

1964

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS

REPORT

RELATING TO THE PROPOSED DEVELOPMENT OF

AIRFIELD PAVEMENTS

AT

CAIRNS AIRPORT, QUEENSLAND

Presented pursuant to Statute; ordered to be printed, 25th August, 1964

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

(NINETEENTH COMMITTEE.)

(Senators and Members of the House of Representatives appointed 4th March, 1964.)

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- (1) Ceased to be a member of the Committee 10th June, 1964.
(2) Appointed 18th August, 1964.

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES, No. 28
DATED 20TH MAY, 1964

9. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—WORKS AT CAIRNS AIRPORT.—Mr. Freeth (Minister representing the Minister for Works) moved, pursuant to notice, That, in accordance with the provisions of the *Public Works Committee Act 1913–1960*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for investigation and report:—Proposed lengthening and strengthening of the existing runway and strengthening of the apron and taxiways at the Cairns Airport, Queensland.

Mr. Freeth presented plans in connexion with the proposed work.

Debate ensued.

Question—put and passed.

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WITNESSES

	Paragraphs in Evidence
Bradfield, Dr. K. N. E., First Assistant Director-General (Ground Facilities), Department of Civil Aviation, 499 Little Collins Street, Melbourne, Victoria	1-9, 30-37, 55-56
Chataway, Alderman S. D. E., Mayor of Cairns, Cairns City Council, Cairns, Queensland	17-20
Lewis, Captain N. A., Assistant (Flying) to the Director of Operations, Trans Australia Airlines, 339 Swanston Street, Melbourne, C.1, Victoria	38-47
Moloney, W. M., Esq., President, Cairns Chamber of Commerce, P.O. Box 808, Cairns, and representing Cairns and District Travel League	21-25
Murdoch, Captain N., Assistant Operations Manager, Ansett A.N.A., 489 Swanston Street, Melbourne, C.1, Victoria	48-54
Purdam, R. K., Esq., Acting Executive Engineer, Department of Works, Head Office, Box 2807AA, G.P.O., Melbourne, Victoria	10-16 26-29, 57

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

DEVELOPMENT OF AIRFIELD PAVEMENTS, CAIRNS AIRPORT, QUEENSLAND

REPORT

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

DEVELOPMENT OF AIRFIELD PAVEMENTS, CAIRNS AIRPORT, QUEENSLAND.

REPORT

By resolution on 20th May 1964, the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report, the proposal to lengthen and strengthen the existing runway and strengthen the aprons and taxiway at the Cairns Airport, Queensland. The Committee have the honour to report as follows—

GENERAL

1. The Committee heard evidence from representatives of the Departments of Civil Aviation and Works, local interests in Cairns and the major airline operators. During the course of the inquiries a visit was made to Cairns to inspect the airport and hear evidence.

CAIRNS AIRPORT

2. Cairns Airport is at the northern end of the trunk air route along the east coast of Australia. It is the connecting point for services to Cape York Peninsula, Thursday Island, Normanton and Karumba and is the terminal on the mainland for the Fokker Friendship service operating between northern Australia and Papua and New Guinea. It also serves as a base for aircraft which visit the cattle stations in the southern part of the Gulf of Carpentaria, for charter services, aerial ambulances, agricultural aircraft and aero club activities. Comprehensive maintenance and overhaul facilities for light aircraft have been established at the airport.

3. The airport serves the growing city of Cairns, the population of which increased by 4,535 to 25,589 between the 1954 and 1961 censuses, and a surrounding area with a population of more than 100,000 people.

4. The aerodrome was first developed in 1936 when the Council prepared a system of three strips constructed largely on a mangrove swamp with levee banks to keep back tidal water. Later that year the Commonwealth offered to take over the aerodrome in order to develop it for a proposed airmail service to New Guinea and it became the Commonwealth's responsibility in 1937.

5. Further development took place during the war and by 1945, the main runway, 5,150 feet long and 150 feet wide and of sufficient strength for use by aircraft up to the size of the Douglas DC4, had been constructed. In 1949, the runway was lengthened to 5,600 feet and in the years since, apron and taxiway construction and strengthening have been undertaken. Resealing was carried out in 1958 following the introduction of Viscount aircraft on the service to Cairns and since then, continuous maintenance has been necessary to prevent major pavement failure which would otherwise have occurred with constant use by this aircraft. Up to the present time, expenditure on the airport has amounted to £690,000.

THE AIRPORT SITE

6. The fact that it has been found necessary to locate the aerodrome on a mangrove swamp highlights the difficulty of finding a site of sufficient area and with clear approaches

in the vicinity of Cairns. The city lies in a narrow strip of land between the coast and the Whitfield and Macalister ranges. There is no possibility of locating an aerodrome to the south of Cairns as the narrow valley between the Isley Hills and the mountain range to the east is too broken by Trinity Inlet and other waterways to give an adequate area of land and the mountains themselves would obstruct the approaches.

7. The only possible alternative is an area just north of the Barron River where sufficient land is available but this does not have sufficiently clear approaches.

8. In view of the work now proposed a detailed survey of the area was made recently but this only served to confirm earlier surveys and the wisdom of the original decision to develop the airport on its existing location.

9. The main runway at the Cairns Airport lies close to and under the lee of the eastern side of Mount Whitfield. Approaches to both ends are clear and proximity to the coast provides an unobstructed approach from over the sea permitting an aircraft to break cloud in an area free from hills or mountains. Adequate navigational aids and night landing facilities are provided.

10. The Committee are satisfied that the present airport site is the only suitable one within a reasonable distance of Cairns.

EXISTING PAVEMENTS

11. The original runway consists of 3 inches of bitumen stabilised river gravel over approximately 6 inches of gravel on top of various fill materials, the total thickness of the pavement and fill varying between 35 and 50 inches. The northern extension, constructed in 1949 across the bed of the Little Barron River, consists of 8 inches of bitumen sealed gravel on sand filling.

12. There are two smaller unsealed strips 3,475 feet and 3,260 feet long which are used by light aircraft. The main runway is joined to the apron system by short taxiways and these are generally satisfactory for aircraft of weights and tyre pressures similar to the Viscount.

THE NEED FOR STRENGTHENING THE PAVEMENTS

13. Reference has already been made to the fact that the runway has required constant maintenance since Viscount aircraft have been using the Cairns Airport. Since 1960 this has involved almost daily attention to the pavement to keep cracks sealed and thus prevent the entry of water into the pavement. This treatment has prevented major pavement failures on a strip which is obviously of insufficient strength for the aircraft now using it.

14. The following table shows the growth of air traffic at Cairns since 1958—

Year					Passengers in and out	Freight short tons
1958	..	..	..	..	42,148	918
1959	..	..	..	..	55,280	1,126
1960	..	..	..	..	58,465	1,178
1961	..	..	..	..	55,435	1,246
1962	..	..	..	..	58,499	1,182
1963	..	..	..	..	66,071	1,561

Based on the figures for the first six months of 1964, the number of passengers for the full year is expected to be 75,000. The airline companies expect that aircraft of the size of the Electra will be needed for the service between Cairns and Brisbane.

15. Boeing 727 aircraft are to be introduced to the main Australian trunk routes later this year and when these fleets are added to in September 1965, Electra aircraft will be released progressively from what will be their supporting role to the jets. Both major operators wish to use Electras on the service to Cairns as they become available and for this to be possible, pavements will have to be strengthened.

16. The weights and tyre pressures of aircraft determined the strength of airfield pavements required to give satisfactory performance under regular traffic. These figures are set out in the following table—

Aircraft	Weight (lb.)	Tyre Pressure (p.s.i.)	Single Isolated Wheel Load (lb.)
Douglas DC4	73,000	72	33,000
Viscount 800	72,500	100	33,000
Electra	113,000	130	51,000
Boeing 727	153,000	130	68,000
BAC111	83,000	110	36,000
Douglas DC9	90,000	104	40,000

This shows that the Electra aircraft requires considerably stronger pavements than all others except the Boeing 727 and that the BAC111 and the Douglas DC9 have requirements somewhat similar to the Viscount.

17. Much publicity has been given recently to the possibility of the major airline operators re-equipping in the 1966-67 period with a smaller jet of the BAC111 or DC9 type. Because of the differences between the weights and tyre pressures of the Electra and these smaller jets, we needed to be satisfied that the former aircraft would make sufficient use of the Cairns strip, before replacement by a smaller jet, to warrant strengthening to the standard required by it.

18. Neither of the main operators have reached a decision about the purchase of a smaller jet but we have been assured that when such an aircraft comes into service, its main role will be as a support aircraft on the main trunk routes and that Electra aircraft are expected to be operating to Cairns at least until 1970.

19. We are satisfied that the pavements at the Cairns Airport need to be strengthened and in view of assurances that Electra aircraft will be used on this service for a number of years, we recommend that the strength should be sufficient to permit regular operation by Electra aircraft.

THE NEED FOR LENGTHENING THE RUNWAY

20. The 5,600 feet of runway available is sufficient for Viscount and Electra aircraft but insufficient for the Boeing 727, BAC111 and the DC9. Visits to Cairns by Boeing 727 aircraft will be rare and it will be a number of years before the smaller jets will be available to fly to Cairns although in the future they are expected to be operated on the regular scheduled service. Ultimately, therefore, a longer runway will be needed.

21. Strengthening the runway will involve overlaying the existing pavement with 13 inches of material and this will necessitate closing large portions of the strip to aircraft operations with consequent disruption to airline services. A number of alternatives could be adopted to minimise this disruption.

22. One possibility would be to lengthen and strengthen one of the two short strips but this would bring their western approaches so close to Mt. Whitfield that operations would only be possible in daylight. This would

seriously restrict schedules to Cairns and the cost would be extremely high for work which would have no real residual value.

23. Another alternative is to construct a temporary strip parallel to the main runway suitable for Fokker Friendship aircraft during the period when the main runway is being strengthened. However, the cost of this work would be at least as high as that of extending the runway and again there would be no residual value.

24. A third alternative would be to abandon airline services to Cairns during the construction period and transfer operations to either Mareeba or Innisfail. In order to reach Mareeba, passengers would have to be taken 42 miles from Cairns by road up the range leading to the Atherton Tablelands. This journey would take at least 1½ hours. Innisfail is 57 miles away and the journey would take at least 1½ hours. Aircraft loadings during the tourist season would necessitate the use of at least two buses. Additional problems would be created by the absence of night landing facilities, the need for additional staff and the provision of catering and cabin servicing at aerodromes not equipped for these operations.

25. The problem of maintaining aircraft services to Cairns can best be overcome by lengthening the main runway and so staging construction that the aerodrome will remain open for Fokker Friendship services at all times and only be closed to DC3 aircraft for about 13 weeks. There is no alternative to the curtailment of Viscount services for a period of about 6 months. This solution has the added advantage of providing Cairns with an airstrip long enough for operations by smaller jet aircraft when these are introduced on services up the north east coast of Australia, thus giving full residual value to the work.

26. In order to minimise disruption to air services while the runway is being strengthened and so that the work involved will have residual value when smaller jets are introduced on the service to Cairns, extension of the main runway by 1,000 feet is recommended.

THE WORK PROPOSED

27. The work proposed at the Cairns Airport involves runway strengthening and lengthening, taxiway and apron strengthening, the construction of blast areas at both ends of the main runway, drainage, clearing, extension of the access road and the construction and repair of levee banks.

28. *Runway Strengthening:* Field and laboratory investigations which have been carried out on the runway pavements and sub-grade materials have led to the conclusion that strengthening satisfactory for Electra aircraft can be achieved by overlaying the existing pavements with 5 inches of bitumen sealed fine crushed rock on 8 inches of cement stabilized sand mixture. It is intended to strengthen the whole of the existing runway in this way. Complementary work on the runway shoulders will be necessary to match this work.

29. The additional weight of the runway is expected to cause settlement of about 1 to 2 inches approximately half of which should occur during the construction period. As settlement is expected to be uniform it should not affect aircraft operations.

30. The Committee recommend runway strengthening to Electra standards as proposed.

31. *Runway Lengthening:* The main runway which is 5,600 feet long would need to be lengthened to 6,600 feet for operation by smaller jets of the BAC111 or DC9 type during the summer months. By adding this length, construction of all the runway work proposed can be so staged that the minimum length available at any time will be 3,700 feet. This is sufficient for operations by the Fokker Friendship.

32. It is proposed to extend the runway to the north over an area which is divided approximately in two by the levee bank required to keep tidal waters off the aerodrome. The area between the end of the existing runway and the levee bank has been partly filled with sand; beyond the levee the only filling is that which was required for the access road to the approach lights. After construction, settlement of the pavement of the order of 2 inches is expected between the existing runway and the levee and of about 4 to 6 inches beyond it. Settlement of this order is not expected to have any adverse effects on aircraft operations. It is intended to fill the area beyond the levee as soon as possible in the construction period so that most of the expected settlement will occur prior to the completion of the extension.

33. The pavement of the runway extension is to be of the same construction as the overlay of the existing portion. This will be placed on sand fill, the total thickness of which is to be not less than 5 feet over the mud.

34. In anticipation of jet aircraft operation at Cairns, bitumen sealed blast areas, 200 feet long, are to be constructed at both ends of the runway. These will be capable of carrying Fokker Friendship and DC3 aircraft during the construction period.

35. Associated work will include some modification to existing levee banks at the southern end of the runway, construction of new levee banks at the northern end, construction of an open drain on the western side of the extended portion of the runway, extension of the access road to the approach lights and clearing of trees in the northern approach.

36. The extension of the runway by 1,000 feet to 6,600 feet and construction of the work associated with it as proposed is recommended.

37. *Strengthening of Taxiway and Aprons:* Apart from 200 feet of taxiway adjacent to the runway which is to be strengthened in the same manner as the existing pavement, the remainder of the apron and taxiway areas will be strengthened by cement stabilising the existing gravel and overlaying with 5 inches of bitumen sealed fine crushed rock.

38. Strengthening of taxiway and apron areas as proposed is recommended.

39. While the work is in progress, the opportunity will be taken to repair some sections of the existing levee bank to restore them to level.

CONSTRUCTION TIMETABLE

40. To permit aircraft operations to continue during the construction period, runway work will be staged in the following manner—

- (1) Construction of 1,000 feet of runway extension and both blast areas;
- (2) Strengthening of the northern 2,100 feet of the existing runway;
- (3) Strengthening of 400 feet of the central portion of the existing runway;
- (4) Strengthening of the southern 3,100 feet of the existing runway.

The critical period will be the third stage when the length of runway available will be 3,700 feet. This stage is expected to take six weeks to complete.

41. Subject to the severity of wet seasons, the whole of the work is expected to take up to two years to complete. Of vital importance to the achievement of the construction timetable is commencement of filling work for the

northern extension before the onset of the wet season in November-December 1964 in order to permit pavement construction to begin during the next dry season commencing in April 1965. If this programme can be maintained, it should be possible to have pavements ready for use by Electra aircraft in November-December 1965.

42. It is inevitable that the carrying out of the work proposed will cause disruption to airline services and impose a strain on airline company organisation. The airlines realise this is the best method and gives rise to the least inconvenience. We wish to emphasise the desirability of keeping disruption of air services to a minimum and for this reason we stress the need for the proposed construction timetable to be observed.

ESTIMATES OF COST

43. The estimated cost of the work proposed is £643,000, made up as follows:—

	£	£
Runway Works—		
Strengthen existing 150 degree runway, 5,600 ft. long 150 ft. wide with 8 ft. wide sealed shoulders and associated flank filling ..	380,000	
Construct runway extension, 1,000 ft. long, 150 ft. wide with 8 ft. wide sealed shoulders, and associated earthworks ..	120,000	
Blast areas, 200 ft. long, 150 ft. wide at south end of existing runway and at north end of runway extension ..	30,000	
Levee banks, drainage, extension of access road and clearing ..	50,000	
		580,000
Aprons and Taxiway Work—		
Strengthen and widen Taxiway "B" and strengthen defined area of T.A.A. and Ansett-A.N.A. aprons and connecting taxiway ..	60,000	
		60,000
Repairs to existing levee banks ..	3,000	
		3,000
		643,000

SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

44. A summary of the recommendations and conclusions of the Committee are set out below and alongside each is shown the paragraph to which it refers.

- (1) The present airport site is the only one suitable within a reasonable distance of Cairns 10
- (2) In view of assurances that Electra aircraft will be used on services to Cairns for a number of years, pavements should be of sufficient strength to permit regular operations by this type of aircraft and runway strengthening as proposed is recommended 19, 30
- (3) Extension of the main runway by 1,000 feet and construction of the work associated with it as proposed is recommended 26, 36
- (4) Strengthening of taxiway and apron areas as proposed is recommended .. . 38
- (5) The desirability of keeping disruption of air services to a minimum and the need for the proposed construction timetable to be observed are emphasised .. . 42
- (6) The estimated cost of the work proposed is £643,000 .. . 43

R. L. DEAN, Chairman.

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

20th August, 1964.