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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

R E P O R T

relating to the proposed provision of

OPERATIONS AND CONTROL TOWER BUILDINGS

at

SYDNEY (KINGSFORD-SMITH) AIRPORT

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

OPERATIONS AND CONTROL TOWER BUILDINGS  
AT SYDNEY (KINGSFORD-SMITH) AIRPORT

R E P O R T

On 18th May, 1965 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report the proposal to provide operations and control tower buildings at Sydney (Kingsford-Smith) Airport.

GENERAL

1. The present proposal is one of a number of major developmental works designed to permit Sydney Airport to handle an increasing volume of air traffic efficiently and safely. The various phases of the development are:-

- (a) the southern extension of the 16/34 runway;
- (b) the site preparation of the north-west building area;
- (c) the buildings, roadways and engineering services for the international terminal complex and associated aircraft pavements;
- (d) the operations and control tower buildings; and
- (e) an instrument landing system for the 16/34 runway.

2. The southern extension of the 16/34 runway was investigated by the Committee in 1963. In a report presented to the House of Representatives on 22nd August, 1963 we recommended that the runway length be 8,500 feet instead of the 7,900 feet proposed by the Departments of Civil Aviation and Works. The recommendation was accepted and construction of the extension is in progress at the present time. The remaining four projects have now been referred to the Committee, including the work which is the subject of this report. Reports on the other references will be presented separately.

THE PRESENT REFERENCE

3. The reference on which the Committee is now reporting involves construction of three buildings for an operations centre and control tower at Sydney airport. These are the operations building, the control tower (adjacent and joined to the operations building by a covered passageway) and the services building housing the stand-by power supply and air conditioning plant for the other two buildings. The reference also includes the roads and car parks to serve the three buildings, access to General Holmes Drive, foreshore protection and some minor reclamation work.
4. The work in the present reference is not directly related to other projects currently proposed for the airport.

COMMITTEE'S INVESTIGATION

5. We inspected Sydney airport, including the location of the proposed buildings. Evidence was taken in Sydney from representatives of the Departments of Civil Aviation and Works, Qantas Empire Airways Limited and the Municipality of Rockdale.

FUNCTIONS OF OPERATIONS BUILDING AND CONTROL TOWER

6. The proposed operations building and control tower will accommodate the activities associated with air traffic control, communications, a civil/military co-ordination centre, monitoring of navigational aids and training of air traffic controllers, as follows:-
7. Air Traffic Control This control is in three categories -
- (a) Sydney area control, or the control of air traffic in an area based on Sydney (as distinct from approach control and airport control).
  - (b) Sydney approach control, or the control of air traffic within a radius of 30 miles from Sydney airport. Approach control for the military aerodrome at Richmond will also be carried out from the Sydney operations building.
  - (c) Sydney airport control, or the control of air traffic within a radius of 10 miles of Sydney airport, and on the airport itself.

8. Area and approach control functions will be carried out from the operations building and airport control functions from the control tower. The Sydney control centre regulates traffic in the controlled air space in the Sydney "flight information region". This is an irregular shaped area based on the routes flown by aircraft and extends from Coffs Harbour to the N.S.W.-Victoria border, and from Broken Hill almost to Norfolk Island and New Caledonia. Within this area, controlled air space covers the heavily trafficked routes towards Brisbane, Melbourne and Adelaide and the direct route from Melbourne to Brisbane. It also includes lanes for traffic flying north-west to places such as Darwin, Manila and Djakarta, and over the Pacific the space between the route to Christchurch in the south-east and that to Nadi in the north-east.

9. Control by the Sydney centre embraces the whole of this air space except for approach control exercised by control centres at Canberra, Tamworth and the military aerodromes at Williamtown and Nowra, and airport control at these four airports and at Bankstown, Camden and Richmond. Air traffic control exercised by the Sydney centre is co-ordinated with that of control centres adjacent to it.

10. With increasing air traffic densities, it has become necessary to give controllers additional working aids. High powered radar has been introduced as a result. Radar is expected to play an increasingly important part in air traffic control and accommodation is allowed for this equipment in the operations centre. The Sydney long range radar station with its revolving scanner is situated about a mile to the east of the proposed operations building. It picks up the radio signals reflected from the aircraft and these will be fed to the operations centre to form the radar picture the controller will use. Radar display will be available to all air traffic controllers.

11. Air traffic control is a field which lends itself to automation and the use of computers. As it is expected that air traffic densities will warrant the use of a degree of automation after the building is occupied, accommodation is being provided for this type of equipment.

12. Communications

- (a) Ground to air communications permit the exchange of information between the air traffic controller and the pilot, and the automatic transmission to the pilot from the ground of information such as meteorological data. Voice communication between the air traffic controller and the civil pilot is largely by very high frequency (V.H.F.) radio. This form of communication requires line-of-sight transmission and is used because it is relatively free of static and atmospheric interference. It is not practicable over long distances above water or large flat land areas due to the curvature of the earth, but is ideally suited to country where the terrain permits the siting of transmitting and repeater stations on mountain tops. This is the case in the heavily trafficked areas in south-eastern Australia and the building of such stations to give coverage over air routes from a point north of Brisbane to Melbourne, Adelaide and Hobart is well advanced. V.H.F. coverage is also being provided on the routes to western New South Wales.

Where V.H.F. links are not practicable, ground to air communication is carried out by high frequency (H.F.) radio. Although this method of communication does not depend on line-of-sight and can be operated well over very long distances, it is more susceptible to static and atmospheric interference than V.H.F. radio.

International and Australian domestic airline aircraft operating in the south-eastern part of the continent carry both V.H.F. and H.F. radio. Privately owned aircraft carry one or the other, or both.

The communications centre will accommodate the staff and equipment to allow communication with almost all aircraft flying in the Sydney flight information region. The centre uses V.H.F. radio for ground to air communication in the controlled air space

in that part of the Sydney flight information region which is over the mainland and about 100 miles out into the Pacific. H.F. radio is used for communications within other controlled air space over the Pacific Ocean. V.H.F. radio communication from Sydney will depend primarily on a strong and vital link between the operations building and a repeater station at Woronora, 17 miles to the south-west. Messages are sent from this station to and from aircraft or to other V.H.F. stations for subsequent transmission to aircraft or further points in the network.

- (b) Ground station to ground station communications link Sydney with other control and communications centres. This communication allows the fast passage of information, not only in relation to aircraft movements, but also on meteorological conditions, the state of airports and navigational aids. As well as this traffic, known as Class A traffic, the centre also handles Class B traffic for international airlines and for domestic airlines operating to New Guinea. This is airline company traffic relating to reservations and passenger and freight accommodation on connecting aircraft and is paid for by the companies at commercial rates.

Ground to ground communication is by voice or printed messages, using direct landline including teleprinters, cables and V.H.F. and H.F. radio systems. The Sydney communications centre will have direct landline links for its air traffic control speech channels (known as air traffic control co-ordination channels) to Tamworth, Cooma, Bankstown, Richmond, Williamstown and Nowra and will use a V.H.F. system for these channels to Brisbane, Melbourne, Canberra, Wagga, Coffs Harbour and Dubbo. It will also have co-ordination channels by H.F. radio to Darwin, Mt. Iaa, Adelaide, Alice Springs and Port Moresby. International communications will be available through the Commonwealth Pacific Cable to Nadi and Auckland and by the H.F. radio system to Manila and Singapore.

- (c) A teletype switching centre will receive, co-ordinate and automatically re-transmit messages from a large number of originating stations in Australia and overseas and direct them to their appropriate destinations. The use of teletype for the passage of written messages is increasing in civil aviation communications and the switching centre will ensure that the increased traffic expected can be handled.
13. Civil/Military Co-ordination Centre This centre will permit effective control over the different types of air traffic found in civil and military activities and enable proper co-ordination of this traffic with the use of various prohibited areas around Sydney.
14. Communication between the air traffic controller and the military pilot is usually by means of ultra high frequency (U.H.F.) radio which has similar line-of-sight requirements and characteristics to V.H.F. communications. The Department of Civil Aviation's V.H.F. stations are also U.H.F. stations and give a similar coverage for these communications. Accommodation will be provided in the operations building for services personnel so they can work closely with civilian controllers.
15. Monitoring of Navigational Aids It is essential to detect immediately faults or failures in navigational aids which are directly associated with the control of air traffic. Aids within 100 miles of Sydney will be continuously monitored from the operations building. Outside this area and within the controlled air space of the Sydney flight information region, monitoring will be carried out from the operations building by intermittent interrogation. The V.H.F. air to ground communication equipment located both at Sydney and at remote repeater stations, and significant components of the long range radar station at Sydney, will also be monitored continuously.
16. Training Centre The training centre will provide facilities both for the training of new air traffic control and communications staff and the instruction of existing staff on new developments. The centre will provide both procedural and radar training and will incorporate a radar simulator.



EXISTING FACILITIES AND ACCOMMODATION

17. The Sydney operations centre is currently housed in an unsatisfactory collection of buildings, some dating to before the war and others built during the war. They are sub-standard, mostly of timber construction, with little room for the expansion of the activities and the introduction of the new equipment which are required to cope with the demands imposed by increasing air traffic.

18. The new control tower is needed since the present tower, erected in 1954, is becoming too small to handle its functions adequately. Furthermore, with the expansion of the airport and the future development of parallel runways, the tower would be better placed in the location now proposed.

19. The Committee are agreed that it is necessary to construct a new operations building and control tower at Sydney (Kingsford-Smith) Airport.

CO-ORDINATION WITH THE TERMINAL BUILDING

20. The activities to be carried out in the proposed new operations building will be co-ordinated with some which are now carried out in the existing terminal area and which will remain there after the operations building is completed. Pilot briefing and flight planning for both international and domestic operations, the meteorological observation and forecasting centre and the rescue co-ordination centre will remain in their present positions until the new terminal buildings are completed. The separation of these activities is necessary for functional reasons and will not result in any operational difficulties.

THE SITE

21. It is proposed to construct the buildings on Commonwealth-owned land in the south-west corner of the airport. The site is on the foreshore of Botany Bay immediately adjacent to the mouth of Cooks River and 1500 feet west of the 16/34 runway extension. General Holmes Drive forms the northern boundary to the site. The present frontage to Botany Bay is a narrow beach with high water mark approximately at the site of the proposed control tower.

22. Advantages of the Site The location of the control tower in this area will allow the air traffic controller to see clearly the whole of the airport including the extension of the north-south runway into Botany Bay. He will not be troubled by aircraft movement behind him since all the approaches to the airport will be visible within an arc of about 180°. Furthermore, visibility will not be affected by the late afternoon sun and a clear view of all aircraft on the ground will be possible.

23. The operations building is to be placed in this location for functional reasons. There will also be a clear line of sight between the operations building and the V.H.F. repeater station at Woronora which is essential for the establishment of the radio link between them. Were the operations building to be sited elsewhere than in the south-west corner of the airport, this radio link would be affected either by aircraft crossing its path, power output from the long range radar, or radio interference generated in the terminal and maintenance areas.

24. Apart from the proposed site having advantages independently for the control tower and the operations building, there are also advantages in having the two buildings adjacent to one another. The staff employed in area control and approach control who will be located in the operations building, carry out the same basic duties as those employed in airport control which is carried out in the tower. If the two buildings are joined, the staffs can work together as a unit sharing the same facilities for training and the same working conditions and amenities. Furthermore, with the buildings close to one another, the electrical and communications links are shortened, thereby reducing the risk of power failure and minimising costs.

25. In considering the site of the buildings it was necessary to observe aircraft clearance requirements. As this factor will be critical in this area when the parallel runways are built, some minor reclamation of the Bay, and foreshore protection, will be necessary.

26. Difficulties of the Site The Committee are conscious of the difficulties which will result from siting these buildings just above high water mark on the Botany Bay foreshore where they will be exposed to severe weather conditions and salt laden spray. However, it is felt that these disadvantages can be overcome by good design and the choice of appropriate materials. Careful consideration will need to be given to construction methods and materials to ensure their suitability and economy and ease of maintenance under these conditions. We believe particular attention should be given to waterproofing, and to the prevention of the seepage of moisture through exposed concrete areas on the buildings. It was noted that the Commonwealth Experimental Building Station is undertaking research on the suitability of the materials proposed.

27. The Committee endorses the proposed siting of the operations building, control tower and services building.

28. The activities to be carried out in the operations building and in the control tower will not affect radio or television reception in the nearby residential areas.

29. Although the public will lose the benefit of natural beach on the foreshore adjacent to the proposed building, access to the area for limited recreational purposes will be available from the road to be constructed under the Endeavour Bridge. However, we viewed with some concern the loss of the beach on Botany Bay to be caused by this work and the extension of the north-south runway. The Committee therefore considers that as much of the foreshore as possible adjacent to the proposed buildings should remain available to the public and access to it should be facilitated.

#### THE BUILDING PROPOSALS

30. Site Preparation To form the site it is proposed to reclaim a small portion of Botany Bay and to construct a rock fill retaining wall to protect the reclamation and the foreshore between the Cooks River outlet and the western side of the runway extension. The retaining wall will be located to permit the future extension of the

operations building in a north-easterly direction. The top of the wall will be at least four feet above high water level. It will be stone-faced in the same way as the adjoining section of the retaining wall on the runway extension. The area enclosed by the wall is to be filled with sand from the site. It is proposed to grade the area and form a grassed bank from the southern footpath of General Holmes Drive to the proposed car park.

31. Operations Building This will be a reinforced concrete two-storey structure 225 ft. x 97 ft. with a three-storey area at the western end, 76 ft. x 25 ft., the top floor of which will provide an aeriels room for the micro-wave radio link to Woronora.

32. The ground floor will accommodate air traffic control and communications equipment, teletype equipment and the teletype switching centre. An area will be available for the installation of the automatic data processing equipment associated with air traffic control. Workshops for the maintenance of equipment will be on this floor.

33. The first floor will house area control and approach control activities and the communications room from which a flight information service will be available to aircraft flying outside the controlled air space. The second floor provides enclosed accommodation for the micro-wave antenna and supporting equipment for it.

34. Control Tower This building will be a six-storey reinforced concrete structure joined to the operations building by a passageway on the first floor level. The floor height of the cabin of the control tower is to be 64 ft. above the adjacent ground level. The cabin itself will be an eight-sided glazed structure. The shaft of the tower will contain a stairway, passenger lift and air conditioning and cable ducts.

35. Services Building This is to be a brick structure 150 ft. x 40 ft. accommodating the emergency power supply, air conditioning plant, electrical sub-station and car shelter for departmental vehicles.

36. Foundations The control tower will be founded on steel piles driven to a depth of about 50 ft. Foundations for the operations building will be spread footings, and for the services building strip footings to the walls, with pad footings to the steel crane columns.

37. Structure and Walls The frame of the operations building and the control tower will be reinforced concrete columns, beams and floor slabs. The services building will be of load bearing brick construction. The roof decking on all buildings will be supported on steel framework. The walls of the operations and services buildings will be of cavity brickwork with an external face of selected glazed bricks. The control tower will be finished externally in off the form concrete cast in timber shuttering pre-designed to produce a pattern of textures.

38. Roofing The proposals submitted to the Committee included the use of copper sheeting as a roofing material because of its resistance to salt corrosion. Experiments are, however, being undertaken to determine whether aluminium roofing will be equally effective. The saving, if aluminium is used, will be of the order of £22,000.

39. Floors In the operations building the floors will be designed to provide a series of cable ducts by means of timber joists laid above the concrete floor slabs. The joists will be covered with timber flooring and finished generally with vinyl tile. Where low sound levels are essential, carpet is to be provided. In the control tower and services building, floors will be reinforced concrete finished in sheet rubber, vinyl tile or a grease resistant granolithic screed according to requirements.

40. Windows The windows of the operations building are to be framed in a non-ferrous metal and double glazed to minimise sound transference. They will be suitably screened on the north to reduce thermal gain in the building. Windows in the walls of the control tower will be similar to those in the operations building except that they will be deeply recessed to avoid visual marring of the line of the shaft. The windows of the control cabin will be non-ferrous frames double glazed, with the outer glazing hinged to permit cleaning.

41. Mechanical Engineering Services Most areas in the operations building and the control tower will be air conditioned for functional reasons and for the protection of equipment. Air handling plants will be connected to central chiller and boiler plants in the services

building. The areas not air conditioned, such as service plant rooms and toilets, will be mechanically ventilated.

42. Hydraulic Services Domestic and fire fighting water supplies will be taken from the existing airport reticulation by a system of 8", 6" and 4" water mains. Sewage from the area will be piped to the Metropolitan Water, Sewerage and Drainage Board's outfall line nearby through an ejector station. Stormwater disposal will require pipes of up to 15" diameter discharging to existing drainage channels.

43. Electrical Services Power supply will be provided by means of an underground 11 kV cable extension from the existing terminal radar building through the sub-station in the services building. In addition, two no-break and two auto-start emergency diesel generating sets will be provided in the services building. The auto-start sets will supply essential power on failure of normal supply and the no-break sets will ensure continuous power to circuits requiring it.

44. Street lighting will be installed on the approach roads from General Holmes Drive to the operations building. Fittings and standards will match those already along General Holmes Drive. Lighting within the buildings will generally be by fluorescent fittings with incandescent units where required.

45. Vertical transportation will be provided by an electro-hydraulic goods lift serving the operations building and an electric passenger lift up to lower cabin level in the control tower.

46. An automatic fire detection system, consisting of smoke detectors in equipment rooms and thermal detectors elsewhere, will be installed in all buildings.

47. A suggestion was made to the Committee that electricity supply for the buildings should be taken from the St. George County Council in preference to the Sydney County Council which is the authority at present supplying all airport facilities. The boundary between the franchise areas of the St. George and Sydney County Councils divides the airport site along the original course of Cooks River. The proposed buildings will therefore be in the St. George area. It is

the opinion of the Deputy Crown Solicitor that the Commonwealth can purchase power from any supply authority for reticulation in its own area irrespective of State legislation which might place a franchise boundary through it.

48. The St. George County Council will supply electricity for the tunnel in General Holmes Drive which runs below the extension of the 16/34 runway and for this purpose has run an 11 kV cable along General Holmes Drive adjacent to the site for the operations buildings. It would be logical, therefore, that the power supply for these buildings be taken from the St. George County Council. However, because of the airport's peak loading pattern there could be a saving of £750 per annum on tariff charges if Sydney County Council power is used.

49. We feel that the Commonwealth is entitled to take power from the most economical source. In the circumstances, however, the Committee considers that the supply should be taken from the St. George County Council provided the cost to the Commonwealth is no greater than from the alternative source of supply.

50. Road Works Vehicular access to the site will be from General Holmes Drive, which is a dual carriageway road. As traffic from the northern carriageway will not be permitted to cross the median to gain access to the operations and control tower buildings, it is proposed to construct a road under the Endeavour Bridge across Cooks River to connect the site road system to the northern carriageway and the airport perimeter road. Construction of the two lane underpass will involve widening the bank of Cooks River beneath the northern span of the bridge to provide the width of roadway required. Because of the large volume of traffic using the Drive it will be necessary to construct deceleration and acceleration lanes on both carriageways for the safety of vehicles entering and leaving the site.

51. The road connection from the underpass to the northern side of General Holmes Drive will cross the Metropolitan Water, Sewerage and Drainage Board's concrete sewers, one of which is not strong enough to support road vehicles. A small reinforced concrete bridge will

therefore be constructed over it. The internal road system to serve the operations building, control tower and services building will be connected to the airport perimeter road around the runway extension.

A car park will be provided for about 100 cars.

52. Roads will be generally 24 feet wide and except for the underpass which will be paved with concrete, the roads and the car park will be bitumen surfaced over a fine crushed rock base. Ducts will be provided to facilitate the laying of cables from the site to the airport.

53. Recommendation The following is an extract from the Minutes of the Committee meeting at which the building proposals were discussed by the Committee.

"It was moved Senator Prowse, seconded by Senator Marriott - that the Committee recommend the construction of the facilities proposed in the reference.

Debate ensued.

The Committee divided -

<u>Ayes</u> (5)	<u>Noes</u> (2)
Mr. Brimblecombe	Mr. Bosman
Mr. Buchanan	Mr. Griffiths
Senator Marriott	
Mr. O'Connor	
Senator Prowse	

and so it was resolved in the affirmative."

54. The construction of the facilities proposed in this reference is therefore recommended.

55. Construction Time The Department of Works estimates that 13 months will be required after an approval to proceed is given to complete drawings and tender documents, call tenders and let a contract.

56. Construction of the buildings is expected to take 15 months. Allowing 18 months for the installation of equipment, it is expected that the facilities in the buildings will be in service towards the end of 1969.



COSTS

57. The estimated cost of the proposals referred to the Committee is £1,198,000 made up as follows:

Building Works

Operations building	£450,000	
Control tower	£113,000	
Services building	<u>£50,000</u>	£613,000

Mechanical Services

Air conditioning	£126,000	
Mechanical ventilation	£5,000	
Emergency generating plant	£143,000	
Miscellaneous	<u>£4,000</u>	£278,000

Electrical Services

Electricity supply	£44,000	
Street lighting	£2,000	
Light and power in buildings	£35,000	
Lifts	£15,000	
Fire detection	<u>£4,000</u>	£100,000

Site Preparation (including rock fill and protective facing on sea front) £55,000

Roads, Parking Area, Ducts, etc.  
(including underpass at Cooks River bridge, strengthening of sewer, loaming and grassing) £115,000

Hydraulic Services £37,000

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£1,198,000

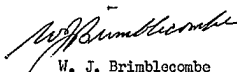
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58. However, it will be noted, if it is practicable to use aluminium for the roofing instead of copper, there would be a saving of £22,000.

RECOMMENDATIONS AND CONCLUSIONS

59. The summary of recommendations and conclusions is set out below. Alongside each is shown the paragraph in the report to which it refers.

	<u>Paragraph</u>
1. IT IS NECESSARY TO CONSTRUCT A NEW OPERATIONS BUILDING AND CONTROL TOWER AT SYDNEY AIRPORT.	19 .
2. THE COMMITTEE ENDORSES THE PROPOSED SITING OF THE OPERATIONS BUILDING, CONTROL TOWER AND SERVICES BUILDING.	27
3. THE COMMITTEE CONSIDERS THAT AS MUCH OF THE FORESHORE AS POSSIBLE ADJACENT TO THE PROPOSED BUILDINGS, SHOULD REMAIN AVAILABLE TO THE PUBLIC AND ACCESS TO IT FACILITATED.	29
4. THE COMMITTEE CONSIDERS THAT THE ELECTRICITY SUPPLY SHOULD BE TAKEN FROM THE ST. GEORGE COUNTY COUNCIL PROVIDED THE COST TO THE COMMONWEALTH IS NO GREATER THAN FROM THE ALTERNATIVE SOURCE OF SUPPLY.	49
5. CONSTRUCTION OF THE FACILITIES PROPOSED IN THIS REFERENCE IS RECOMMENDED.	54
6. THE ESTIMATED COST OF THE PROPOSED WORK IS £1,198,000.	57
7. IF IT IS PRACTICABLE TO USE ALUMINIUM FOR ROOFING INSTEAD OF COPPER, THERE WOULD BE A SAVING OF £22,000.	58

  
 W. J. Brimblecombe  
 Chairman

Parliamentary Standing Committee  
 on Public Works,  
 Parliament House,  
 Canberra, A.C.T.

26th August, 1965.