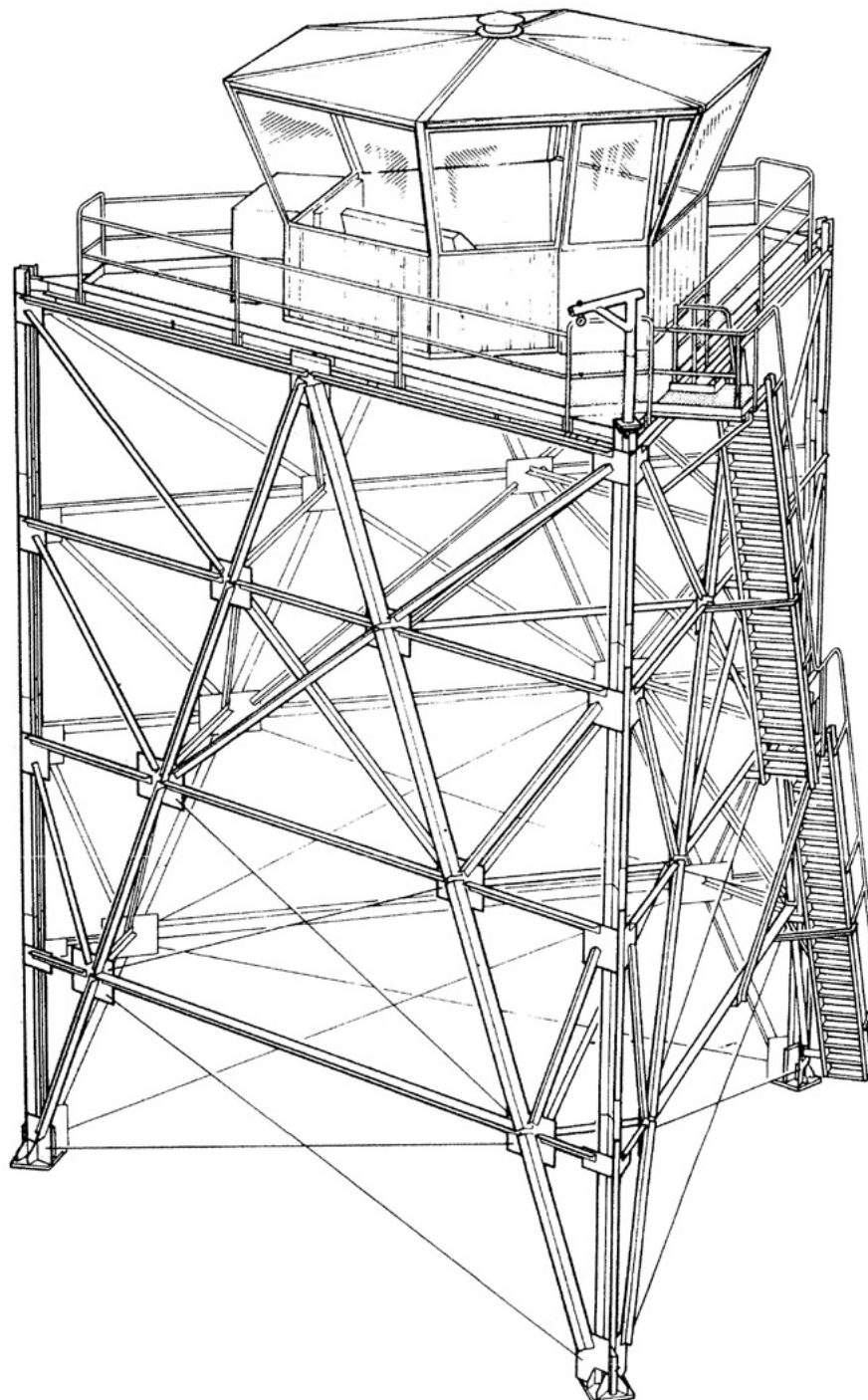
Source Civil Aviation
Historical Society



Figure 36 Launceston ATC tower, Tasmania, late 1950s

Source Civil Aviation
Historical Society





HEIGHT TO CAB FLOOR - 34' 0" } APPROX.
OVERALL HEIGHT - 43' 0"

FIG. 1 TRANSPORTABLE
CONTROL TOWER

Figure 37 Transportable
perimeter-frame ATC tower
developed by the Department of
Civil Aviation (Australia), 1970s

Source Civil Aviation
Historical Society

4.1.2 Column ATC towers

The other ATC tower typology introduced in Australia in the late-1960s was the column tower surmounted by a services pod. The first completed example in Australia was at Melbourne (Tullamarine), 1969 (Figure 38).

The earliest control cabins on tall concrete columns were built in the USA from the late-1950s. The precedent may have been integrated concrete water towers, which were built in abundance from the early twentieth century. Column ATC towers comprised an integrated cabin and services pod on top of a slender concrete shaft. The unprecedented height of the column towers required a new approach to the physical relationship between the ATC cabin and the equipment required for its operation. Proximity of radio, audio and other systems was required to ensure reliable feeds and signals, which had not presented a problem in lower, earlier towers. The new column towers resolved this issue by dividing the equipment that services the cabin into two sections: the main equipment room at ground level, and a subsidiary equipment space immediately below the cabin.

Following Melbourne, the next column towers in Australia were built at Perth and Brisbane, being commissioned in 1986 and 1988 respectively (Figure 39 and Figure 40). Both were taller and more sculptural than their Melbourne predecessor, with cones housing services and cabins splaying from slender faceted shafts. Both were designed and documented by private architectural practices under the direction of the Department of Housing and Construction (DHC) to specifications supplied by the Department of Aviation. At Brisbane, the DHC, in consultation with stakeholders, explored the potential for the DCA specifications to be tailored to the character of the airport, then undergoing a major expansion program. John Grealy was the project architect:

We wanted the tower to be simple, elegant and unembellished, like the design principles behind the airport. We also wanted to minimise the amount of accommodation in the tower ... We looked at overseas examples, including the current generation of American towers, with prefabricated cabins. The control tower at Charles de Gaulle Airport (Figure 41) with a fluted shaft, was also an influence.⁸¹

Figure 38 Melbourne ATC tower no. 1, commissioned 1969 (left) and ATC tower no. 2, 2013 (right) www.melbourneairport.com.au, accessed 5 August 2016





39	40
41	

Figure 39 Perth ATC tower, commissioned 1986;

Figure 40 Brisbane ATC tower, 1988

Figure 41 Control tower at Charles de Gaulle Airport, Paris, designed by Paul Andreu (1974): its elegant fluted form was an influence on the Brisbane tower of 1988

Source www.paul-andreu.com (accessed 2009)



Later column towers, including Cairns (1990), Coolangatta (1990), Tamworth (1997) and Melbourne no. 2 (2013) did not repeat the sculptural form of Brisbane and Perth. Rather, these later towers were generally composed of broad cylinders housing services/amenities and cabins positioned on top of slender columns. In this context, the flamboyant and playful design of Sydney 5 is a notable exception.

4.1.3 Architectural design and ATC towers

There is a long, if intermittent, history of architectural design in the context of airports. The emergence of air travel, in the 1920s, coincided with the zenith of Art Deco and Moderne design, trends that spoke of modernity and movement, and were readily adapted to airport architecture. The operations building at Cleveland Airport, which included a roof-mounted control cabin – the first in the United States⁸² – was a symmetrically composed structure with a strong cubic character (Figure 42). The cabin itself was octagonal, and glazed to all sides. The Cleveland operations building has been demolished.

The operations building at Elmdown Airport, Birmingham, England (1939, demolished), which also included a roof-mounted control cabin, was a variation on the Cleveland model, with projecting wing-like canopies to either side. The concept was imported to Australia in the form of the Ops & Admin facilities at Archerfield, Parafield and Mascot (See Figures 35, 36 and Chapter 2, Figure 10).

Design during World War II and in the post-WWII period was generally utilitarian and unpretentious. A notable change occurred in America in the early 1960s, the heyday of the ‘jet age’, when a number of prominent architects were engaged for airport commissions. In the late-1950s, Finnish-American architect and industrial designer Eero Saarinen (1910-1961) was commissioned for a new international airport for Washington (Washington Dulles), at Chantilly, Virginia. The concrete-stemmed control tower at Dulles – an early example of the column tower – comprised two projecting dark-coloured service levels below the square cabin, and the roof-mounted sphere (the *radome*, since remodelled). It gave the tower a distinct appearance, not to be repeated (Figure 43). The tower, and the passenger terminal – the latter distinguished by its catenary curved roof – was subsequently used on to a 20 cent stamp in the United States (Figure 45).

In 1963, architect Wallace K Harrison (1895-1981) designed a new control tower at La Guardia Airport, New York. The whimsical design, comprising a flared 12-storey circular tower punctuated with portholes, coincided with the New York World’s Fair of 1964. The Metropolitan Opera House at the Lincoln Center for the Performing Arts and the Empire State Plaza in Albany are among Harrison’s more notable projects. He also served as Director of Planning on the United Nations complex. Harrison’s La Guardia tower was demolished in 2011.

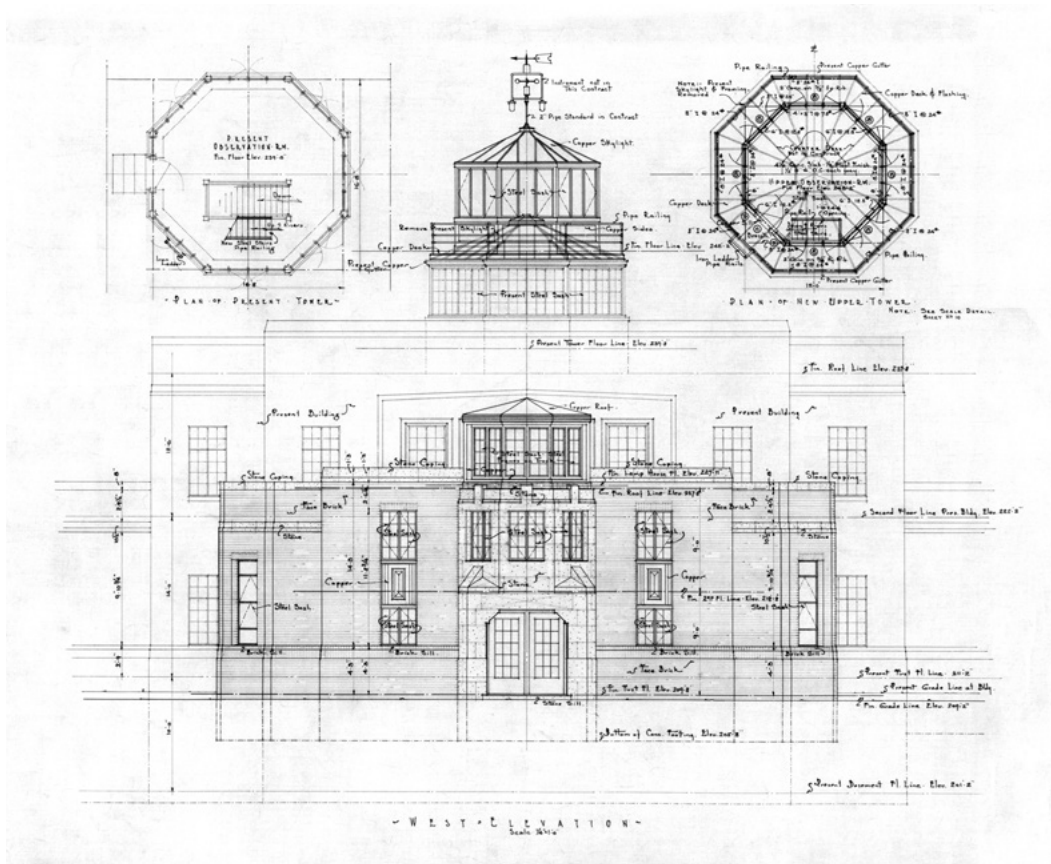


Figure 42 West elevation of
Cleveland Airport terminal building
with integrated control cabin, c.
1929

Source Historic American Building Survey



Figure 43 Integrated terminal building and control tower at Elmdon Airport, Birmingham, England, built 1939

Source Historic England,
historicengland.org.uk, accessed 5
August 2016

Figure 44 Washington-Dulles International Airport, with the control tower to the right of the passenger terminal, built 1962

Source Historic American Building Survey



Figure 45 Washington-Dulles Airport: one of four 'American Architecture' themed stamps, 1982

Source stampcommunity.org





Figure 46 Control tower at La Guardia Airport, New York, completed in 1964 (now demolished)

Source Tumblr

Since the 1990s, commissioning prominent architects to design landmark control towers has become a trend around the world. The speed and size of aircraft have forced ATC towers to unprecedented heights. As a consequence ATC towers, always the tallest buildings at airports, have become impossible to ignore. Recent examples include:

- The National Air Traffic Services tower at Edinburgh Airport, Scotland designed by Reid Architecture. The tower is 57 metres high, and is clad with more than 9000 zinc tiles (Figure 47)
- The ATC tower at Vienna Airport, designed by Zechner + Zechner Architectkten, which is 109 metres high, and was commissioned in 2006 (Figure 48)
- The ATC tower at Suvarnabhumi Airport, Thailand, designed by American practice Murphy/Jahn; 132 metres tall (Figure 49)
- A cable-stayed ATC tower designed by Rogers Stirk Harbour + Partners at Heathrow Airport, England, and commissioned in 2007 (Figure 50)

47	48
49	50

Figure 47 Edinburgh ATC tower, Scotland, commissioned 2005;

Source Architonic, accessed 9 August 2016

Figure 48 Vienna Airport control tower, commissioned 2006

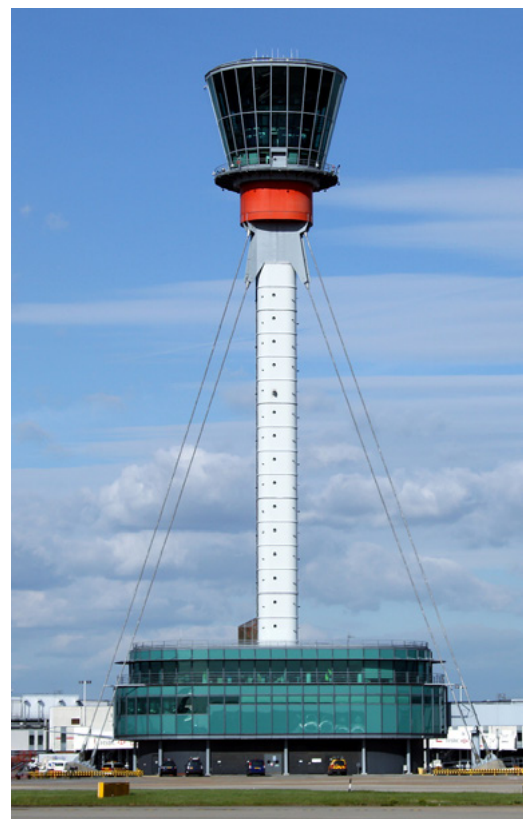
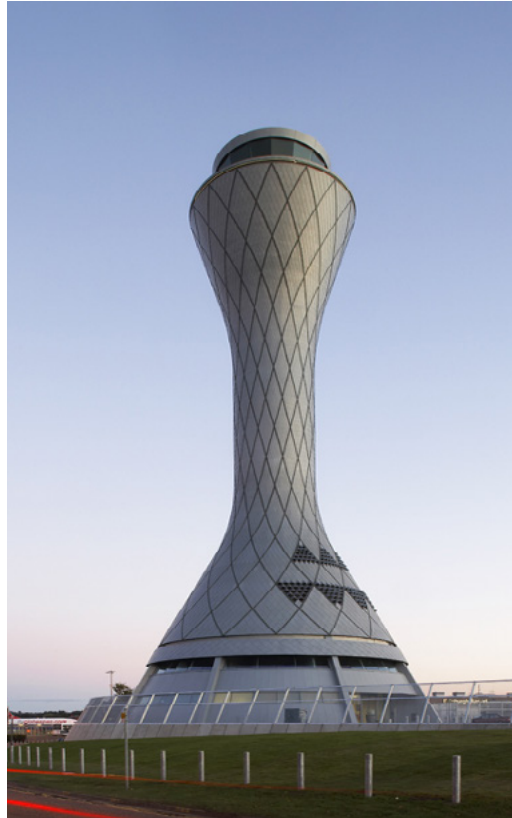
Source www.geograph.com.au (Thomas Nugent), accessed 8 August 2016

Figure 49 Control tower at Suvarnabhumi Airport, Thailand, commissioned 2006

Source www.asiaexplorers.com, accessed 8 August 2016

Figure 50 Heathrow control tower, London, commissioned 2007

Source www.airliners.net (photograph Helmut Bierbaum), accessed 8 August 2016



Some ATC tower have been designed with national or regional characteristics, consistent with the prominence of the towers at major points of arrival to a country. Examples of this pattern include ATC towers at Abu Dhabi International Airport, where the 109-metre high ATC tower is based on the form of a traditional dhow, Bahrain ATC tower and the ATC tower at Harare Airport, Zimbabwe (Figures 51- 53).



51	52
53	

Figure 51 Control tower at Abu Dhabi International Airport, United Arab Emirates, commissioned 2010;

Source www.airliners.net, accessed 8 August 2016

Figure 52 ATC tower at Bahrain International Airport

Source airteamimages.com, accessed 9 August 2016

Figure 53 ATC tower at Harare Airport, Zimbabwe

Source www.panoramio.com, accessed 8 August 2016



4.1.4 Sydney ATC tower no. 5 – design sources

The playful design of Sydney ATC tower no. 5 has no known precedents in the field of ATC tower design. Heathrow ATC tower is comparable as a cable-stayed tower, but post-dates Sydney. Looking more broadly, a notable Sydney reference point is the Centrepont Tower, designed by Donald Crone & Associates (late-1970s), with its bucket-shaped superstructure and cable bracing (see Figure 18).

Further afield, the biomorphic imagery of Sydney ATC tower no. 5 references British 'High-Tech' architecture after Renzo Piano and Richard Rogers' Pompidou Centre, Paris, completed in 1977. Distinguishing characteristics of High-Tech design include an interest in pre-fabrication and expressed structural framing and services (Figure 19 and Figure 20). Another aesthetic counterpart, albeit significantly earlier, is the furnace tower at Paimio Sanatorium, Finland, 1933, by Alvar Aalto, which has similar proportions, a concrete spiral stair around the outside of a brick smokestack and a massive spark arrestor at the top.



Figure 54 Centrepont Tower, Sydney, designed by Donald Crone & Associates, completed 1974

Source National Library of Australia

Figure 55 Warehouse and Distribution Centre for Renault, Swindon, Wiltshire, England, by Foster Associates, 1983

Source *High Tech Architecture*, Colin Davies, Thames and Hudson, London, 1991, p. 65



Figure 56 Laboratories and Corporate Facility for PA Technologies, Princeton, New Jersey, by Richard Rogers Partnership, 1984

Source *High Tech Architecture*, Colin Davies, Thames and Hudson, London, 1991, p. 37



4.2 Analysis of cultural heritage values

An analysis of the cultural heritage value of Sydney ATC tower no.5 was completed in 2009 as part of the National Control Towers Heritage Assessment project. The conclusion of that project was that Sydney ATC tower no. 5 satisfied Criterion F, 'importance in demonstrating a high degree of creative or technical achievement at a particular period', at a level sufficient for inclusion in the Commonwealth Heritage list. Having regard to the further detailed examination of the history of the place and comparison with like places undertaken in the preparation of this report that conclusion is confirmed as summarised in the following table (Table 3). In addition, more detailed assessment concludes that Sydney ACT tower no. 5 also satisfies Criterion E, 'importance in exhibiting particular aesthetic characteristics valued by a community or cultural group', as also addressed in the table below.

CRITERIA A		
Criterion	Significance indicators	Threshold indicators
(a) importance in the course, or pattern, of Australia's natural or cultural history;	association with: - significant event, political, economic or social process - significant phase in the development of civil aviation - significant development in the provision of air traffic control services	- distinctive/exceptional - integrity - longevity - nature and extent of association
Assessment Sydney 5 control tower, and integrated circular plan base building, is associated with a runway expansion program at Sydney Airport, one of the world's oldest continually-operating airports. While the tower is visually and technically highly distinctive its construction occurred within the context of the growth and expansion of Sydney airport and is not in its own right an event of importance to the history of civil aviation or air navigation and traffic control. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

Table 3 Assessment against CHL criteria

CRITERIA B		
Criterion	Significance indicators	Threshold indicators
(b) possession of uncommon, rare or endangered aspects of Australia's natural or cultural history;	Rare example of a particular typology of control tower Rare example of significant technology associated with air traffic control.	in state/national context
Assessment Sydney 5 ATC tower is an elaboration of the cabin-on-a-slender-concrete-shaft type tower type first introduced in Australia at Melbourne-Tullamarine (1968) and subsequently refined at numerous airports, including Perth (1987), Brisbane (1988), Cairns (1990) and Tamworth (1997). It is not rare as an example of its type nor is it rare as demonstrative of significant technology associated with air traffic control. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA C		
Criterion	Significance indicators	Threshold indicators
(c) potential to yield information that will contribute to an understanding of Australia's natural or cultural history;	potential information for: - air traffic control operations - associated technology	- earliness - rarity - intactness
Assessment Sydney ATC tower no. 5 was commissioned in January 1996. It is the fifth (to date) ATC tower at Sydney Airport, which has operated since 1919. While innovative in terms of its design and construction, it has very limited potential to yield information of consequence to the nation, either in the context of air traffic control operations, or associated technologies. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA D		
Criterion	Significance indicators	Threshold indicators
(d) importance in demonstrating the principal characteristics of (i) a class of Australia's natural or cultural places; or (ii) a class of Australia's natural or cultural environments;	Representative example of a control tower typology considered important in the history of the building type.	integrity
Assessment Sydney 5 ATC tower is a relatively recent and unconventional example of the cabin-on-a-slender-concrete-shaft tower type. The first Australian example was built at Melbourne-Tullamarine in 1968. The tower and integrated circular plan base building are largely intact as built, including equipment and fittings. As representative of its type and in demonstrating the principal characteristics of a class of cultural places Sydney ATC no. 5 is undistinguished in doing so. It is a relatively late example of such places and not one which can be elevated over others. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA E		
Criterion	Significance indicators	Threshold indicators
(e) importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;	Evidence that aesthetic characteristics are valued	- design peer group recognition - published - popular recognition
Assessment In addressing the potential for ATC towers to meet this criterion the 2009 National Control Towers Heritage Assessment commented: Little or no evidence was discovered over the course of the study of any of the control towers being valued in the wider context for their aesthetic qualities (using the usual indicators of published reviews, images, and other expressions of a broader interest in the design/appearance of the towers). It is possible this could change over time in the case of the more architecturally refined and/or flamboyant designs of the past 20 years, which have more refined design qualities and a greater physical presence deriving from their height. At present, however, there is no strong evidence of an appreciation of the aesthetic/design qualities of any of the towers.		

Assessment (continued)

As countering this assessment, in describing Sydney ATC tower no. 5 in the *Encyclopedia of Australian Architecture*, Peter Webber notes in his entry on Ken Woolley, 'In one of the most strongly assertive works, the beautifully sculpted forms of the Control Tower at Sydney's Kingsford Smith Airport (1993) signifies to the tens of thousands who pass by each day that this is the nerve centre of Australia's largest airport. The ability to exercise such restraint is the hallmark of an extremely sophisticated and distinguished architect.'⁸³

Considering this comment and in the absence of a formal assessment by way of consultation it is reasonable to state that of all of the post-war ATC's in the country Sydney is the most memorable and potentially of the greatest landmark status. This conclusion goes to its highly distinctive design and aesthetic quality, combined with its prominent siting on a major road.

The external expression of the tower was an innovative and highly creative interpretation of the standard brief for control towers, adapting conventional control tower forms to explore the potential presented by its prominent site. An assured and resolved design by a prominent award-winning architect, tower no. 5 stands as the first (and to date, the only) control tower in Australia consciously designed as a landmark, and displaying such distinctive and flamboyant architectural qualities. Its predecessors in the Australian context were either utilitarian structures based on standardised models (1950s-1980s), or imposing but comparatively restrained forms comprised of slender concrete columns surmounted by amenities/services with cabins above (late-1960s to present).

While, like many places valued for their aesthetic quality and character, it is difficult to establish that there is a specific community or cultural group which values the particular aesthetic of this place, it is reasonable to assume that such a group might materialise if the future of the tower was under threat. In this regard it is evident that Sydney ATC tower no. 5 is of such aesthetic distinction that albeit without defined community which values the place, such a community is highly likely to exist such that its importance in exhibiting particular aesthetic characteristics is met at a Commonwealth level.

As such it is considered to meet this criterion at a level that is indicative of Commonwealth heritage value. It is noted that while it is considered to meet this criterion in the assessment undertaken in the preparation of this HMP, aesthetic significance has not been assessed or approved by the Minister and as such is not a Commonwealth heritage value. The aesthetic significance of the Sydney ATC Tower is considered to be a managed value and not a Commonwealth Heritage Value.

CRITERIA F		
Criterion	Significance indicators	Threshold indicators
(f) importance in demonstrating a high degree of creative or technical achievement at a particular period;	demonstrable qualities: • technical/artistic merit • resourceful (technique) • adaptation (material and construction) • expressive of function/parts	• integrity • design excellence • craftsmanship • legibility • unity • innovative
Assessment Sydney ATC tower embodies a number of new ideas, both architectural and technical. It is the only cable-stayed control tower in Australia, and one of very few internationally. The cabin roof, carried on a single central column, was another Australian ‘first’ – the central column avoids interruption to sightlines by external columns. It was the first Australian tower with a circular cabin, and first to be fitted with a peripheral console, an established format internationally and the preferred future form in Australia. The requirement for unimpeded sightlines over the expanded airport dictated the use of peripheral consoles, which in turn informed the requirement for a central column to support the cabin roof. These design features, practically resolved at Sydney 5, were requirements of the brief. Sydney 5 was also the first tower in Australia to employ computer screen-based technology for its control consoles, derived from the ‘fly-by-wire’ concept used in modern aircraft. The touch-screen consoles give controllers ready access to radar, communication and meteorological data displays.⁸⁴ The use of touch-screen technology is consistent with on-going international developments in air traffic management. However, it is the formal appearance of Sydney 5 ATC tower that is considered to be of greatest interest. Sydney ATC Tower no. 5 is considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA G		
Criterion	Significance indicators	Threshold indicators
(g) strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;	values: • social and cultural meaning • longevity of association • popularity	• extent and degree of association • enduring quality
Assessment While it is possible that Sydney ATC tower no. 5 of interest to specialist aviation groups and air traffic controllers, no associations between the building and particular communities or cultural groups for social, cultural or spiritual reasons have been revealed by research undertaken for this HMP that satisfy the threshold for Commonwealth Heritage significance. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA H		
Criterion	Significance indicators	Threshold indicators
(h) special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history	associations: • important people or groups • major achievement of a recognised person or group	• integrity • design excellence • legibility
Assessment: In addressing this criterion the primary consideration is the significance of the tower in the work of architect Ken Woolley. As noted, Woolley had a long and distinguished architectural career over which time he was the principal designer for numerous and diverse projects. In this context the Sydney ATC tower no. 5 was an important commission to which he responded with a highly creative structure. In considering Woolley's career, however, and his recognised importance in Australia's cultural history as a distinguished architect, the tower does not stand out as a work which contributes to that importance. More broadly since 1919, Sydney Airport has been closely associated with the development of civilian air travel in New South Wales and Australia. It has been visited by numerous pioneer aviators and visiting dignitaries. However, no associations between such individuals and Sydney ATC tower no. 5 have been revealed by the research undertaken to date. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

CRITERIA I		
Criterion	Significance indicators	Threshold indicators
(i) importance as part of Indigenous tradition	Not applicable	Not applicable
Assessment There are no identified sites of indigenous significance within Sydney Airport and the highly disturbed nature of the airport site means that the potential for sites of indigenous significance is low. As such it is not considered to meet this criterion at a level that is indicative of Commonwealth heritage value.		

4.3 Statement of significance

This following statement of significance summarises the findings of this assessment.

What is significant?

Sydney ATC tower no. 5 was designed in 1993, built in 1994-95 and commissioned on 6 January 1996. It comprises a cable-stayed concrete shaft to which an external lift is attached by steel fly braces to the north. The amenities and equipment level cantilevers from the top of the shaft, and is carried on a steel platform which resembles a cloverleaf in plan. The circular control cabin is above the amenities and equipment level. The cabin floor is 38.5 metres above ground level, and 42.85 metres to the cabin roof. The integrated base building, which is circular in plan, is located in a landscaped setting. The control tower and base building are largely intact as built.

How is it significant?

Sydney ATC tower no. 5 is of aesthetic significance and technical/creative significance (CHL criterion F) to Australia.

Why is it significant?

Sydney ATC tower no. 5 is an example of a cabin-on-column ATC tower type. This typology emerged in the United States in the 1950s. The first example in Australia was Melbourne-Tullamarine ATC tower no. 1 (commissioned 1969).

The flamboyant and distinctive design of Sydney ATC tower no. 5 was the work of architect Ken Woolley (1933-2015), of the prominent Sydney practice Ancher, Mortlock & Woolley. The architect shaped the brief in collaboration with the Civil Aviation Authority in order to optimise the prominent site adjacent to General Holmes Drive (the M1).

The aesthetic significance of the tower rests in the external expression which pursued an innovative and creative interpretation of the standard brief for control towers, adapting conventional control tower forms to explore the potential presented by its prominent site. An assured and resolved design, Sydney ATC tower no.5 is the first (and to date, only) control tower in Australia consciously designed as a landmark. As a tall building (the cabin roof is RL 49.1m) in a low-lying landscape located next to a major freeway the building is well-known locally. The external spiral staircase and the clover-leaf plan of the services level are referred to colloquially as the 'slide' and the 'beer cans'.

The predecessors of Sydney ATC tower no.5 in the Australian context were either utilitarian structures based on standardised models (1950s-1980s), or tall but comparatively restrained forms comprised of slender concrete columns surmounted by amenities/services with cabins above (late-1960s to present). Australian towers built subsequent to Sydney ATC tower no. 5 have been variations on the column-and-pod model. A number of ATC towers built overseas since the mid-1990s have been designed as landmarks. In this sense, Sydney ATC tower no. 5 is an early example of an international trend.

Sydney ATC tower no.5 embodies a number of new ideas, both architectural (aesthetic) and technical. It is the only cable-stayed control tower in Australia, and one of few internationally. The cabin roof, carried on a single central column, was another Australian 'first' – the central column avoids interruption to sightlines by external columns. It was the first Australian tower with a circular cabin, and first to be fitted with a peripheral console, an established format internationally and the preferred future form in Australia. Sydney 5 was also the first tower in Australia to employ computer screen-based technology for its control consoles, derived from the 'fly-by-wire' concept used in modern aircraft. The touch-screen consoles give controllers ready access to radar, communication and meteorological data displays.

4.3.1 Commonwealth heritage values and attributes

The table below (Table 4) identifies both the Commonwealth Heritage values and managed values and related attributes at Sydney no. 5 ATC tower. These elements and attributes should be retained and conserved.

Criteria	Values	Attributes
(e) Aesthetic importance (an additional managed value)	The aesthetic importance of Sydney ATC tower no. 5 rests in its assured and highly creative external form and presentation.	Attributes which contribute to the aesthetic importance include the spiral stair, the attached lift shaft, the cloverleaf like amenities and equipment level and the cable stays.
(f) Technical/creative achievement	The design of Sydney ATC tower no. 5 is an innovative and creative interpretation of the traditional cabin-on-column ATC tower type	Technical and creative achievement is demonstrated in the following external features/ attributes: • cable-stayed concrete shaft • steel-framed external lift, attached to the shaft by fly braces • spiral staircase • amenities and equipment level, carried on a steel platform which resembles a cloverleaf in plan • control cabin Technical and creative achievement is demonstrated in the following internal feature: • The column that supports the cabin roof

Table 4 Commonwealth Heritage values and related attributes

4.3.2 Elements of interest

The peripheral touch-screen consoles are elements of interest. This recognises that earlier consoles had been located in the centre of cabins. Further, the touch-screen consoles were the first examples of their type in Australia. They are, however, not features of value to the Commonwealth in their own right.

In the event of a requirement for wholesale replacement, a preference would be for recording of the consoles by means of archival photography prior to removal.

5.0 OPPORTUNITIES AND CONSTRAINTS

The following establishes a framework for the conservation policy at Chapter 6.

5.1 Typological characteristics of ATC towers

Obsolescence of ATC towers as a consequence of technical advances is an established pattern worldwide. As noted at Chapter 2, this issue is particularly pronounced at Sydney Airport, where the operational lifespan of ATC towers is approximately 20 years. Indeed, the building typology itself may be on the cusp of obsolescence, as digital technologies continue to improve. Airservices has recently run trials of a digital ‘tower’ at Alice Springs operated remotely from Adelaide,⁸³ and continues feasibility studies into digital aerodrome technologies as they become available in the marketplace.

In the years ahead, it can be anticipated that a driver for the change in the context of ATC provision will be the introduction of OneSKY, Australia’s first integrated civil and military air traffic management system. OneSKY has been developed collaboratively by Airservices and Defence and constitutes a major overhaul of the technology that supports Australia’s system of air traffic management. The current system, known as TAAATS, was introduced in the 1990s and is nearing the end of its life.⁸⁴

Operational requirements of OneSKY include ATC towers fitted with Integrated Tower Automation Suite consoles (INTAS) which provide air traffic controllers with electronic flight and operational information.

5.2 Implications arising from significance

The Statement of Significance at Chapter 4 demonstrates that Sydney ATC tower no. 5 is of aesthetic significance (CHL criterion E) and technical/creative significance (CHL criterion F) to Australia as an aesthetically arresting and innovative interpretation of the traditional cabin-on-column ATC tower type. The prominently located tower was designed as an eye-catching landmark. The implication arising from this assessment is that key aspects of the ATC tower should be conserved to retain this significance. The key features requiring conservation include:

- The cable-stayed concrete shaft
- The steel-framed external lift attached to the shaft by fly braces
- The spiral staircase that wraps around the shaft
- The amenities and equipment level, which cantilevers from the top of the shaft and is carried on a steel platform which resembles a cloverleaf in plan
- The external presentation of circular control cabin, with canted windows
- The column that supports the cabin roof
- Views of the tower from the public realm, including the M1 (General Holmes Drive) and within the airport complex

5.3 Legislative requirements

5.3.1 *Airports Act 1996* (Australia)

The Department of Infrastructure, Transport, Regional Development and Communications (DoITRDC) owns 21 federally leased airports in Australia, including Sydney. These airports are leased to long-term airport lessee companies (ALCs), Sydney Airport Corporation Ltd (SACL) in Sydney's case. DoITRDC takes on a regulatory role managing these airports through the *Airports Act 1996* and, with respect to the environment, the *Airports (Environment Protection) Regulations 1997*. The management of heritage places at federally leased airports is subject to controls under both the *EPBC Act* and the *Airports Act*.

The *Airports Act* requires that a Master Plan be prepared for each airport that, 'incorporates an Environment Strategy. The Master Plan is a 20-year strategic vision for the airport site which is renewed every five years. The Master Plan includes future land uses, types of permitted development, and noise and environmental impacts. The Environment Strategy sets out the airport's strategy to manage environmental issues within a five-year period and beyond. It is the basis on which the Commonwealth measures the environmental performance of airports and the document by which airport tenants will determine their environmental responsibilities.'⁸⁵ Further, DoITRDC's Heritage Strategy (2016) places responsibility for management of heritage assets, including the preparation of management plans for Commonwealth Heritage places, with the ALCs. In the case of sub-lessees on a federally leased airport (in this case Airservices Australia), the ALC is obliged to work collaboratively in managing heritage values at the airport.

The Sydney Airport Master Plan 2039 was prepared by SACL in accordance with the requirements of the *Airports Act*. The Master Plan was approved by the Australian Government on 17 February 2014 and establishes a development framework for the airport until 2039.⁸⁶ The Sydney Airport Environment Strategy (2019-2024) includes consideration of heritage at the airport (including Indigenous cultural heritage). The key objective of the Environment Strategy with regard to heritage is to 'ensure that items listed in the Heritage Management Plan for the airport as having heritage value are managed in accordance with applicable legislation.'⁸⁷

The *Sydney Airport Heritage Management Plan* was prepared by GML Heritage in 2019. The purpose of the Heritage Management Plan was to, 'provide principles, policies and specific guidelines for managing the heritage values of Sydney Airport during ongoing operations and during any future proposed development, sale or lease of the site, or part of the site.'⁸⁸ (The HMP was updated in August 2019.)

Sydney ATC tower no. 5 is identified in the Heritage Management Plan as an element of high heritage value with little tolerance for change in terms of its location, form and fabric, but with a high tolerance for change with regards to function (see Appendix A).⁸⁹

Management of heritage values

The management of development at airports is controlled by the *Airports Act*. Under Part 5 – Land Use, Planning and Building Controls – a Major Development Plan will be required for significant developments at airports, including where the development is likely to have a significant environmental (which includes its heritage values) or ecological impact. Where a development proposal may constitute a controlled action, the development may also be referred to the Minister for the Environment under Section 68 of the *EPBC Act* (see Section 5.3.2 below).⁹⁰

In addition, building and construction activities at leased federal airports must be approved by the Airport Building Controller (ABC). The ABC is appointed under Commonwealth law to administer the airport building control regime.⁹¹

5.3.2 *EPBC Act 1999* (Australia)

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the *EPBC Act* as matters of national environmental significance.⁹² The Act imposes obligations on Commonwealth agencies to protect and maintain the environment, including the cultural heritage values, of assets that they own or lease.

Section 341ZA of the *EPBC Act* requires that Commonwealth Agencies prepare a Heritage Strategy to provide for the management of any place which has, or might have, one or more Commonwealth Heritage values. Airservices Heritage Management Strategy 2018-2020 identifies how Airservices will meet its heritage responsibilities under the EPBC Act. The objectives of this strategy primarily relate to:

- ensuring continued integration of heritage management into Airservices corporate planning framework
- educating and training Airservices staff to be aware of their heritage obligations
- continuing the program of identifying and assessing likely Commonwealth heritage values of places owned or controlled by Airservices
- ensuring effective inter-governmental, aviation industry and community consultation, and conflict resolution processes exist in relation to heritage matters
- maintaining a register of heritage places under Airservices ownership and control.⁹³

The Regulations to the *EPBC Act*, at Schedules 7A and 7B, identify matters to be addressed in an HMP for places included in the CHL – including Sydney ATC tower no. 5.

The provisions of the *EPBC Act* provide protection for the Commonwealth Heritage values of all places which are either entirely within a Commonwealth area or are owned or leased by the Commonwealth or a Commonwealth Authority, including but not limited to places which are included in the CHL.

Management of heritage values

Any place which is either entirely within a Commonwealth area or is owned or leased by the Commonwealth or a Commonwealth Authority is protected by the *EPBC Act*, regardless of whether it is included on the CHL. Generally, any action which will have a significant impact on the environment of a Commonwealth Heritage Place, including Commonwealth Heritage values, requires approval of the Minister for the Environment. If an agency is unsure that a proposed action will result in a significant impact it can refer the proposal to the Minister for a determination. The decision on whether to refer a proposal is a matter for the agency concerned, being a matter of judgement as to whether the action could have a significant impact on heritage values.

However, Section 9(1) of the *EPBC Act* states that this Act does not affect the operation of the *Airports Act*. As such, if an action is likely to have a significant impact on the environment of a listed place, this action requires assessment and approval under the *Airports Act* and associated Regulations rather than the *EPBC Act*. As outlined in Section 5.3.1 where a development proposal may constitute a controlled action, this development may be referred to the Minister for the Environment under Section 68 of the *EPBC Act*, however ‘where there are processes in place under the *Airports Act*, airports use these rather than referral process under the *EPBC Act*.’⁹⁴

5.3.3 *Air Services Act 1995* (Australia)

The *Air Services Act 1995* establishes Airservices Australia which provides air traffic services, aeronautical information, radio navigation and telecommunications services and rescue and fire-fighting services at federal airports.

Section 9(1) of the *Air Services Act* states that, ‘in exercising its powers and performing its functions, Airservices must regard the safety of air navigation as the most important consideration’. Protection of the environment – which includes heritage places, buildings and attributes – is addressed at Section 9(2) of the Act, under which Airservices has an obligation to, ‘exercise its powers and perform its functions in a manner that ensures that, as far as is practicable, the environment is protected from the effects associated with operations and use of aircraft’.

5.3.4 *Heritage Act 1977* (NSW)

The NSW State Heritage Register, established under the *Heritage Act 1977*, is a list of places and items of State significance, including buildings monuments, Aboriginal places and archaeological sites. One site within Sydney Airport is included in the NSW Heritage Register – Sewage Pumping Station 38.

There are no archaeological sites identified within Sydney Airport which are included on the State Heritage Register, however the New South Wales *Heritage Act 1977* protects the State’s natural and cultural heritage and contains measures to protect archaeological relics/remains. Section 139 of the Act contains provisions for the protection of relics other than those included on the State Heritage Register.⁹⁵ Permission by way of an excavation permit issued by the Heritage Council of NSW is required to excavate land or disturb any archaeological relics in NSW.⁹⁶ However, the *Heritage Act 1977* does not apply to Commonwealth owned places and as such, there are no obligations under the Heritage Act relating to archaeological remains within Sydney Airport unless the Department of the Environment directs the state approval and management process to be undertaken.⁹⁷

5.3.5 *National Parks and Wildlife Act 1974*

Aboriginal cultural heritage is protected in New South Wales under the *National Parks and Wildlife Act 1974*. The Act is administered by the Office of Environment and Heritage (OEH). Under section 84 of the Act, the Minister for the Environment may declare land as an Aboriginal Place when it is or was of special significance to Aboriginal culture. Aboriginal Places protect ceremonial and spiritual values and areas containing objects such as middens, burials, reburials, Bora rings and rock art.⁹⁸

An Aboriginal Heritage Impact Permit (AHIP) is the statutory instrument that OEHL issues under section 90 of the Act to manage harm or potential harm to Aboriginal objects and places.⁹⁹

There are currently no identified sites of indigenous significance within Sydney Airport and according to the Sydney Airport Environment Strategy (2019-2024), ‘archaeological studies indicate that the potential for sites of indigenous significance is low due to the highly disturbed nature of the airport site.’¹⁰⁰

5.3.6 *National Construction Code*

The National Construction Code (NCC) provides the minimum necessary requirements for safety, health, amenity and sustainability in the design and construction of new buildings, and new work in existing buildings, throughout Australia. The NCC was developed to incorporate all on-site construction requirements into a single code. It covers the Building Code of Australia and Plumbing Code of Australia and is managed by the Australian Building Codes Board (ABCB).

The NCC provides a nationally accepted and uniform approach to technical requirements for the building industry. It contains provisions for the design and construction of buildings and other structures, covering such matters as structure, fire resistance, access and egress, environmental sustainability, services and equipment and aspects of health and amenity.

In cases of existing buildings undergoing alterations and/or additions, some discretion may be available with regard to upgrading the existing part of the building to meet the NCC. Provisions also exist in some states for dispensations to be granted for partial or non-compliance in the case of listed heritage places.

5.4 Lease agreement

The CAA (now reconstituted as Airservices Australia) entered into a 40-year lease arrangement with the Federal Airports Commission (FAC, subsequently disbanded) in July 1993 for Sydney ATC tower no. 5. Under the terms of this lease the FAC may carry out construction or demolition works in any part of Sydney Airport other than the ATC tower and associated land, but no works may be carried out to the control tower without the CAA’s consent. Should wider airport planning and development objectives require the CAA to vacate the control tower, negotiations will be entered into to relocate the CAA to a suitable substitute location on the airport site.¹⁰¹

Airservices’ obligations under the terms of this lease are that the control tower must not be used for any purpose other than the permitted use (the construction and operation of a control tower for air traffic control functions, specifically excludes all other uses). Further, the control tower must be kept in good repair. Under the terms of the lease, should the lease expire or be terminated, Airservices would be obliged to remove all or part of any works (buildings, improvements, fixtures, fittings, facilities, paving and landscaping) other than those belong to the FAC.¹⁰² The lease agreement does not explicitly exclude the ATC tower from makegood (which can be understood to mean demolition) at the end/termination of the contract.

The lease provides no guidance with regards to which agency/entity would assume responsibility for Sydney ATC tower no.5 at such time as the lease ends or is terminated. Discussion of future uses of the tower is at Chapter 6 (Policy 14 and Policy 15). Policy 17 addresses statutory implications associated with disposal.

5.5 Stakeholders

At a general level, stakeholders (people or organisations with a real and demonstrated interest in Sydney ATC tower no. 5) fall into three categories: statutory authorities responsible for ensuring the appropriate management of the asset; groups/businesses that rely on the services that the tower provides; and the general public, for whom the tower may be valued as a prominent and distinctive landmark. There are a range of stakeholders with an interest in and concern for Sydney ATC tower no. 5, including the following:

- Department of Agriculture, Water and the Environment
- Department of Infrastructure, Transport, Regional Development and Communications
- Sydney Airport Corporation Limited (SACL)
- Aviation operators
- General public at large

Consistent with the Commonwealth Heritage values of the place (relating, in large part, to its external presentation) and its prominent location, the ATC tower is generally valued and recognised as a largescale public sculpture (Chapter 3). It is not an asset that is accessible to the public, nor has it ever formed part of the community's day to day lived experience, beyond its presence as a landmark. On this basis, it was not considered that there was an imperative to undertake widespread community consultation for this HMP. However, the following targeted consultation was undertaken.

During the preparation of this HMP, the project team sought insights and advice from SACL, the Department of Infrastructure, Transport, Cities and Regional Development (DoITRDC), the Airways Museum and Airservices personnel. Complete drafts of the document were issued to SACL and DoITRDC, and a final draft of the report was placed on public exhibition for 20 business day, as per the requirements of the EPBC Act. No public comments were received during this period.

5.5.1 Department of Agriculture, Water and the Environment

As a Commonwealth Heritage Place, the Department of Agriculture, Water and the Environment (DoAWE) is concerned with the identification, protection and conservation of the identified Commonwealth Heritage values of the Sydney ATC tower no. 5. Any development which may be required at Sydney Airport which would result in the decommissioning of the ATC tower, or its replacement with a new tower will be a matter of interest to DoAWE.

5.5.2 Department of Infrastructure, Transport, Regional Development and Communications

DoITRDC owns 21 federally leased airports in Australia, including Sydney. These airports are leased to long-term airport lessee companies (ALCs, SACL, in Sydney's case – Section 5.5.1 above). DoITRDC takes on a regulatory role managing these airports through the *Airports Act 1996* and, with respect to the environment, the *Airports (Environment Protection) Regulations 1997*.

5.5.3 Aviation operators

Sydney Airport is an international airport and the only major airport serving Sydney. It is the busiest airport in Australia, with almost 350,000 aircraft movements in 2017.¹⁰³ Air traffic services at Sydney Airport are critical to allow for the operational use of the airport however it is unlikely that the manner of the provision of this service would be a matter of concern to these operators.

5.5.4 General public

Sydney ATC tower no. 5 is a prominent and visually striking structure in a predominantly low-lying landscape. It is a well-known and widely recognised landmark that features regularly in photographs of and advertising relating to Sydney Airport. It can be anticipated that there will be a high degree of public interest in proposals for change, new works and adaptive re-use of the ATC tower.

5.6 Presentation and condition

Presentation

Sydney ATC tower no. 5 is largely intact as built, including its landscaped setting.

Alterations have included the extension of the lobby in the base building, and modifications to the console in the control cabin.

Condition

The ATC tower is generally in sound condition, and there are no known impediments to the on-going use of the facility as a consequence of structural integrity.

An infrastructure assessment conducted in 2018 notes identified works required to maintain the structure as an operational tower for a period of 20 years. The report found that the tower should have a further 25 years of service life, provided existing maintenance regimes are maintained, particularly as related to addressing corrosion of exposed structural members and tensioning of the stay rod connection bolts that connect the stay rods to the reinforced concrete buttresses.¹⁰⁴ It is noted that Airservices is committed to the maintenance and upkeep of the tower and there is an annual budget for maintenance to Sydney ATC tower no.5.¹⁰⁵

The infrastructure assessment also makes recommendations for significant upgrades to services, including electrical systems, heating ventilation and air-conditioning and hydraulic systems. The total cost of works to sustain the tower for a further 20 years (to 2038) was estimated at \$19.6 million.¹⁰⁶

6.0 CONSERVATION POLICY AND MANAGEMENT GUIDELINES

This conservation policy is based on the assessment of cultural significance at Chapter 4, and informed by the opportunities and constraints identified at Chapter 5. The policy provides direction and guidance on the conservation and management of Sydney ATC tower no. 5 consistent with its on-going operation as a control tower. It also considers heritage management implications in the event that the tower is decommissioned.

6.1 Definitions

The terminology used in this chapter is of a specific nature. The following definitions are from the *Burra Charter, 2013* (Article 1), as endorsed by a large number of statutory and national heritage bodies.

Place means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.

- › Cultural significance is embodied in the **place** itself, its **fabric, setting, use, associations, meanings**, records, **related places** and **related objects**.
- › Places may have a range of values for different individuals or groups.

Fabric means all the physical material of the **place** including elements, fixtures, contents and objects.

Conservation means all the processes of looking after a **place** so as to retain its **cultural significance**.

Maintenance means the continuous protective care of a **place**, and its **setting**.

Maintenance is to be distinguished from repair which involves **restoration** or **reconstruction**.

Preservation means maintaining a **place** in its existing state and retarding deterioration.

Restoration means returning a **place** to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

Reconstruction means returning a **place** to a known earlier state and is distinguished from **restoration** by the introduction of new material.

Adaptation means modifying a **place** to suit the existing **use** or a proposed use.

Use means the functions of a **place**, including the activities and traditional and customary practices that may occur at the place or are dependent on the place.

Compatible use means a **use** which respects the **cultural significance** of a **place**. Such a use involves no, or minimal, impact on cultural significance.

Setting means the immediate and extended environment of a **place** that is part of or contributes to its cultural significance and distinctive character.

Related place means a *place* that contributes to the *cultural significance* of another place.

Related object means an object that contributes to the *cultural significance* of a *place* but is not at the place.

Associations mean the special connections that exist between people and a *place*.

Meanings denote what a *place* signifies, indicates, evokes or expresses to people.

Interpretation means all the ways of presenting the *cultural significance* of a *place*.

6.2 General policies

Policy 1 Significance as the basis for future conservation and management

The Statement of Significance included in this HMP should be the principal basis for the future management and conservation of Sydney ATC tower no. 5.

Specific conservation objectives should include:

- Managing in accordance with the significance attributed in this HMP (Chapter 4). In general terms the implications of the identification of significance are as follows:
 - › Significant elements and attributes should be retained and conserved according to the principles of the *Burra Charter* (2013)
 - › Elements and attributes that are not identified as significant can be retained, re-used or replaced by new construction or works in a way which has a minimum or no adverse effect on significant elements and attributes
- The retention and conservation of significant elements and attributes in accordance with the policies and recommendations in this HMP.
- A sensitive and respectful approach to adaptation, new works and future development where significant fabric and elements may be affected.

If alterations or changes are proposed which support an appropriate and viable use for the control tower, the works should be undertaken in a manner which has minimal impact on significant fabric.

A summary of significant fabric/elements, and the implications of these assessments, is included in the Sydney ATC tower no. 5 'User Guide' (Appendix C). This brief document was prepared by Airservices to provide guidance to contractors and staff about obligations relating to heritage at the site. The User Guide has been updated for consistency with the findings of this HMP.

Policy 2 Adoption of the Burra Charter

The conservation and management of the subject site should be carried out in accordance with the principles of the Burra Charter (2013).

When assessing the suitability of proposed works to significant elements and attributes at Sydney ATC tower no. 5, the principles of the **Burra Charter** and its practice notes should be referenced. These principles provide guidance on the conservation and adaptation of places and elements identified as being of cultural heritage significance.

Policy 3 Adoption of policies

The policies included in this HMP should be endorsed and adopted by the present and future owners, or managers, of the Sydney ATC tower no. 5, and should form the primary guide for its management.

This HMP should inform future development of the Sydney ATC tower no. 5. The present and future owners of the tower should adopt and implement the policies of the HMP as the key guiding reference in terms of managing change and future development within the site.

Policy 4 Specialist advice and skills

Advice from qualified heritage practitioners should be sought before any action is proposed or undertaken that could have an impact on the Commonwealth Heritage values of Sydney ATC tower no. 5.

Where works to significant elements or attributes are proposed, or where technical advice is needed, it is important to select consultants and contractors with proven experience in the relevant field. This applies to the development of strategic approaches to undertaking works, as well as to the delivery of conservation works.

Policy 5 Compliance with legislation

Airservices Australia should develop and implement protocols for compliance with all legislation, including the EPBC Act and the Airports Act.

The development of protocols to ensure compliance with all applicable legislation should include triggers to ensure compliance with the **EPBC Act**, being the key piece of legislation that applies directly to the management of heritage values. A department within Airservices should be tasked with preparing an information sheet identifying processes to be followed when contemplating works at the control tower, and disseminating the outcomes.

In the event that actions with the potential to have a significant impact on the Commonwealth Heritage values of Sydney ATC tower no. 5 are contemplated, Airservices Australia should consult with the Minister for the Environment. This consultation is not a formal requirement of the **EPBC Act** but is recommended in recognition of the fact that the **Airports Act** takes precedence over the **EPBC Act** in a range of matters, including issues that affect the operation of the place.

Policy 6 Stakeholder liaison

Airservices Australia should consult with all stakeholders identified at Chapter 5 (Section 5.4) and other parties/individuals as relevant, on matters affecting the heritage values of Sydney ATC tower no. 5.

Key stakeholders – being individuals and organisations with a particular interest in the ATC tower – should be advised of any proposals with the potential to impact on the identified values of the place and provided with opportunities to comment. This should also include, where appropriate, community liaison which may be conducted via public advertising (general public) or direct contact.

Policy 7 Managing sensitive information

Airservices Australia should develop and implement protocols to protect sensitive information and equipment relating to the operation of Sydney ATC tower no. 5.

Sydney ATC tower no. 5 is a critical component of Sydney's air safety infrastructure. It includes sensitive information and equipment. Protocols to ensure that this information and equipment is not compromised, or accessed by unauthorised parties should be developed and implemented by Airservices Australia. This policy complies with *EPBC Act Regulations, 2000*, Schedule 7a (h) (v).

Policy 8 Review of the HMP

Consistent with best practice, and the requirements of the EPBC Act, this HMP should be reviewed and updated every five years (by 2024).

Relevant considerations in undertaking a review of this HMP are to incorporate any new information that comes to light, particularly where there is the potential for the new information to result in a reassessment of values. Major physical change to the place would be a trigger for a review of this HMP. Other triggers include instances where: major change occurs as a result of an accident or misadventure (i.e. vandalism or fire); or the HMP is found to be out of date with regard to significance.

6.3 Conservation policies

Policy 9 Conservation of significant attributes and elements

Significant attributes and elements of Sydney ATC tower no. 5 should be conserved.

Significant attributes and elements of the ATC tower are:

- The cable-stayed concrete shaft
- The steel-framed external lift (painted yellow), attached to the shaft by fly braces
- The spiral staircase, that wraps around the shaft
- The amenities and equipment level, which cantilevers from the top of the shaft and is carried on a steel platform which resembles a cloverleaf in plan
- The external presentation of circular control cabin, with canted windows
- The column that supports the cabin roof
- Views of the tower from the public realm, including the M1 (General Holmes Drive) and within the airport complex

Implementation of this policy will require recognition of and respect for the attributes and elements identified above on the part building occupant and managers, and the adherence to Policy 4, which recommends engaging the services of professional heritage consultants in planning and designing outcomes that are compatible with the ATC tower's heritage values. Consistent with the Burra Charter, appropriate heritage outcomes may include: maintenance, preservation, restoration and adaptation.

Condition of Commonwealth Heritage values

Sydney ATC tower no. 5 is a major item of infrastructure that is fundamental to the operation of the Sydney Airport. It is the subject of a cyclical maintenance regime (Chapter 5).

The tower is a high maintenance asset, costing in the order of \$85,000 per annum to maintain. This is largely due to the environmental conditions which are generally poor as a result of the saline air and high levels of aviation fuel. Both of these factors contribute to the corrosion of metal surfaces (painted and unpainted). The cable stays are likewise the subject to cyclical inspections. The condition of the tower is described further detail at Chapter 3.

In relation to the CHL values of the place, its technical (and creative) significance is expressed through its external presentation including the cable stays, the 'beer can' design of the amenities/services level and the spiral staircase. These elements, and the external fabric of the ATC tower generally, are in good condition.

Policy 10 Heritage curtilage

The heritage curtilage for Sydney ATC tower no. 5 should be defined as the Airservices Australia lease at Sydney Airport.

The 'heritage curtilage' for a building, complex or site has been defined as, 'the area of land (including land covered by water) surrounding an item or area of heritage significance which is essential for retaining and interpreting its heritage significance'. A heritage curtilage should include all significant elements and establish an area which is managed to ensure the maintenance of heritage significance. Identification of land to be included within a heritage curtilage does not preclude change within this area. Land within a heritage curtilage does, however, need to be managed so as not to adversely impact on the setting, presentation or significance of a heritage place.

Based on research undertaken for this HMP, there is no heritage imperative to consider a heritage curtilage that extends beyond the boundaries of the area leased by Airservices Australia at Sydney Airport.

Policy 11 Views

Visibility of Sydney ATC tower no. 5 should be maintained, to enable an appreciation of its landmark qualities (aesthetic values).

Sydney ATC tower no. 5 is a freestanding building that was designed to be seen, and to provide views to all parts of the apron and runways. There are views of the building from all sides, some distant (including from the passenger terminals), some more intimate (including views from the M1).

In the event that the tower is decommissioned, and new development of scale is contemplated in proximity to it, views of the tower should be considered in the siting and height of the new works.

Policy 12 Remedial works and cyclical maintenance of significant built fabric

Programs of priority maintenance, remedial works and cyclical maintenance should continue to form the basis for on-going care of the significant built fabric at Sydney ATC tower no. 5.

The fabric of buildings will deteriorate over time due to the effects of age, weather and use – air conditions at Sydney Airport are particularly corrosive, due to its coastal setting. Poor maintenance can hasten the decline and decay of fabric, which can be expensive to rectify if not promptly addressed. It may also result in the loss of significant built fabric which can in turn impact on the heritage values of the place.

Regular inspections of the Sydney ATC tower are carried out by Airservices personnel, and this should continue. This approach will help to retard deterioration of original and significant fabric. Ad hoc repairs or patch ups should be avoided. The focus of regular inspections should continue to place emphasis on susceptible areas which, in this case, includes all external fabric, particularly unpainted metalwork, connections between steel elements and areas prone to guano deposits.

At a minimum, the cyclical inspection and maintenance program for Sydney ATC tower no.5 should include:

- Finishes to the cabin roof, painted and unpainted metal surfaces, downpipes, drains and surface drainage, security and fire precautions, plumbing, electrical and data cables and appliances, windows and doors.

Generally, day-to-day maintenance work can be carried out in accordance with the conservation policies and without reference to a conservation specialist. However, major maintenance works should be undertaken under the direction of an appropriately qualified conservation practitioner.

The primary aim of repair work should be to retain as much of the existing original material as possible. In most cases involving repairs to significant fabric, the advice of a heritage practitioner will be required prior to undertaking the works, to ensure the significant fabric is treated appropriately.

Maintenance

Maintenance addresses all existing components of the place, including fabric and setting. Introducing new elements (such as new structures) or changing and adapting the existing building are not matters of maintenance, and are addressed in policies and recommendations included elsewhere in this HMP.

Typical maintenance works at Sydney ATC tower no.5 include:

- Cleaning out drainage systems and other water storage and drainage areas
- Maintaining and securing external wall fabric and glazing in an appropriate and sympathetic manner (may require specialist input)
- Maintaining equipment and services (i.e. building services, not services related to the operation of the building as a control tower)
- Replacing or upgrading services (may require specialist input for substantial works)
- Maintaining existing services where this involves no alteration to the fabric of the place
- Repainting to match the existing (subject to the recommendations)

Note also that the audit of condition carried out by Woolacotts (8 August 2014) provides recommendations for treatment of corroded/deteriorated fabric, including localised jet blasting of paint finishes to limit deterioration.¹¹⁰

Repairs

From a heritage perspective it is generally recommended that repairs of significant buildings and structures should involve replacing 'like with like,' i.e. the replacement of material (missing, deteriorated or broken) with fabric to match the existing. Accepting this principle, it is also important to determine if the material proposed for replacement is appropriate (it may not be original or have performed satisfactorily). The advice of a qualified heritage practitioner should be sought on this. Wherever possible, only actual decayed fabric of a heritage structure should be replaced, instead of the whole host element.

Repairs to significant structures should also, in preference, be carried out by appropriately skilled staff or contractors, and may require in some cases prior analysis of the composition of the fabric to be repaired/replaced.

Specialist input may also be required for the identification and eradication of any damage caused by pest infestations. Rectification may involve repair to, or replacement of, damaged fabric.

Policy 13 Presentation

Original aspects of the tower's external presentation should be maintained.

The external paint colours and materials palette are original, and form an important part of the building's character and presentation. Repainting of painted external surfaces, including the lift shaft, should match the existing. Likewise, replacement of external cladding materials should in preference match the existing (original) treatment.

Where paint has failed due to corrosion of the metal surface, the metal should be coated with an appropriate stabilizing paint finish (such as Luxaprime Zince Phosphate available from Dulux) to limit further corrosion prior to repainting. For further direction, refer to the Structural and Building Fabric Audit prepared by Woolacotts (2014).

In preference, the existing (original) landscape treatment should also be maintained, including native shrubs, grasses and low-growing trees.

6.4 Use, adaptation and change

Policy 14 Use

Future uses of Sydney ATC tower no. 5 should be compatible with the assessed values of the place so that its cultural significance is maintained and conserved.

As discussed at Chapter 5, air traffic control towers are prone to obsolescence. The four earlier towers at Sydney (1937, 1938, 1953 and 1972) were replaced, variously, because of technological advances, the introduction of new safety standards and extensions to the airport. Other common determinants for the replacement of towers are the introduction of larger and faster aircraft, which require larger airfields to accommodate them, and the introduction of development that obscures sight lines from the air traffic control towers.

The nature of the form and construction of Sydney ATC tower no. 5, and the limited dimensions of the internal spaces to the upper levels, are constraints in terms of identifying a new use for the tower component of the complex. The building's location in a secure compound isolated from the principal public areas of the airport, and SACL's aspirations for the expansion of the apron to the north of the Airservices lease are further limitations (see Section 5.5.3).

The key issue to consider regarding a future use of the ATC tower complex at Sydney will be to avoid or minimise the potential for impacts on the tower's Commonwealth Heritage values, being its external presentation (aesthetic value) and its technical/creative values. Having regard to this objective, the element (or area) with greatest potential to support a new use at the ATC complex is the base building, which has limited visibility from the public domain and has previously been modified (extension of the lobby).

Policy 15 New works and change to significant elements

New works within the Airservices lease and physical alterations to significant fabric should be limited to works that do not diminish the cultural heritage values of Sydney ATC tower no. 5.

In the event of disposal by Airservices Australia it can be anticipated that physical change will be required to support a new use for Sydney ATC tower no. 5. As foreshadowed at Policy 14, it is anticipated that the element with the greatest potential for change without undue impact on the building's CHL values is the base building, which might reasonably be contemplated for extension and/or alteration. It is also noted that the equipment at the control tower has not been assessed as being of significance in its own right, and could be removed to create unencumbered internal spaces to the west of the base building. As noted at Chapter 4, the peripheral consoles and touch-screens used in the cabin are of interest from a heritage perspective. As such, in the event that there is a requirement for them to be upgraded – perhaps as related to the introduction of OneSKY (see Section 5.1) – the existing consoles (see Section 5.1) – the existing consoles should be recorded by means of archival recording prior to removal (see also Policy 16).

Where works are required the overriding objectives are firstly to retain and conserve significant fabric and attributes, and secondly to plan and undertake works in a manner that is sensitive to the valued form and presentation of significant fabric. All alternative approaches should be investigated before removal of significant elements, and new works should be clearly identifiable as such.

Subject to impacts on views of the tower (see also Policy 13), there may also be potential for the introduction of new development to the east and west of ATC tower compound.

Policy 16 Recording

Airservices Australia, and subsequent owners, should maintain a record of significant interventions to Sydney ATC tower no.5.

Records of works/interventions to the tower should be maintained by Airservices Australia. The record (or file) should include copies of all superseded architectural drawings, and photography of the affected areas before and after the works. This policy complies with *EPBC Act Regulations*, 2000, Schedule 7a (h) (x).

In the event of disposal or termination of the lease, Airservices Australia's obligations include removing fixtures and fittings. Prior to this obligation being implemented, an audit of equipment and fittings should be prepared. While fixtures and equipment at the building are generally not considered to be significant in their own right, it is noted that the touch screens and peripheral console (as modified) are the first examples of their type in Australia. As such, it would be appropriate to undertake archival recording of the console in the form of photography and measured drawings prior to removal.

6.5 Management policies

Policy 17 Statutory controls

Sydney ATC tower no. 5 should continue to be recognised as a place of cultural heritage significance to Australia through its inclusion in the Commonwealth Heritage list.

Sydney ATC tower no. 5 has been assessed as a place of aesthetic (architectural) and technical significance to Australia. As such, it should continue to be managed in compliance with the heritage obligations under the *Airports Act 1996* and the provisions of the *EPBC Act 1999*. It is recommended that the CHL entry for the control tower should be updated to reference this HMP, and to include the Statement of Significance in this HMP.

In the event that the asset is divested Airservices Australia will ensure that the Commonwealth Heritage values of the asset are protected. As per Section 341ZE of the EPBC Act, in the event that the tower is sold or leased, Airservices will advise the Minister at least 40 business days prior to the execution of the contract, and follow all appropriate measures to ensure the Commonwealth Heritage values of the tower are protected. Assuming that Sydney Airport remains Commonwealth-owned land, the ATC tower would remain in the CH list.

In the event that Sydney Airport were to be sold by the Commonwealth, Sydney ATC tower no. 5 should be nominated for inclusion in the NSW State Heritage Register.

Anyone is able to nominate a place/object for listing in the NSW Heritage Register, which is established under Part 3A of the *Heritage Act 1977* (NSW). The process, set out on the NSW Government Office of Environment and Heritage website (www.environment.nsw.gov.au/Heritage/listings/nominateshr.htm) would require the ATC tower to satisfy more than one of the criteria listed below. The Act also provides for the inclusion of places that meet only one criteria, if they are of 'particular significance'.

The NSW heritage criteria are as follows:

- a an item is important in the course, or pattern, of NSW's cultural or natural history
- b an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history

- c an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW
- d an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons
- e an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history
- f an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history
- g an item is important in demonstrating the principal characteristics of a class of NSW's
 - › cultural or natural places
 - › cultural or natural environments.

It should be noted that Sydney ATC tower no. 5 may not satisfy the threshold for inclusion in the NSW Heritage Register.

It is noted that Sydney Airport, including the ATC tower is currently listed as an indicative place on the CH list. Were it to be included in the List, the ATC tower no. 5 would also be included in this listing.

Policy 18 Access and security

The security arrangements, requiring all visitors to present themselves to the security guard based to the west of the entry, should be maintained.

While the ATC tower remains operational, Airservices should maintain the current security arrangements, which require all visitors to present themselves at the guard's office. This policy complies with *EPBC Act Regulations, 2000*, Schedule 7a (h) (ii).

Policy 19 Training and awareness

A training program should be instigated to raise awareness of the heritage significance of Sydney ATC tower no.5 among the staff of Airservices Australia and SACL.

The heritage significance of the Sydney ATC tower no.5 may not be evident to casual observers and passers-by. It is recommended that a training program to promote awareness of the building's heritage values is developed and implemented by Airservices Australia. Key audiences for the program are Airservices Australia personnel, and staff of SACL.

Recognising that the Commonwealth heritage values relate to the external presentation of the tower, the training and awareness will ensure personnel are aware of the implications of inadvertently impacting the heritage values of the place. At such time as new staff are inducted, the heritage status of the tower will form part of their induction package, including training and awareness of how the heritage values may be impacted.

Policy 20 Interpretation and promotion of heritage values

Airservices Australia, and subsequent owners of Sydney ATC tower no. 5, should promote and disseminate information about the cultural heritage values of the building.

Strategies for the promotion and dissemination of information about the cultural heritage values of the ATC tower should be prepared in the form of an interpretation plan. Recommendations for interpretation should be informed by but not limited to consideration of: best practice principles (including the *Burra Charter* 2013 practice note 'Interpretation'); the identified heritage values of the place; the anticipated audience for interpretation; and existing interpretative programs at Sydney Airport.

Interpretation can be undertaken via a range of tools and methods. Information can be presented in a readable format (printed or electronic, including brochures, pamphlets, books and websites); through on-site signage; through the display of objects/artefacts; and through art works.

In the event that the ATC tower is adapted to a new use, especially a new use that provides public access to the building, the nature of the interpretive program is likely to change (see also Policy 14).

Policy 21 Archaeology

The discovery of historical archaeological artefacts and objects at the site should be reported to the Department of the Environment.

The *Heritage Act 1977* does not apply to Commonwealth owned places and as such, there are no obligations under the Heritage Act relating to archaeological remains within Sydney Airport unless the Department of the Environment directs that state approval and management processes should be undertaken. In the event that archaeological artefacts relating to pre-Airservices uses of the land, the discoveries should be reported to the Department of the Environment.

This is also consistent with regulation 4.05 'Duty to give notice of cultural etc discovery' in the *Airports (Environment Protection) Regulations 1997*.

Policy 22 Monitoring of policies

Monitoring and implementation of policies in this HMP should be reported in Airservices Australia's annual report.

Relevant personnel/departments within Airservices Australia should be given responsibility for monitoring and implementing the policies in this HMP. Timelines for review should also be identified, consistent with this conservation policy – i.e. annual reporting for maintenance (Policy 12, 'Remedial works and cyclical maintenance'); five-yearly reporting for review of this HMP (Policy 8. The information identified above should be included in Airservices' annual report. This policy complies with *EPBC Act Regulations*, 2000, Schedule 7a (j).

Policy 23 Risk preparedness

A Risk Management Strategy should be integrated into the broader management and administration of Sydney ATC tower no.5.

Risk preparedness and management is an important means of protecting and conserving the heritage values of heritage places. While a detailed assessment of risk is beyond the scope of this report, the following table describes potential threats and hazards posed to the physical fabric at the subject site by environmental and man-made factors.

Table 6 Analysis of risk to
Sydney ATC tower no.5

Threat	Probability	Preparation/Response
Vandalism and theft	Moderate	Vandalism and theft are always possible. Existing security arrangements, including security cameras, should be maintained
Fire	Always present	Establish a fire suppression and warning system as part of any adaptive re-use, and upgrade as required. Ensure there is an evacuation plan in place, and conduct regular training and rehearsals. Ensure that combustible materials do not come into contact with hot lights. Ensure that extinguishers, fire blankets etc, are located within reach of potential sources of fire. Maintain electrical systems in good order. Maintain liaison with fire brigade to regularly test and monitor systems.
Lightening	Always present	Maintain lightening protection system in accordance with the relevant Australian Standard (currently AS/NZS 1768:2007).
Flood	Possible	Localised internal flooding, from toilets, sinks and pipe work, is always possible. Maintenance of wet areas and pipe work is a means of minimising this possibility.
Water ingress	Moderate	Rainwater goods should be repaired (where required), maintained, installed and kept clear. Inspect and maintain roofs, windows and doors regularly.

6.6 Implementation plan

A plan for the implementation of the policies set out at Section 6.2 'General policies', 6.3 'Conservation policies', 6.4 'Use, adaptation and change' and 6.5 'Management policies' is included at Table 7. This complies with *EPBC Act Regulations*, 2000, Schedule 7a (i).

Sydney ATC tower no. 5 is an operational asset, and as such is managed and maintained in accordance with Airservices' corporate Environmental Management System (EMS), which is certified (and independently audited) against ISO14001:2015. This includes compliance with a range of on-ground environmental standards, procedures, plans and guides, including heritage matters.

Sydney ATC tower no. 5 is operated and maintained as part of Airservices annual operational budget for Air Navigation Services (ANS) operations (Southern Region).

Table 7 Implementation plan

Policy	Responsibility	Timing	Funding
Policy 1: Ensure that the Statement of Significance included at Section 4.3 of this report is referred to prior to any proposed works or alterations, including conservation and management, being undertaken to the ATC tower.	Airservices project managers	On-going (low priority)	N/A
Policy 2: Ensure that conservation, maintenance, preservation, restoration or adaptation works to the ATC tower, or within the area leased by Airservices, are consistent with the Burra Charter.	Airservices project managers	On-going (low priority)	N/A
Policy 3: Ensure that the policies in this HMP are endorsed and form the primary guide for the management of the ATC tower.	Airservices project managers	On-going (high priority)	N/A
Policy 4: Maintain access to specialist contractors and consultants	Airservices project managers	On-going (low priority)	N/A
Policies 5, 17 and 21: Maintain protocols for compliance with legislation, including with regard to unexpected discoveries (archaeology)	Airservices project managers	On-going (low priority)	N/A
Policy 6: Ensure that stakeholders identified at Section 5.5 of this report are provided with opportunities to comment on proposed changes to the ATC tower	Airservices project managers	On-going (low priority)	Funds to be identified in project budgets
Policy 7: Protocols to protect sensitive data and equipment should be maintained.	Environment Team Leader	On-going (low priority)	Airservices' annual operating budget
Policy 8: Ensure that a review of this HMP is undertaken by 2023	Environment Team Leader	By 2023 (high priority)	Funds to be allocated for HMP review in 2022
Policy 9: Ensure than elements and attributes intrinsic to the significance of the ATC tower, as listed at Section 6.3 of this report, are conserved	Airservices project managers	Within the life of this plan, 2018-2023 (high priority)	Airservices' annual operating budget

Policy	Responsibility	Timing	Funding
Policies 10, 11 and 13: Ensure that works within the area leased by Airservices, do not impact detrimentally on the setting or presentation of the ATC tower.	Airservices project managers	On-going (high priority)	N/A
Policy 12: Monitor and document the condition of the built fabric (annual maintenance regime). Undertake maintenance works as required.	Airservices project managers	On-going – annually (high priority)	Airservices' annual operating budget
Policies 14 and 15: In the event that ATC tower no. 5 is replaced, ensure that changes associated with adaptation to a new use are compatible with the building's assessed significance and CHL values.	Airservices and/or future owner	N/A (low priority)	N/A
Policy 16: Maintain a record of significant interventions to the ATC tower.	Airservices project managers	On-going (low priority)	N/A
Policy 17: In the event of disposal by Airservices, the ATC tower should be nominated for inclusion in the NSW State Register.	Environment Team Leader	N/A (low priority)	N/A
Policy 18: Ensure that access and security protocols are maintained while the tower is operational.	Airservices staff	On-going (high priority)	N/A
Policy 19: Instigate heritage awareness training program, to promote an understanding of the tower's significance	Environment Team Leader	Within the life of this plan (2018-2023) (high priority)	Heritage matters are covered under site inductions for Sydney ATC tower and through mandatory online environmental training for all staff and contractors (with regular refreshers).

Policy	Responsibility	Timing	Funding
Policy 20: Develop and implement an interpretation plan for the ATC tower	Environment Team Leader	Within the life of this plan (2018-2023) (low priority)	As required
Policy 22: Ensure that monitoring and implementation of policies in this HMP are reported in Airservices Australia's annual report.	Environment Team Leader	Annually (high priority)	As required
Policy 23: Ensure that risks associated with vandalism, theft, fire and flood are managed in line with the recommendations set out in this report.	Airservices project managers	Ongoing (high priority)	These risks are evaluated, managed and mitigated to a level of ALARP (as low as reasonably practical) through Airservices corporate risk management system (CIRRIIS)

6.6.1 Monitoring of implementation

The implementation of the management plan, and its effectiveness in conserving the ATC tower's CHL values will be managed by the ANS Senior Environmental Specialist and assessed by the relevant ANS Technical Services Officer (using the ANS Annual Site Condition Checklist – Form081, v19, 1 February 2017).

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APPENDIX A

HERITAGE CITATIONS

- A.1 Commonwealth Heritage list entry for Sydney ATC tower no.5**
- A.2 Extracts from Sydney Airport Heritage Management Strategy, GML, June 2009**

Place Details

[Send Feedback](#)

Sydney Airport Air Traffic Control Tower, General Holmes Dr, Sydney Airport, NSW, Australia

Photographs	None
List	Commonwealth Heritage List
Class	Historic
Legal Status	Listed place (22/01/2016)
Place ID	106116
Place File No	1/16/007/0014

Nominator's Summary Statement of Significance

Sydney 5 ATC tower is of aesthetic significance in the context of control tower design in Australia as a flamboyant and highly distinctive air traffic control tower design of the late twentieth century and a landmark at Sydney Airport.

The Sydney 5 ATC complex was conceived in the early-1990s, when government approval was granted for a new parallel north-south runway at Sydney Airport, a development that meant the existing control tower (Sydney 4) would no longer have visual access to all areas of the runways and taxiways. The new tower was designed by architects Anchor Mortlock & Woolley Pty Ltd (design architect Ken Woolley) to specifications prepared by the Civil Aviation Authority (CAA). Documentation was complete in 1993, with construction occurring between 1993 and 1995. The complex was commissioned on 6 January 1996.

The control tower is an elaboration of existing column-and-pod tower forms. It comprises a cable-stayed pre-cast concrete shaft with a steel and glass passenger lift attached. A cranked spiral stair sweeps around the concrete shaft. The amenities/equipment level adopts an unusual clover-like plan form (series of circular pods) and is cantilevered out from the top of the shaft, with the circular control cabin above this; both use distinctive faceted blue tinted glazing.

The cabin roof is 42.85m above ground level. A number of new ideas, both architectural and technical, were applied at Sydney 5. It is the only cable-stayed control tower in Australia. The cabin roof, carried on a single central column, was another 'first' in Australia - the centralised column avoids interruption to sightlines by external columns. Sydney 5 was also the first Australian tower with a circular cabin fitted with a peripheral console, an established format internationally and the preferred future form of console in Australia (this was a requirement of the brief).

The external expression of the tower was an innovative and highly creative interpretation of the standard brief for control towers, adapting conventional control tower forms to explore the potential presented by its prominent site. An assured and resolved design by Ken Woolley, a prominent award-winning architect, Sydney 5 ATC tower stands as the first (and to date, the only) control tower in Australia consciously designed as a landmark, and displaying such distinctive and flamboyant architectural qualities. Its predecessors in the Australian context were either utilitarian structures based on standardised models (1950s-1980s), or imposing but comparatively restrained forms comprised of slender concrete columns surmounted by amenities/services with cabins above (late-1960s to present). By way of comparison, the towers at Perth Airport (commissioned 1986) and Brisbane Airport (1988) are taller but far more restrained architecturally; both are faceted concrete columns flaring at c. 45m to accommodate amenities/services and control cabins.

Since the completion of Sydney 5, a number of tall and aesthetically-striking control towers with 'landmark' qualities have been constructed overseas. Examples include Malpensa Airport, Italy (2001), Vienna Airport, Austria (2006), Heathrow Airport, England (2007) and Suvarnabhumi Airport, Thailand (2006), which is the world's tallest free-standing control tower.

The Sydney 5 ATC tower is considered to meet the Commonwealth Heritage List criteria at a level indicative of Commonwealth Heritage Value/s.

Official Values Not Available

Description

Context:

The control tower complex occupies a central position in the airport, to the north of the point at which General Holmes Drive goes under the main north-south runway. The tower is staffed 24hrs a day, every day of the year. The cabin floor is 38.5m above ground level; 42.85m to the cabin roof.

Exterior:

Sydney 5 control tower comprises a cable-stayed pre-cast concrete shaft with an external passenger lift to the north. A spiral escape staircase sweeps around the concrete shaft, which is positioned just off-centre of the circular single-storey base building. The amenities/equipment level cantilevers from the top of the shaft, with the circular control cabin above.

The design concept is described by architect Ken Woolley:

The geometry of the design is based on an equilateral triangle or tri-star plan with a slim pre-cast central column in which services run, supporting a steel strutted and cantilevered platform and braced by post-tensioned steel rods to three points on the base building. This ensures the most rigid, sway-free structure with the advantage of prefabrication for rapid construction. (*'Control Tower, Sydney Airport,' Ken Woolley, of Ancher, Mortlock & Woolley, April 1995. Courtesy of Ken Woolley*).

The doughnut-shaped plan of the base building is broken to the north-east to accommodate an opening for a paved pathway, which leads to an entrance lobby at the south of a sheltered courtyard. The lobby was extended into the courtyard in c. 1998 to create a larger reception area.

The base building is sheathed in glass and aluminium panels. The roof, like all areas of roofing at the ATC complex including the roof of the cabin, is a waterproof membrane with pre-cast concrete panels above. A canopy projects from the south-west, shielding the primary point of access to the equipment rooms.

The off-white segmental concrete shaft is 2.5m in diameter and 20m high, with a flat face to the north to which the lift is attached by steel fly-braces. A metal column rising from the top of the concrete shaft carries the steel cloverleaf platform above. The lift shaft has a metal frame, painted yellow, with translucent glass panels. The lift terminates at the amenities/service level.

The platform for the amenities/services level was lifted from the ground in one piece. It is strutted by stainless steel fittings and tension adjusters, brought down to three piers at the edge of the base building. The platform has a cloverleaf plan of six bays formed by radiating steel ribs. The six bays, nicknamed 'beer cans', are clad in reflective blue-tinted glass panels. The circular cabin has 18 panels of outward canted frameless glass.

The 12m-diameter cabin roof, carried on a central column rising through the cabin, is stabilised by thin stainless steel rods outside the joints of the frameless 25mm-thick glass. The cabin roof accommodates surface movement radar, warning lights and a crown of aials and lightening conductors.

The spiral staircase is a rectangular tube of 18 cranked facets in aluminium panels punctuated by small porthole windows. Two diagonally trussed steel walkways provide stability and access to the concrete shaft.

The fire stair extends from the roof of the base building to a balcony – with an external platform – below the amenities/services bays. A return flight of stairs inside a single-storey concrete cylinder provides access from ground level to the bottom of the spiral staircase.

Interior:

The base building accommodates the plant room, standby generator, uninterrupted power supply, equipment rooms, staff amenities, reception area, offices and meeting room. Finishes throughout are utilitarian and consistent with the mid-1990s period of the construction. Alterations to the base building since construction include the extension of the lobby (c. 1998), and modifications to the subdivision of the east wing to accommodate additional office space. The six bays that comprise the amenities and plant-room level are arranged in three pairs with differing functions. The two bays to the north accommodate air-conditioning plant; the two bays to the south-east are staff stand-down areas, including a galley; the two bays to the south-west accommodate equipment racks and facilities. Toilets are to the west of the central lift lobby and circulation space, with staircases extending to the cabin above and the escape stair below.

The floors are reinforced concrete, carpeted in the central lobby and stand-down areas; exposed in the air conditioning plant and equipment rooms. Ceilings in the lobby and stand-down areas are lined with perforated metal acoustic panels with recessed vents and lighting. Paint throughout is generally light-coloured. The cabin, accessed via a carpeted curving staircase, is arranged around a central steel column, from which six cantilevers splay at the top to support the cabin roof. This arrangement has the advantage of avoiding interference to sightlines by external columns, and also facilitates the use of peripheral consoles. Consoles abut the edge of the circular cabin (diameter 7.5m) to the east, north and west. The cabin managers' desk is to the south (rear). The consoles use touch-screen technology of the type used in modern aircraft, giving controllers access to situational radar, communication and meteorological data displays.

The cabin ceiling is lined with perforated metal acoustic panels. The cabin roof is accessed by a drop ladder to the south of the cabin ceiling. The concrete floor is carpeted. Storage space is limited. Cabinetry has been installed around the base of the central column and to the south-facing wall. The risers and treads of the spiral

escape staircase are steel, painted white.

Conclusion:

The ATC complex is largely intact as built, externally and internally, with the only significant modification being the extension of the curved entrance foyer to accommodate a larger reception area.

History

Sydney Control Tower No.5 was conceived when government approval was granted for a new parallel northsouth runway at Sydney Airport, a development that meant Sydney Control Tower No. 4 would no longer have visual access to all areas of the runways and taxiways.

The eye-catching design of the new tower, conspicuously different from all preceding towers both in Australia and overseas, was developed by the architecture practice Anchor, Mortlock & Woolley (Sydney). Ken Woolley, an experienced and award-winning architect, was the design architect and recalls the commission as follows: 'The design evolved through discussions with the Civil Aviation Authority. The location of the building, next to General Holmes Drive, meant that it was going to be a landmark anyway ... but was it going to be a good landmark? The notion [of developing a building with landmark qualities] was well supported [by the Civil Aviation Authority]' (*Pers comm., Ken Woolley, Anchor, Mortlock & Woolley, and Adam Mornement, Lovell Chen, 25 February 2009*).

The tower was designed and built to a tight time-frame. Construction began in August 1993, and the tower was commissioned on 6 January 1996. The budget was equivalent to recent control towers of conventional construction.

In 1995 the tower was awarded a high commendation in the Australian Steel Design Award for Buildings by the Australian Institute of Steel Construction (New South Wales).

Condition and Integrity

Minor modifications to the entry and internal lay-out occurred in c. 1998.

Location

Approximately 0.1ha, Lawrence Hargreaves Drive, Sydney Airport, comprising the Air Traffic Control Tower and its base building located within Land Parcel 8/DP1050923 and centred on approximate MGA point Zone 56 331900mE 6242400mN.

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Report Produced Thu May 26 13:35:16 2016

Ref no.: 496	Item: Fifth control tower	Heritage Value Ranking: High
Location: Sir Laurence Hargrave Street		 (Source: GML 2008)
Description/Function: The fifth control tower is a 45m high building located southeast of the main north–south and east–west runways. It is constructed of prefabricated concrete and post-tensioned steel with a top cabin featuring angled frameless glass. 25m taller than the fourth control tower, the fifth control tower was completed in 1996 to provide views of the newly constructed third runway.		
Heritage Values: As the most recent and technically advanced of the three remaining control towers at the airport, the fifth control tower is demonstrative of the rapid changes in air traffic handling technology and the changing requirements of an expanding airport. The fifth control tower displays technical merit through its innovative use of materials and design. The tower is a landmark of Sydney Airport, and its iconic and striking design contributes to the aesthetic value of the airport as a whole. The tower is an embodiment of the operational requirements of the airport and, in juxtaposition with the other two remaining control towers, is demonstrative of the growth of civil aviation throughout the twentieth century.		
Tolerance for Change: Low tolerance for change.		

Ref no.:	Item: Fig trees	Heritage Value Ranking: Moderate
Location: Helicopter base, Hammond Place		 
Description/Function: Fifteen fig trees (<i>ficus rubiginosa</i> and <i>ficus macrophylla</i>), planted during the mid-nineteenth century, are located near the helicopter base in the southeastern corner of the airport grounds.		
Heritage Values: The trees mark the former extent of the Engine Pond and are indicative of pre-airport landscaping of the area. They demonstrate how the development of the airport has altered sections of the Botany Wetlands significantly, showing that the size of the Engine Pond has been dramatically reduced. The trees are some of the oldest landscape plantings in the airport. As a group the 15 fig trees, in conjunction with the Botany Water Pumping Station ruins, Engine Ponds, Mill Pond and Mill Stream, and Sewage Pumping Station 38, demonstrate rare aesthetic values not located elsewhere in the constrained industrial site. (Image source: GML 2008)		
Tolerance for Change: Low tolerance for change.		

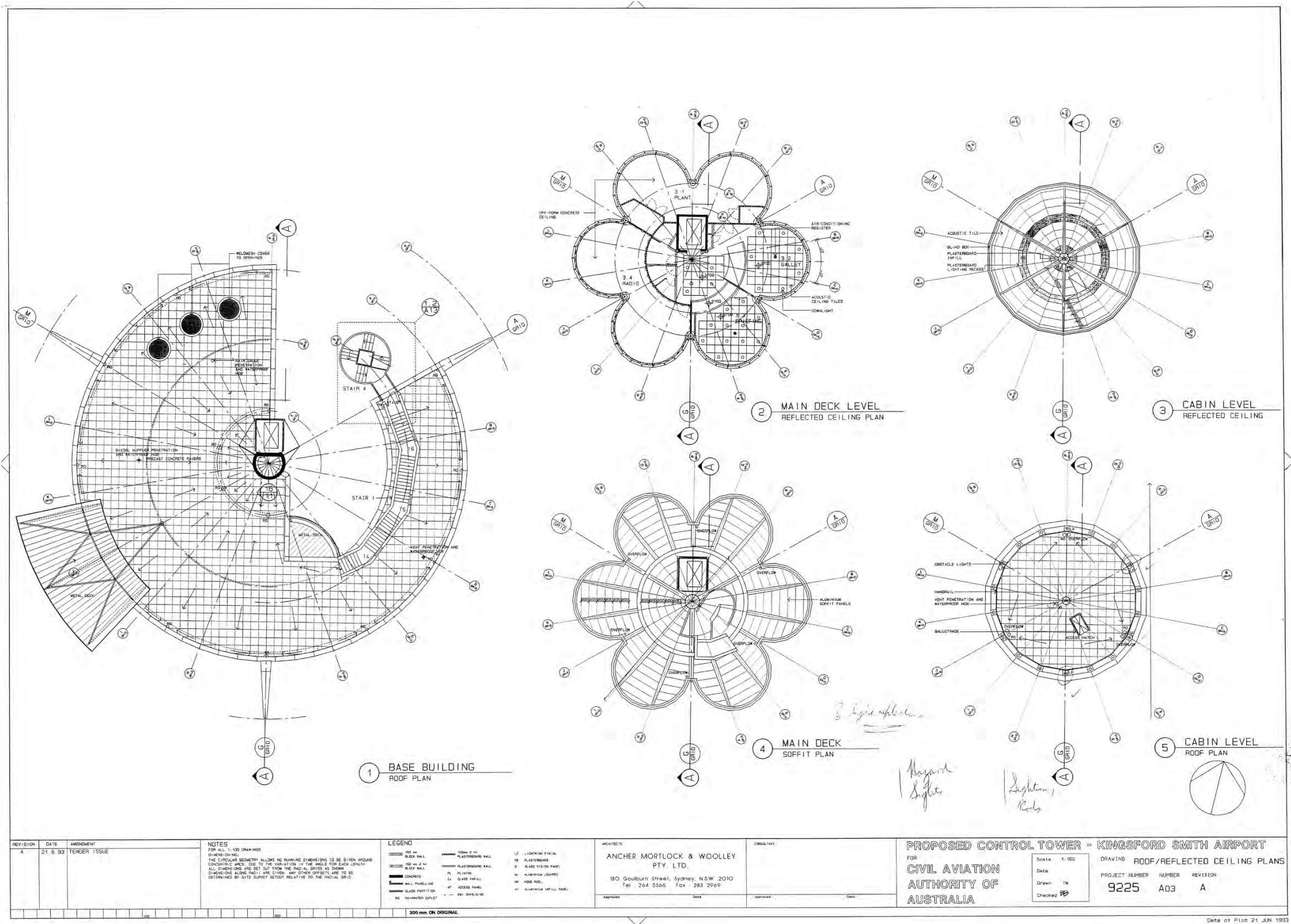
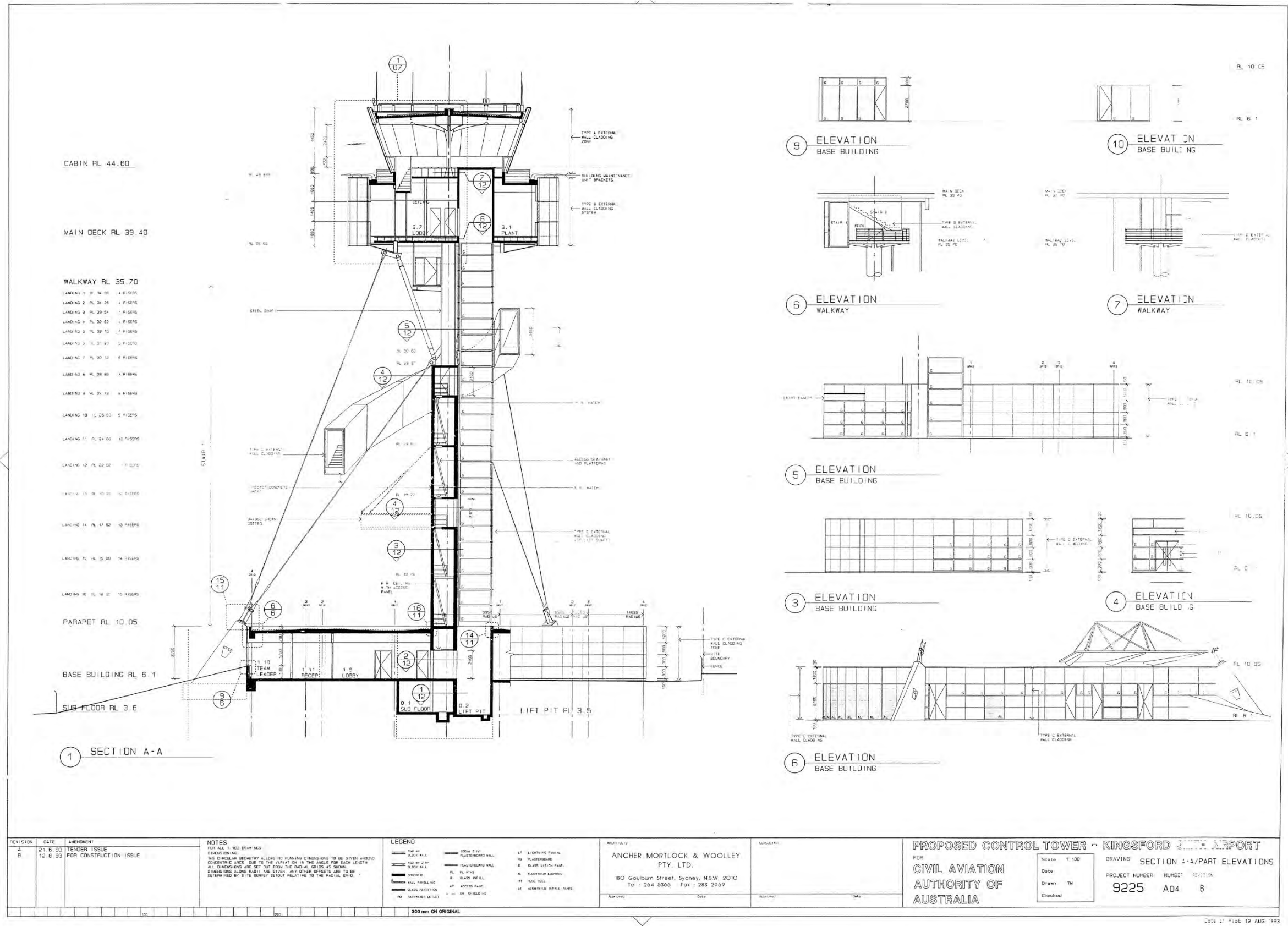


Figure 2 Roof/Reflected Ceiling Plans, Ancher, Mortlock & Woolley Pty Ltd: (9225-03), 21 June 1993, Rev A
Source: Airservices Australia



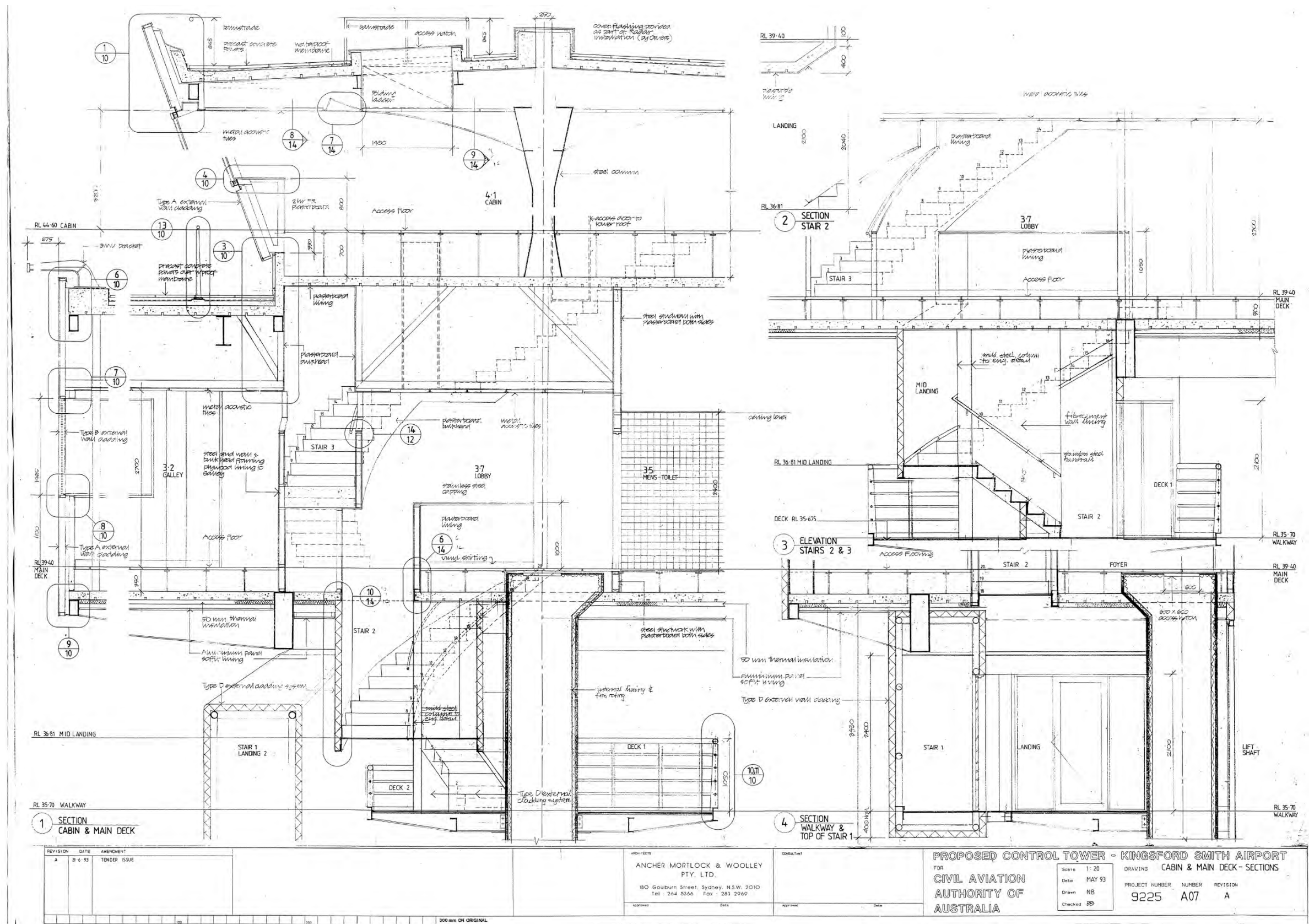


Figure 4 Cabin and Main Deck Sections, Anchor, Mortlock & Woolley Pty Ltd: (9225-07), May 1993, Rev A
Source: Airservices Australia

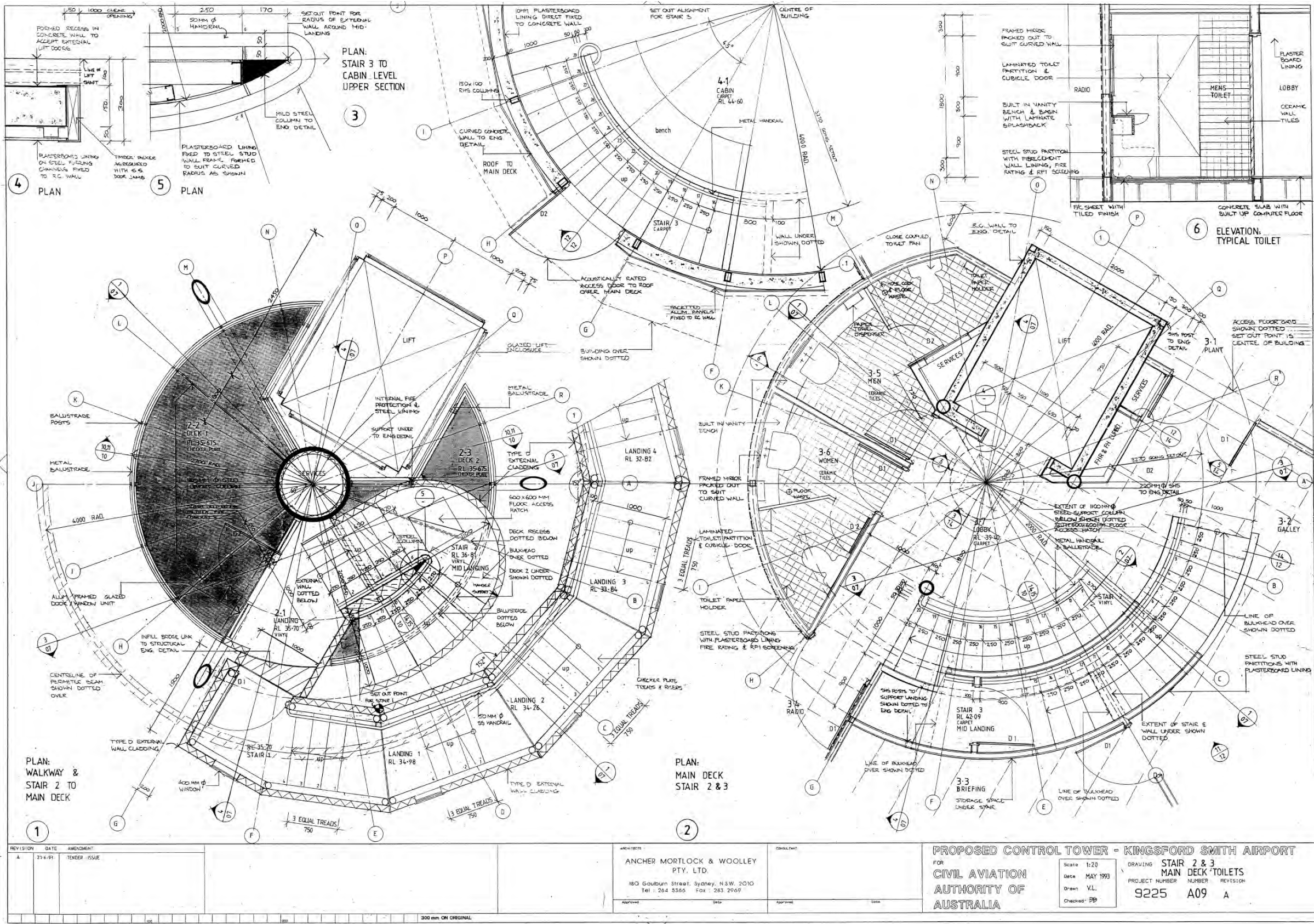


Figure 5 Stair 2 & 3, Main Deck Toilets, Anchor, Mortlock & Woolley Pty Ltd: (9225-09), 21 June 1993, Rev A
Source: Airservices Australia

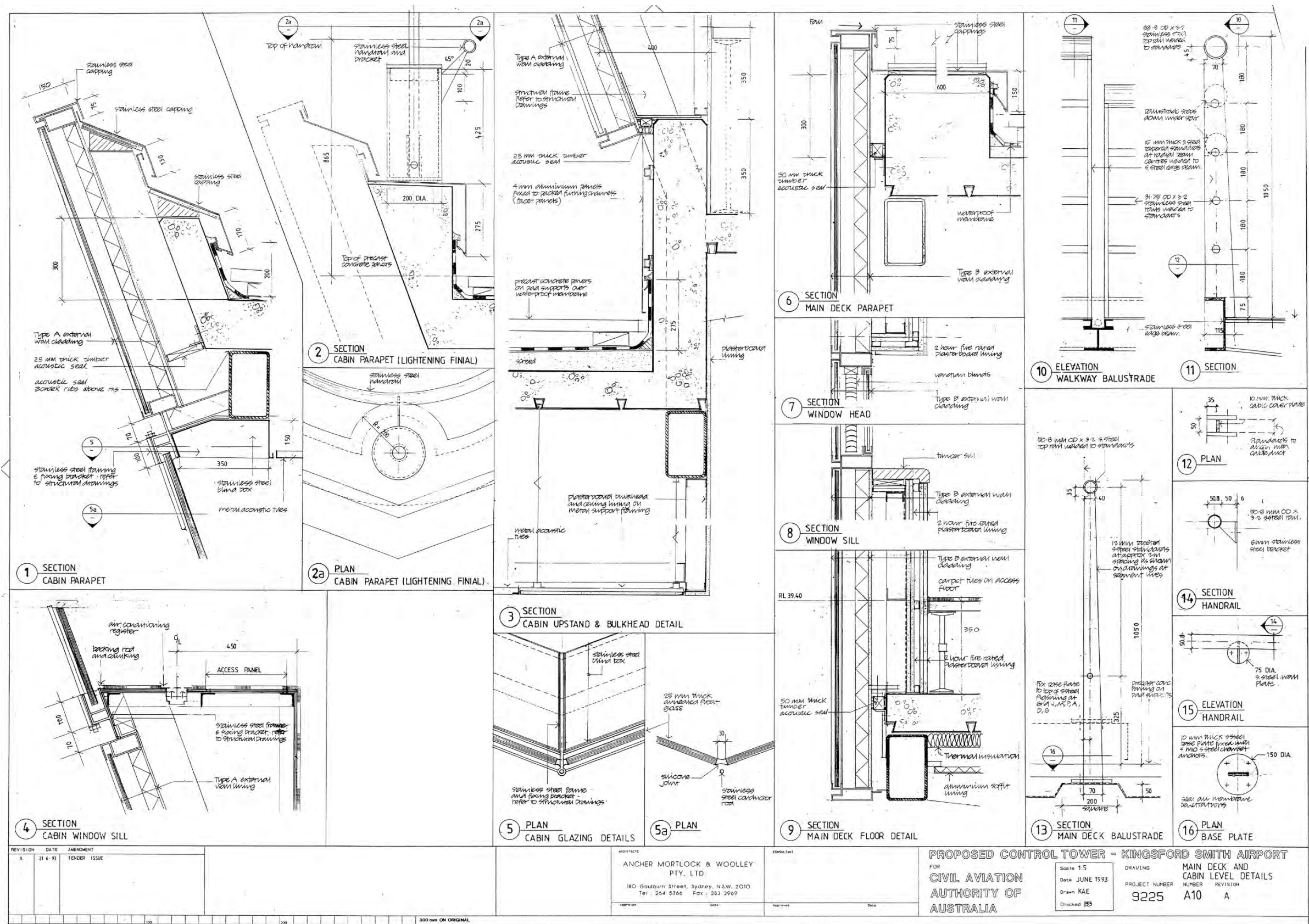


Figure 6 Main Deck and Cabin Level Details, Anchor, Mortlock & Woolley Pty Ltd: (9225-10), 21 June 1993, Rev A
Source: Airservices Australia

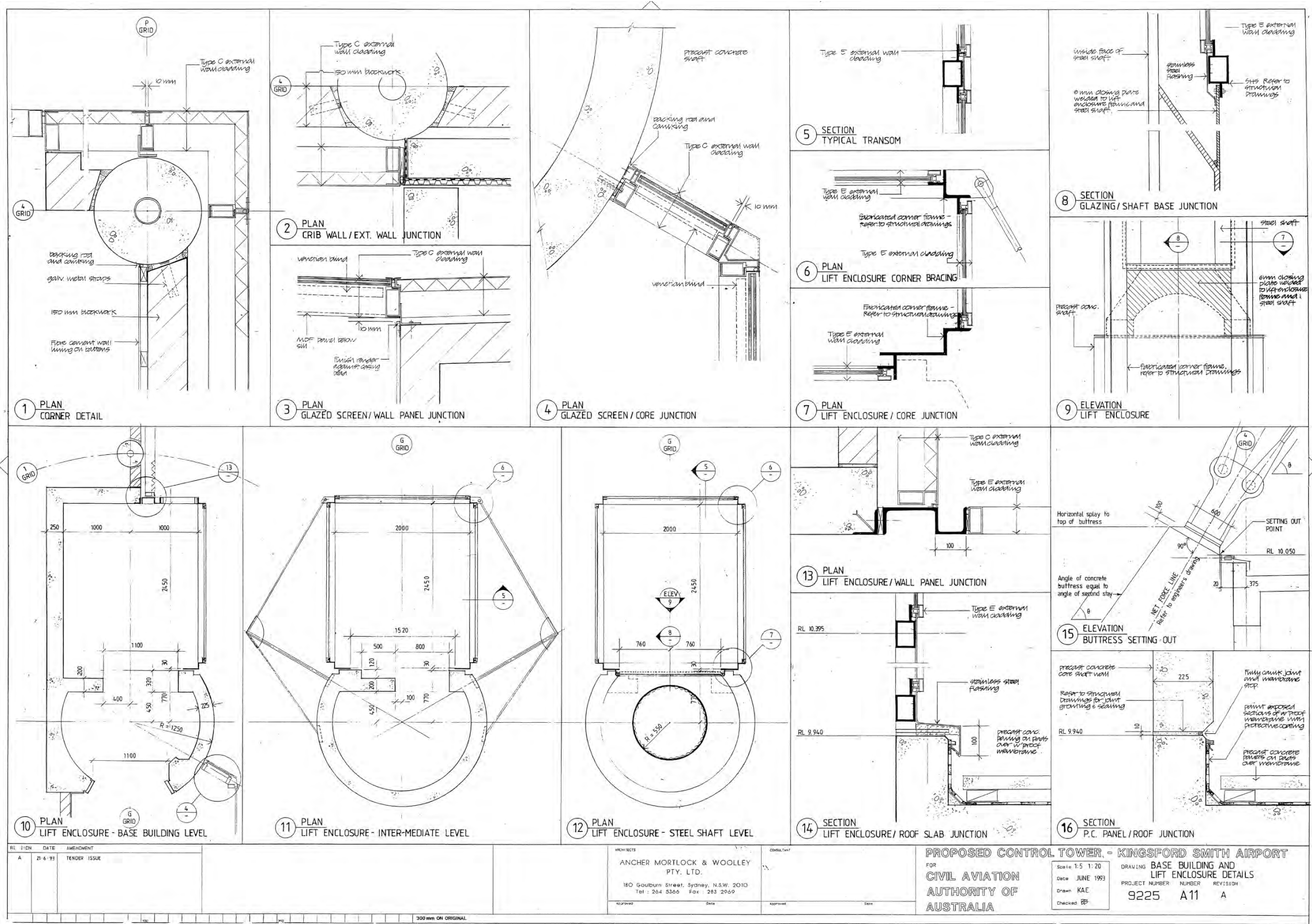


Figure 7 Base Building and Lift Enclosure Details, Anchor, Mortlock & Woolley Pty Ltd: (9225-11), 21 June 1993, Rev A
Source: Airservices Australia

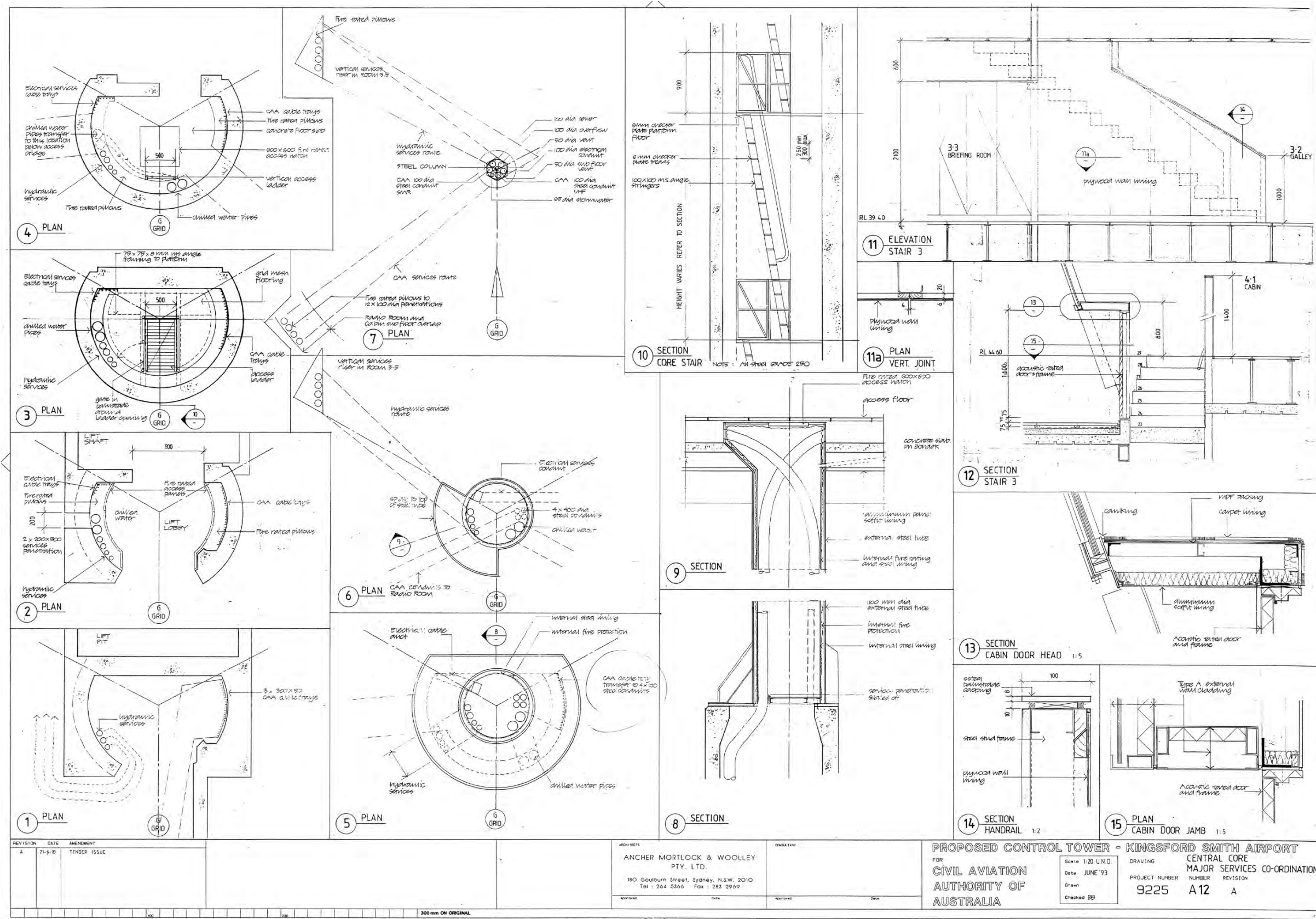


Figure 8 Central Core, Major Services Co-ordination, Ancher, Mortlock & Woolley Pty Ltd: (9225-12), 21 June 1993, Rev A
Source: Airservices Australia

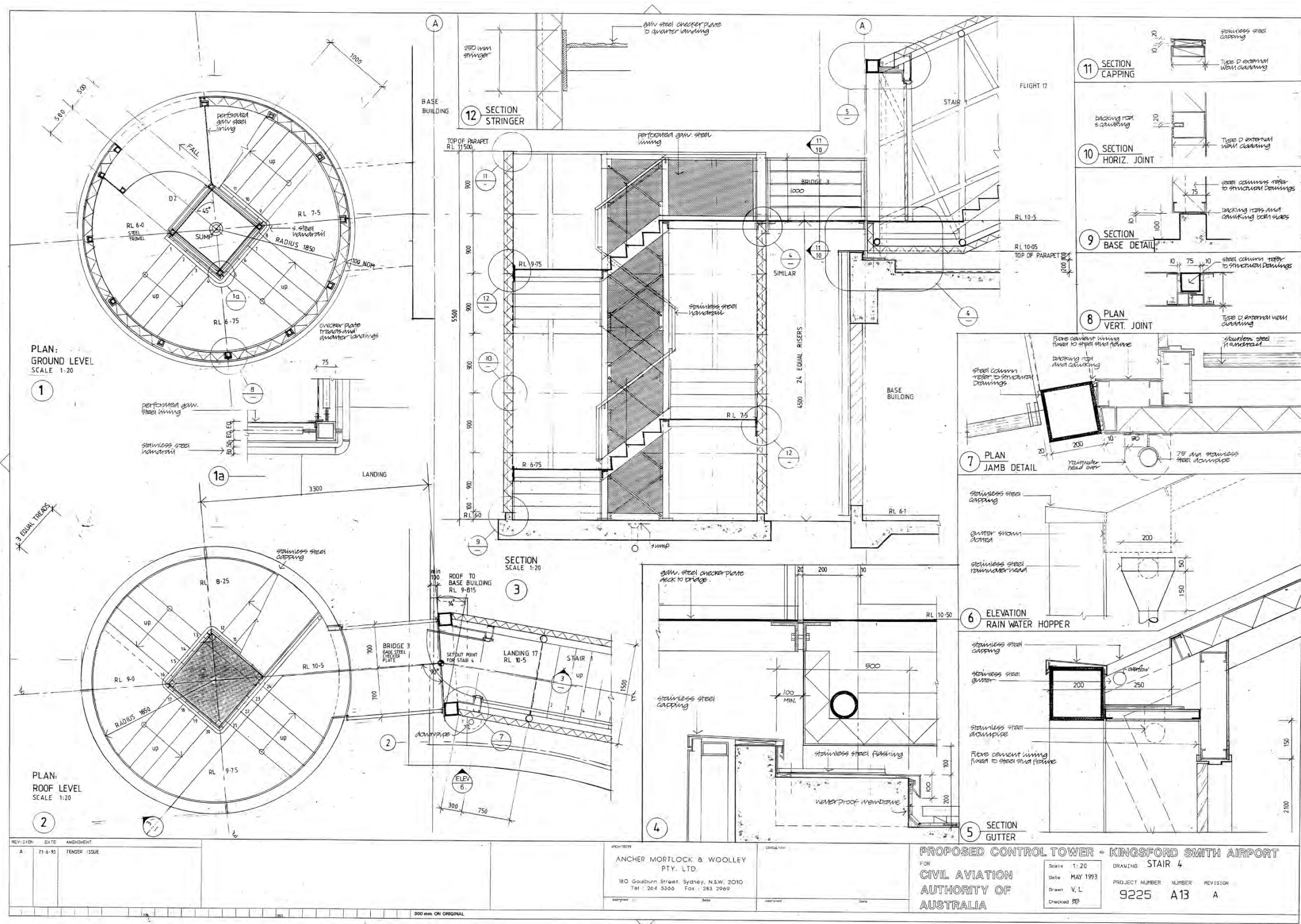


Figure 9 Stair 4, Ancher, Mortlock & Woolley Pty Ltd: (9225-13), 21 June 1993, Rev A
Source: Airservices Australia

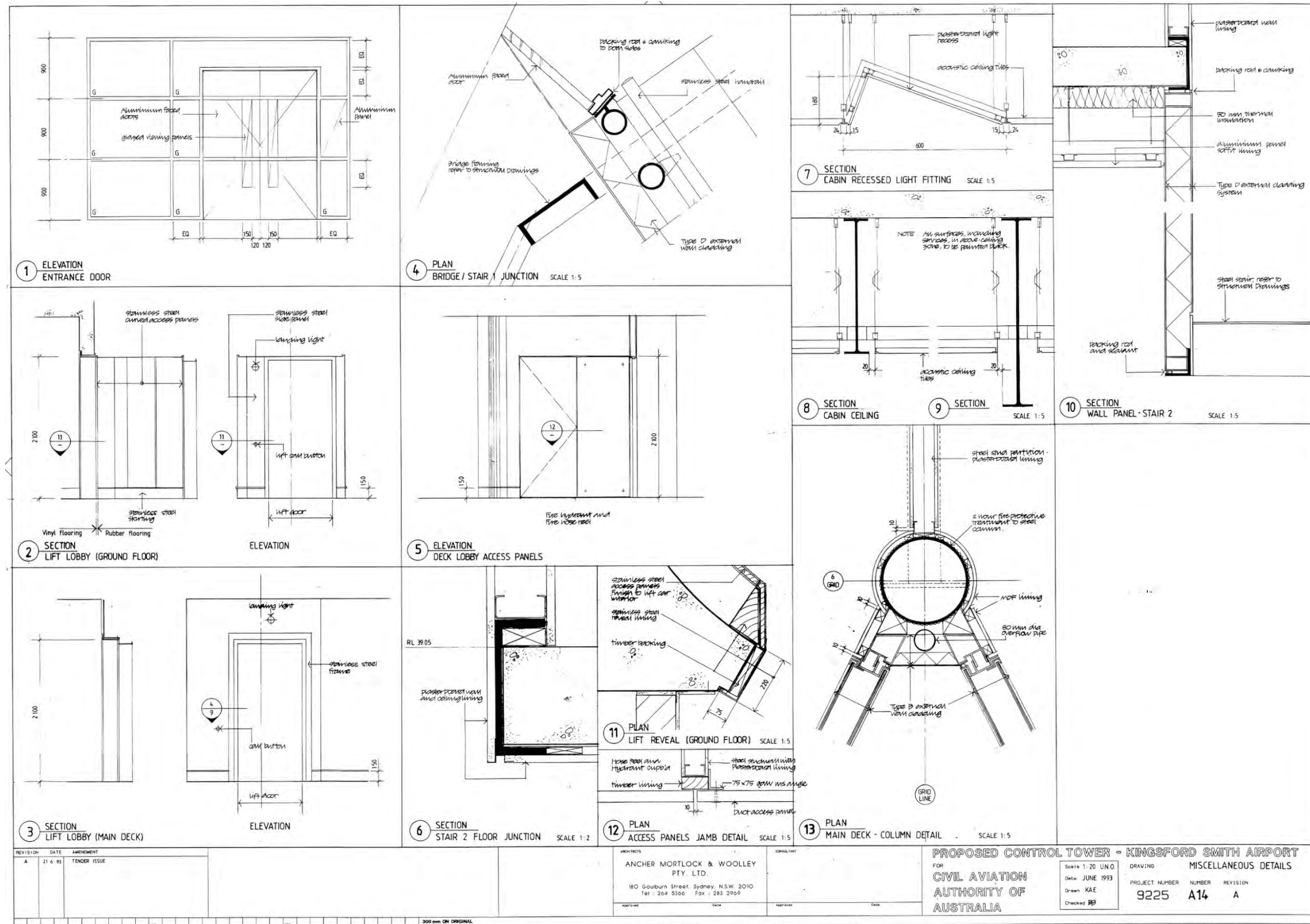


Figure 10 Miscellaneous Details, Ancher, Mortlock & Woolley Pty Ltd: (9225-14), 21 June 1993, Rev A
Source: Airservices Australia

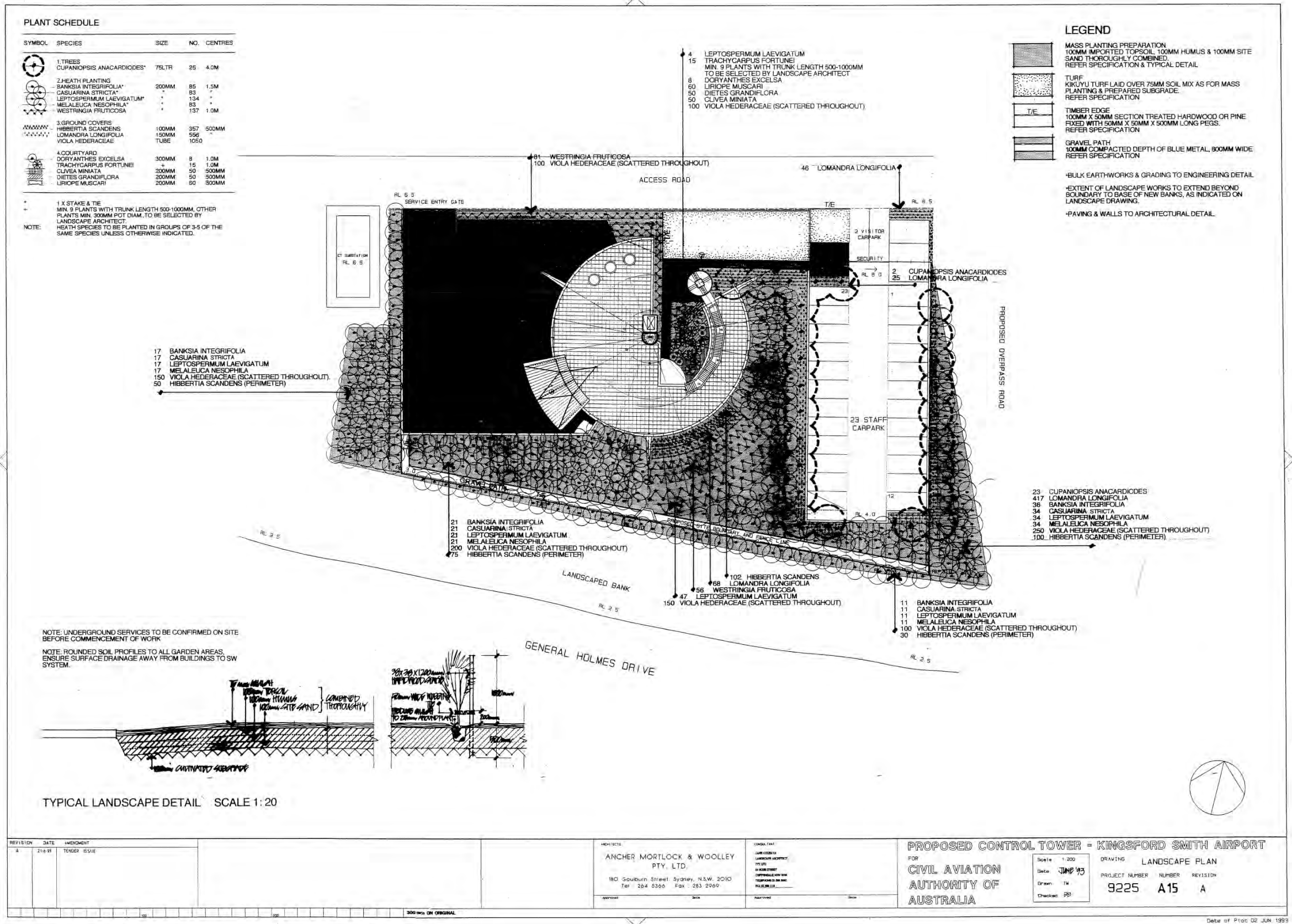


Figure 11 Landscape plan, Ancher, Mortlock & Woolley Pty Ltd: 9225-15), 21 June 1993, Rev A
Source: Airservices Australia

APPENDIX C SYDNEY ATC TOWER NO. 5 'USER GUIDE'

Sydney Air Traffic Control Tower No. 5 – Heritage User Guide

ENV-GUIDE-0012

Version 2

Effective 3 May 2017

Prepared: Paul Zissermann
Senior Environmental Specialist
Property Services

Authorised: Mason Henderson
National Property Manager
Property Services

Authorised: James Asciak
Technical Services Manager
Air Navigation Services

***Information sourced from Lovell Chen National Control Towers Heritage Assessment, June 2009**

Change summary

Version	Date	Change description
1	17 November 2014	Initial Issue.
2	3 May 2017	Updated to include Airservices organisational changes and edits from Lovell Chen (heritage consultants), so document can be included as an attachment to the new Heritage Management Plan (HMP) for this building.

This document was created using Generic Document Template C-TEMP0047 Version 5.

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1 Purpose

The purpose of this document is to guide the management and maintenance of Sydney 5 Air Traffic Control (ATC) Tower, so that any development, works, or modifications are carried out in a manner that does not impact on the heritage values (known or potential) of the site.

2 Scope

The guide sets out the type of works that may be undertaken without heritage advice from Property Services or legal approval from the federal Minister for the Environment, works that typically require advice or approval, and those works that are likely to require approval.

This guide applies to all staff (including contractors) responsible for the management, development and maintenance of Sydney 5 ATC Tower. It also applies to people responsible for works within the vicinity that may affect the tower.

The heritage values (known or potential) of Sydney 5 ATC Tower and a brief history are also described in this document.

3 Context

Airservices has a responsibility under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) to conserve and protect the Commonwealth heritage values of places that it owns or controls.

An approval for works is required from the federal Minister for the environment, where the proposal is likely to have a significant impact on a matter of national heritage significance.

4 Site details

Site Address	General Holmes Drive, Kyeemagh NSW 2216
SAP functional location	SY-APT-CTC
SAP BE/BU	BE 96 BU 16
Heritage Listings	
• Included on the Commonwealth Heritage List • Sydney 5 ATC Tower - Commonwealth Heritage List Nominated Place (ID106116) • Sydney Airport Group - Commonwealth Heritage List Indicative Place (ID105542) • Sydney Airport Group - Register of National Estate Interim List (Place ID 102669)	

5 History

Sydney (Kingsford Smith) Airport has been in continuous use since 1919, making it one of the world's oldest continually-operating major airports. Sydney 5 ATC Tower was conceived in the early 1990s when the federal government approved the new parallel north-south runway and the existing Sydney 4 Tower would no longer have visual access to all areas. The complex was commissioned on 6 January 1996.

6 Significant aspects

Sydney 5 ATC Tower was designed by Ken Woolley, a prominent award-winning architect and is of aesthetic and technical significance in control tower design. It was the first control tower in Australia consciously designed as a landmark and displaying distinctive architectural qualities.

At the time of construction this was the only cable-stayed control tower in Australia, and possibly the world. It was also the first tower in Australia with:

- An external lift (painted yellow),
- A spiral staircase, that wraps around the shaft,
- A circular cabin,
- A central column to support the cabin roof, so avoiding interference to sight lines,
- Peripheral consoles, designed to maximise space and ensure sight lines for controllers,
- Computer screen-based technology for control consoles,
- A design character and location warranting recognition as a landmark.



Above: View of tower illustrating significant elements

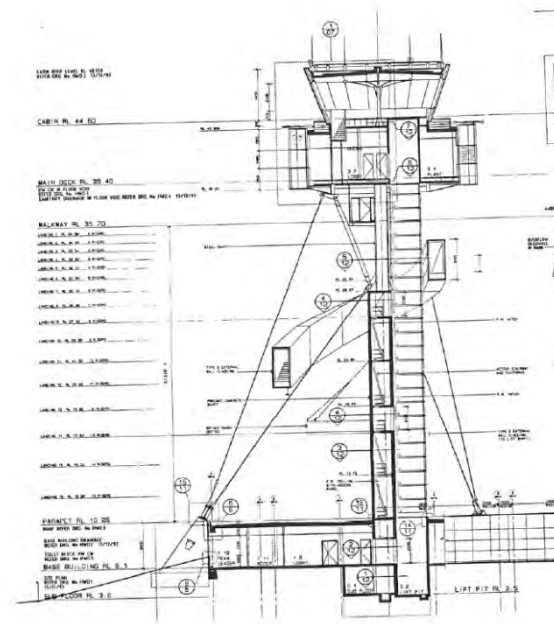


Figure 27 Section.
Source: Airservices Australia.

Above: Section view of tower

7 Implications of significance

[Table 1](#) describes the major structural elements, and associated significant aspects, of the Sydney 5 ATC Tower.

Table 1: Sydney 5 ATC Tower – Structural significance

Major structural element	Significant aspects
Concrete shaft	Cable-stayed pre-cast concrete, off-white colour, flat face to north to accommodate lift.
Lift shaft	Metal frame, painted yellow with translucent glass panels.
Amenities/equipment level cantilevered off top of shaft	Strutted by stainless steel fittings and tensioners, cloverleaf plan of six bays formed by radiating steel ribs, bays clad in reflective blue-tinted glass panels.
Spiral escape staircase	18 cranked facets in aluminium panels with small porthole windows, risers and tread are steel, painted white.
Base building	Doughnut-shaped plan, sheathed in glass and aluminium panels, interior skirtings are vinyl and paint is generally light coloured, stainless panels and door handles. Finishes are utilitarian.

The main elements of the tower (concrete shaft, lift core, cranked stair, amenities pod and cabin) must be retained unaltered and conserved. Modifications or additions require careful consideration so that presentation of the building is not adversely impacted.

Planning and design of base building and associated landscape contribute to aesthetic values and care should be taken in any modification to preserve the original concept.

8 Works approval and advice

8.1 Works not requiring heritage advice or legal approval

- Cleaning and landscaping maintenance,
- Securing and replacing roof, glass or other external materials where replacement material matches the existing,
- Repainting provided paint treatment/colours match the existing,
- Servicing and repair of existing equipment and services including power or pipelines where there is no alteration to building fabric,
- Replacing or modifying internal fittings where they match the existing.

8.2 Works requiring heritage advice include

- Demolishing any building components,
- Constructing an addition to the building or a new structure or building on the property,
- Repairing/replacing original external materials and fabric including glass and steel elements,
- Replacing or modifying the original peripheral control consoles or other original equipment in cabin,
- Repairing/replacing original internal fabric including stairs, doors, door handles, panels, flooring and skirting,
- Changing the paint treatment/colour scheme,
- Reconstructing or reinstating original building elements and features,
- Introducing new external awnings/shades or other significant fixtures ,
- Modifying or removing existing windows,
- Wholesale replacement of room fit outs,
- Any works which impact on the aspects identified as significant above.

8.3 Works which are likely to require statutory heritage approval

All of the actions identified under Section B above, unless heritage advice has been received that states no statutory approval is required. For example, repairs to fittings and fabric typically don't need approval where the works are undertaken in a sympathetic manner including replacing like with like. Heritage input from the contact below is required to clarify and confirm this.

9 Contact

For questions and advice regarding the management of built heritage values, contact contact the Senior Environmental Specialist, Property Services on paul.zissermann@airservicesaustralia.com or (02) 6268 4090.

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