



THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

R E P O R T

relating to the proposed construction of

AIRFIELD PAVEMENTS

for the

TULLAMARINE AIRPORT,

VICTORIA

C O N T E N T S

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THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

PROPOSED CONSTRUCTION OF AIRFIELD PAVEMENTS FOR A NEW AIRPORT
AT TULLAMARINE, VICTORIA

R E P O R T

On 7th March, 1963, His Excellency the Governor-General in Council, referred to the Parliamentary Standing Committee on Public Works for inquiry and report to the House of Representatives, the proposal to construct airfield pavements for a new airport at Tullamarine, Victoria.

The Committee have the honour to report as follows :-

GENERAL

1. An inspection was made of the site for the proposed airport at Tullamarine and with the aid of clearly marked runway centre lines, members were able to obtain, from the air, a clear impression of the proposed pavement layout and approaches. Witnesses included representatives of Commonwealth and State Government Departments, airline companies, airline pilots, local government organizations and local interests. Evidence was taken in Canberra and Melbourne.

AIRPORT FACILITIES IN MELBOURNE.

2. Airport facilities in the vicinity of Melbourne consist of Essendon for the main airline operations; Moorabbin for light aircraft, aero club and flying training activities; Point Cook, Avalon and Laverton for military purposes; and Berwick for gliding.

THE NEED FOR A NEW AIRPORT.

3. At Essendon airport there is an east-west runway, 6,100 feet long and a north-south runway, 5,400 feet long. These lengths limit the use of the airport for international services and will impose some limitations on the operation of internal services with jet aircraft.

4. International services. The international services operating out of Essendon airport use only Comet and Electra aircraft.

The Comet services travel to London through Sydney and Darwin and the Electras fly to New Zealand. The Boeing 707-138B operated by Qantas, the larger Boeing operated by such companies as Pan-American World Airways and B.O.A.C. and the DC8 are unable to use Essendon Airport for international services.

5. Without longer runways, Melbourne would virtually be deprived of international services when Comets are taken off the London route and the Tasman crossing is made by Boeing jets.

6. Internal services. The domestic operators expect to introduce Boeing 727 aircraft to the main air routes towards the end of 1964. They will be able to make use of Essendon airport but they will have to operate with some restriction on the non-stop flight to Perth.

7. Noise. When jets start operating with similar frequency to Electras, people in the neighbourhood can expect to suffer greater hardship from noise than they experience at present.

8. Obstacles to the extension of the Essendon runways. The contours of the land surrounding the Essendon airport make runway extensions impossible except in a westerly direction but this would involve the crossing of a road and a tramline and the demolition of 400 to 500 houses.

9. A new runway in a north-west south-east direction would involve moving a reservoir, heavy earthworks and the demolition of some thousands of houses. Such a runway would point in the direction of a main hospital area.

10. Westerly extension of the east-west runway would cost more than £3,500,000 and the construction of a new north-west south-east runway would cost much more. Future additions would take the runways deeper into built up areas.

11. With greater frequency of services and the ultimate replacement of existing aircraft with jets, the noise created would have serious consequences in the neighbourhood.

12. The Committee are satisfied that longer runways are needed to permit the city of Melbourne to benefit from progress in aircraft design and performance. We agree that Essendon Airport is unsuitable for such development.

THE SITE OF TULLAMARINE

13. To aid in the determination of the most suitable site for a new Melbourne airport, a panel was set up in 1958 to advise the Director-General of Civil Aviation on the development of airport facilities to serve the civil aviation needs of Melbourne and to co-ordinate these facilities with the requirements of the community. The Melbourne Airport Panel was composed of representatives of Commonwealth and State Government departments, town planning authorities, airline pilots and the Melbourne City Council.

14. The alternatives considered. The sites considered and their approximate distances from Melbourne were Tullamarine (12 miles), Wittlesea (18 miles), Hastings (40 miles), Port Melbourne (3 miles), Werribee (25 miles), Laverton (16 miles), Avalon (35 miles), and Moorabbin (14 miles).

15. Considerations such as superior approach paths, proximity to Melbourne and lower development costs narrowed the choice to either Tullamarine or Laverton. Both offer the opportunity of good airport layout and development costs were estimated to be similar although the choice of Laverton would involve the moving of Truginana explosives depot at a cost of about £1,000,000. Laverton is about five miles further from Melbourne than Tullamarine.

16. There was some preference for Laverton from the town planning aspect but the main factor leading to the choice of Tullamarine was the operational requirement.

17. Development at Laverton would involve co-ordination of military and civil aircraft activities and it was concluded that this could not be achieved with the degree of safety considered essential.

18. In addition, the traffic pattern for Laverton would be in conflict with the pattern for Essendon whereas with Tullamarine the two patterns can be so co-ordinated that a common circuit area can be used.

19. The town planning advantages of Laverton were not considered to be sufficient to outweigh the operational disadvantages and the Melbourne Airport Panel reached unanimous agreement in favour of the site of Tullamarine.

20. Nature of the site. The site covers 5,300 acres acquired at a cost of approximately £2,500,000 and is in an area between the Maribyrnong River and Moonee Ponds Creek twelve miles north-west of Melbourne. It is on a gently sloping plateau varying between 300 feet and 500 feet above sea level with good natural drainage. There is a fall of about 1 in 100 from north to south and there are steeper slopes on the western side to the Maribyrnong River and to the Moonee Ponds Creek to the east. There is a light cover of grass and the site is practically clear of trees.

21. Soil conditions. Soil on the site consists of approximately two feet of brown clay and clay loam overlaying a grey clay varying from two feet to four feet in depth. Below this are partly decomposed basalt boulders of varying size. The base material is hard fissured basalt.

22. Soil conditions vary greatly in quality and although extensive test boring and seismic surveys have been carried out, the detailed profile will not be known until the earthworks have been undertaken.

23. The surface soil is generally very susceptible to loss of stability in wet weather and all the clay soils are highly expansive. Unless this expansion is counteracted, the clay would have low stability when saturated.

24. These conditions will involve higher construction costs than if the sub-grade soils were less expansive and more highly stable. Laverton, Essendon, Avalon and almost any area within a reasonable distance north or west of Melbourne would pose the same problems.

25. Residential development. The area is essentially rural, the acquisition involving only 30 houses, 18 of which can remain undisturbed for a number of years. North and west of the site the land is zoned as rural. South of the airport boundary, which is 20,000 feet from the point of take-off roll of aircraft departing in that direction, the area is zoned largely as rural and industrial for the next two miles. Although take-offs to the east will be rare, adequate buffer areas have been provided in this direction. The only area where there is residential development is in the south-eastern corner of the site. Ample space has been provided for future expansion.

26. The airport site is thus almost entirely surrounded by rural zones in which development is severely restricted and where the normal type of sub-division would be not less than five acre lots.

27. Sufficient land has been acquired to provide a buffer between the higher noise areas of the airport and its surroundings. The combination of buffer areas and land zoning will ensure that the airport is a good neighbour in the community.

28. The site at Tullamarine will provide an airport close to the city of Melbourne having the desirable features of easy expansion, good approaches and freedom from intensive residential development. The Committee believe the site is most suitable.

THE FUTURE OF ESSENDON AIRPORT.

29. Tullamarine is planned to come into operation in 1967. Transfer of airline company activities to Tullamarine is likely to be in stages and Essendon is expected to be used for a number of years for some aircraft operations.

30. The likely need for Essendon after all airline activities are moved is difficult to forecast. This will depend on future trends and there may be use for it as a centre for executive type aircraft, for freight operations or as another airport to relieve the light aircraft activities which are steadily increasing at Moorabbin.

31. As it will be possible to co-ordinate operations at Essendon and Tullamarine, and in view of the uncertainty about future civil aviation needs in Melbourne, it is the intention of the authorities to wait for five years before considering Essendon's future. There will be a use for it at least until 1970.

AIRFIELD LAYOUT.

32. Airfield construction in the reference before the Committee consists of two runways, taxiways and an apron area.

33. Runways. The longer of the two runways planned is the north-south (16/34), 8,500 feet long. The east-west (08/26) is to be 7,500 feet long. Each will have a blast area at both ends and effective operational lengths will be 8,700 feet and 7,700 feet. Beyond the southern and western ends will be clear-ways 600 feet long. Runways are to be 150 feet wide in accordance with the recommended standards of the International Civil Aviation Organization and recent overseas practice. There will be 25 feet shoulders on each side of the runways.

34. The lengths have been determined by the distances necessary for operation of aircraft up to the larger Boeing 707-320 and the DC8. They will not be sufficient to permit these aircraft to operate over the longer stage distances to Singapore, Manila and Djakarta, although the smaller Boeing 707-138B will be able to do so. The few flights likely by the larger jets over the longer distances would not justify the cost involved in providing a further 1,500 feet of runway at this stage.

35. The design of the layout takes into consideration the relationship with the Essendon system and prevailing weather conditions.

36. Prevailing winds at Tullamarine are from the north, through west round to the south. Based on statistics and ignoring calms the percentages of use from the four ends of the two runways if the direction of maximum headwind were used would be into the north - 39 per cent, into the south - 29 per cent, into the west - 29 per cent and into the east - 3 per cent. On these figures the north-south runway would be in use 68 per cent of the time and the east-west, 32 per cent.

37. It should be pointed out that aircraft may land with cross wind components. When these are within acceptable limits landings into the south will be preferred in order to position aircraft nearer to the terminal area at the end of their landing run.

38. There was some difference of opinion about which runway would have greatest utilization under conditions of low cloud and poor visibility when landing techniques are more exacting.

39. We support the evidence derived from the statistics of the Meteorological Bureau and these indicate that there is little to choose between the north-south and east-west directions in poor weather conditions. On this basis the greater overall use of the north-south direction justifies the conclusion that the 16/34 runway should be the longer of the two.

40. The suggestion was also made that the east-west runway should be aligned further into the south-west although there was no strong objection to the proposed direction of 08/26. High ground to the north-east and length limitations imposed by the topography of the ground in the north-east and south-west prevent aligning the runway further into the south.

41. The layout of the runways has been designed so that it will be possible to extend them in the future and also to include parallel runways if they become necessary.

42. The runway lengths proposed will permit operations of domestic and international services by aircraft of existing and

expected sub-sonic types. The Committee recommend construction of a 16/34 runway 8,500 feet long and an 08/26 runway 7,500 feet long.

43. Taxiways. It is proposed to lay the main 75 feet wide taxiways parallel to the runways. They will join them at both ends and in addition high speed turnouts are to be incorporated to facilitate quick clearance of landing aircraft from the runways.

44. Holding bays will be provided at both ends of the 16/34 runway and at the eastern end of the 08/26 runway. Because of the infrequency of take-offs into the east, a holding bay at the western end of the 08/26 runway is not considered necessary at present.

45. The Committee recommend construction of the main taxiway system in accordance with the layout proposed.

46. High speed turnouts. High speed turnouts have been located so that they will cater for the most frequent landing directions from the north and east. Their distance of 4,500 feet from the runway ends is such that the Boeing 727 will be able to turn off the runway when its speed is reduced to 60 knots. They would not be able to turn off at right angles until their speed was reduced to 20 knots.

47. The placement of the high speed turnouts will serve the domestic Boeing 727 which will be a more frequent user of the airport than the larger international aircraft. To place turnouts further from the runway ends would be useful to the international aircraft but they would be less effective for the more frequent users which, on reaching them, would be travelling at speeds less than those for which the turnouts would serve a useful purpose.

48. The installation of high speed turnouts at the positions proposed is recommended.

49. Apron and associated taxiways. The apron area and its associated taxiways are closely related to the precise location of the terminal buildings. This has not been finally determined although the terminal will be in an area east of the southern half of the 16/34 runway.

50. To carry out the pavement work special mechanical equipment capable of producing, placing and finishing large quantities of high grade concrete at a high rate and to close tolerances of surface finish will be required. It will be relatively expensive to establish such equipment on the site and in order to obtain the best possible tender price, it is most desirable to call tenders for all concrete work at the one time.

51. It has been proposed to us, therefore, that approval for the apron area and its taxiways be given in principle at this stage so that the work can be included in the contract for other concrete pavement work to be undertaken. The approximate area involved is 240,000 square yards.

52. Final apron and associated taxiway layouts will be brought before the Committee with the second stage involving the terminal and other buildings. In the meantime, we recommend construction of the apron and associated taxiways of an area involving approximately 240,000 square yards.

53. Evidence was obtained about the number of aircraft parking positions to be provided initially. In view of the absence of detailed information about the apron area we do not propose to comment on parking positions at this stage.

THE WORK PROPOSED.

54. The work involved in developing the airfield at Tullamarine consists of earthworks, pavement construction, drainage, provision for a water supply and diversion of Lancefield Road.

55. Earthworks. To obtain the required grading for the runway, taxiway, and hardstanding pavements, relatively extensive earthwork will be necessary. Due to the slight undulations of the area, pavements will be constructed in a variable depth of cut and fill. The volume of earthworks involved has been estimated to be in excess of 1,500,000 cubic yards. For the pavement areas the maximum depth of cut and fill will be of the order of nine feet and six feet respectively over significant areas.

56. Pavements. With highly expansive sub-grade soils and variable depths of cut and fill some unavoidable loss of shape of the pavements can be expected. While this condition will not be detrimental to taxiways and hardstanding areas, the runways and high speed turnouts, under constant use by high speed aircraft with high tyre pressures, may need reshaping in the course of time.

57. Because flexible pavements can be reshaped readily, and if necessary under traffic, they have been chosen in preference to concrete for the runways and high speed turnouts and some other pavements where there will be high traffic concentration.

58. The eastern and northern ends of the two runways, being the ends where extension will not take place, the holding bays, the main taxiways leading to the runway ends and the apron area will be subject to the highest loadings and load repetition. They will also be subject to the most fuel spillage. For these reasons, these pavements generally will be constructed in concrete.

59. Pavements have been designed to withstand the weight of an aircraft up to 500,000 pounds and as such will be capable of accepting the supersonic aircraft expected to be operating within the next ten years.

60. Flexible pavements will be 58 inches thick for the main sections of the runway and the high speed turnouts and 64 inches thick for runway ends and taxiways where the loading will be more concentrated. They will consist of two inches of bituminous concrete over 10 inches of fine crushed rock over a base course of selected non-expansive material.

61. Concrete pavements will be 16 inches thick over a base course varying in thickness depending on the sub-grade soil but of the order of 18 inches over much of the area.

62. Drainage. The main airfield area will be drained by pipes under runways and in areas where there is likely to be traffic.

Elsewhere cheaper open drains will be used. In general, drainage from the runways, taxiways and apron areas will be discharged into the Maribyrnong River and from most of the building area and a small section in the north-east corner of the airfield into Moonee Ponds Creek.

63. Detailed design of the drainage work has not been carried out although a general pattern in preliminary form has been determined. Final design will be based on degrees of concentration and methods of dealing with outlets of water into the Maribyrnong River and Moonee Ponds Creek acceptable to the Melbourne and Metropolitan Board of Works.

64. Water which at present discharges from existing development into the airport area will be dealt with as part of the drainage system of the airfield. In this way, the interests of people living nearby will be protected.

65. Lancefield Road. The only road of any consequence which needs to be diverted as a result of the airport development is Lancefield Road on the eastern side.

66. The diversion work will be carried out by the Country Roads Board of Victoria and the new road will be of a higher standard than the existing one. The Commonwealth contribution, which will be determined by discussions yet to be completed between the Commonwealth and State authorities will be based on the provision of a pavement equivalent to the existing one.

67. It is hoped that arising out of negotiations with the Country Roads Board, early diversion of the road which now carries a large volume of traffic, will be possible.

68. Water Supply. The Melbourne and Metropolitan Board of Works proposes to construct a 46 inch diameter trunk water main which will cross Lancefield Road near Broadmeadows Road. To provide supply to the airport a branch main $1\frac{1}{2}$ miles long laid in Lancefield Road will be needed.

69. In anticipation of this, it is proposed to construct a main within the Commonwealth property and also a storage tank which will suit the reticulation of the water supply in the airport and serve as a fire fighting reserve. The Commonwealth will also contribute to the cost of laying the main in Lancefield Road from the 46 inch diameter trunk main.

70. The Committee support the development of the airfield at Tullamarine by the methods outlined and recommend construction of the work in accordance with the designs proposed.

ESTIMATES OF COST.

71. The estimated cost of the work proposed is £8,000,000 made up as follows :-

	£
Runway 16/34	1,700,000
Runway 08/26	1,300,000
Main Taxiways and Holding Bays	2,300,000
Water Supply (part of permanent system)	100,000
Diversion of Lancefield Road	350,000
Miscellaneous minor service diversions and clearing of site	50,000
Apron and associated taxiways	<u>2,200,000</u>
Total	<u>£8,000,000</u>

72. The Commonwealth contribution towards the cost of diverting Lancefield Road has not been finally determined and the estimate given is within the range of £300,000 to £400,000 which the Commonwealth expects to pay.

73. The estimates do not include amounts for roads between the terminal area and Lancefield Road or around the perimeter. No provision has been made in this reference for a boundary fence or aerodrome lighting.

CONSTRUCTION TIMETABLE.

74. If the necessary approvals are obtained and if funds are provided in time for substantial earthworks to be carried out during the 1963/64 summer, it should be possible, under normal weather conditions, to complete the airfield work in 1967.

75. Buildings and other works to be referred to the Committee in the second phase are also planned for completion in 1967.

76. We have already referred to the effects frequent jet aircraft services will have in the neighbourhood of Essendon airport. Boeing 727 aircraft are to be introduced on Australian internal services at the end of 1964 and on the basis of present planning people living near Essendon airport will experience for some two to three years the effects of the increased noise these aircraft will generate.

77. The Committee recommend that, without detriment to established priorities, construction be so phased that the airport will come into operation in time to handle the high pressure of airline business at Christmas 1966.

RUNWAY LIGHTING.

78. Witnesses pressed for the installation of advanced lighting techniques including the Swedish system of runway flood-lighting as added landing aids. We were impressed with the evidence given by the representatives of the Australian Federation of Air Pilots on this and other aspects of runway development at Tullamarine and we direct the attention of the Civil Aviation authorities to their remarks.

79. The Committee recommend a thorough evaluation of the latest landing aids and focus attention on the need to provide for the incorporation of the most effective equipment in the early planning stages.

SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS.

80. The recommendations and conclusions of the Committee arrived at after studying the material and evidence submitted are set out below and alongside each is shown the number of the paragraph to which it refers.

	<u>Paragraph</u>
(1) Longer runways are needed in Melbourne, and Essendon Airport is unsuitable for such development.	12
(2) The site at Tullamarine is most suitable. It will provide an airport close to the city of Melbourne having the desirable features of easy expansion, good approaches and freedom from intensive residential development.	28
(3) The future of the Essendon Airport is undetermined. There will be a use for it until 1970.	31
(4) The 16/34 runway should be the longer of the two.	39
(5) The 08/26 runway cannot be aligned further into the south.	40
(6) Construction of a 16/34 runway 8,500 feet long and an 08/26 runway 7,500 feet long is recommended.	42
(7) Construction of the main taxiway system in accordance with the layout proposed is recommended.	45
(8) The installation of high speed turnouts at the positions proposed is recommended.	48
(9) Construction of the apron and associated taxiways involving some 240,000 square yards of concrete is recommended	53

- | | <u>Paragraph</u> |
|--|------------------|
| (10) Development of the airfield at Tullamarine in accordance with the designs proposed is recommended. | 70 |
| (11) The estimated cost of the work proposed is £8,000,000. | 71 |
| (12) Construction should be so phased that the airport will be ready for use by Christmas 1966. | 77 |
| (13) A thorough evaluation of the latest landing aids and provision for the most effective equipment in the early planning stages is recommended | 79 |

R. L. Dean

(R.L. DEAN)
Chairman.

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22 AUG 1963