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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Parliamentary Standing Committee on Public Works

REPORT

relating to the proposed

THREE YEAR IMPROVEMENT AND MAINTENANCE PROGRAMME—STUART AND BARKLY HIGHWAYS Northern Territory

(THIRTEENTH REPORT OF 1971)

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C O N T E N T S

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

THREE YEAR IMPROVEMENT AND MAINTENANCE PROGRAMME - STUART AND BARKLY HIGHWAYS NORTHERN TERRITORY

REPORT

On 8 July 1971, His Excellency the Governor-General in Council, referred to the Parliamentary Standing Committee on Public Works for investigation and report to the Parliament, the proposed three year improvement and maintenance programme for the Stuart and Barkly Highways, Northern Territory.

The Committee have the honour to report as follows:

THE REFERENCE

1. The proposal referred to the Committee includes resealing 455 miles of pavement, strengthening 218 miles and re-aligning 55 miles of roadway, and construction of 12 bridges and nine large culverts.

2. The proposed work is the first phase of a comprenensive 10 year programme aimed at upgrading the Stuart and Barkly Highways to an adequate standard of serviceability and safety and includes the widening and strengthening of pavements, and improving alignments where necessary. It also involves the elimination of single lane bridges and causeways. The first three year programme incorporates those items considered to be most urgent.

3. The Committee were told that a further programme is to be submitted to the Government after a comprehensive review and revaluation of requirements.

4. The present work is estimated to cost $16 million.

THE COMMITTEE'S INVESTIGATION

5. The Committee received written submissions and drawings from the Northern Territory Administration and from the Department of Works. At public hearings in Alice Springs, Darwin and Canberra, evidence was taken from representatives of these bodies and of the Northern Territory Tourist Board, the Shell Company of Australia, Ansett-Pioneer Road Services, Commonwealth Railways and from two private witnesses. We also conducted public hearings at Katherine and Tennant Creek where we heard evidence from witnesses representing Buntine Roadways Pty. Ltd., the Katherine Chamber of Commerce and Peko Mines N.L. A number of written submissions was also received.

6. We inspected parts of the Stuart and Barkly Highways north of Tennant Creek, flew over other sections of the Stuart Highway between Alice Springs and Katherine and then travelled by road from Katherine to Darwin.

THE STUART AND BARKLY HIGHWAYS

7. Initial Construction The Stuart and Barkly Highways were constructed between 1940 and 1945 to meet wartime requirements. Construction was a joint effort by the main roads authorities of Queensland, New South Wales, South Australia and Victoria, the Royal Australian Engineers and the Department of the Interior. The length of the

Stuart Highway from Darwin to Alice Springs is 954 miles and the Barkly Highway within the Northern Territory, from the Queensland border to its junction with the Stuart Highway is 278 miles.

8. Due to the urgency of construction and the limited resources then available, the standard of construction of the two roads was low compared with that normally adopted before the war and lower than the present day rural highways. They were built to carry army trucks with axle loads generally not exceeding 12,000 lbs and with alignments suitable for speeds of only 35 miles an hour. The standards of drainage were also low. When bridges were built they were at low level and of single lane width which resulted in frequent traffic delays due to floodwaters. Use was made wherever possible of adjacent high level railway bridges as river crossings during times of flood.

9. The thickness and quality of pavement materials were much lower than normal for peacetime standards. Thickness varied between 2 in. and 4 in. between Alice Springs and Larrimah and about 6 in. elsewhere. The material used was excessively clayey in places and due to the speed of construction the compaction of earth works, formation and pavements were of lower strength than desirable. During the war, many miles of road on poorly drained sections of the Stuart Highway failed and required reconstruction to greater thickness.

10. The seal was generally 16 ft wide except for about the first 100 miles south from Darwin where it was 20 ft. Other short sections at Elliott and Larrimah and immediately north of Alice Springs were sealed wider than 16 ft.

11. Maintenance In 1945 the Government decided to maintain the roads at the original standard of construction but any resealing work was to be limited to a 12 ft width. By the end of the war, a considerable mileage of highway was due for resealing and a continuous programme was carried out up to 1957. In this period, some 30 miles of Stuart Highway and 2 miles of the Barkly Highway were strengthened following failure due to inadequate pavement thickness.

12. In July 1958, an expenditure of $5 million was authorised for the following five year period to provide a sealed road 20 ft wide between Darwin and Adelaide River and 16 ft elsewhere. This represented a considerable increase in highways expenditure and was mainly to provide for the increased width of reseals, allowance for heavier reseals using crushed stone aggregate, and for strengthening the increasing length of failing sections. In 1963/64, the maintenance programme was increased to $1.4 million per annum to provide for a further increase of strengthening work and also for improvements to alignment and drainage structures.

13. In 1967/68, an extra $0.6 million was provided for repairs following major flood damage caused by the record rains of 1966/67, and in 1968/69 $2.248 million was spent on normal maintenance, plus repair and strengthening work necessary after the 1967/68 wet season. Expenditure since has been limited to $2.25 million annually.

14. The Committee were told that whilst expenditure on maintenance and strengthening work has increased over the years, only limited funds have been provided to improve the highways' re-alignment and drainage.

IMPORTANCE OF THE HIGHWAYS

15. The Stuart and Barkly Highways link the Northern Territory's major centres of population as well as providing access to the eastern and southern States. A network of development roads radiating from the highways provides access to smaller centres of population and also to Western Australia.

16. Developments which have increased the use of the Stuart and Barkly Highways include the population growth and the rapid expansion of the cattle, mining and other industries.

17. Population Growth At June 1970, the estimated population of the Northern Territory was 71,400 of whom almost 33,000 lived in Darwin. These figures compare with the census of 1947 when the equivalent figures were 10,868 and 5,208 respectively (excluding Aborigines). Naturally the population growth has produced a corresponding increase in demand for foodstuffs, general merchandise and building materials and as these largely come from southern States, there has been increased usage of the highways by large freight transports. The population growth has also stimulated increasing use of the roads by intrastate travellers.

18. The highways play a significant role in the life and maintenance of the major inland towns of Alice Springs, Tennant Creek and Katherine whose 1970 population figures were 9,800, 2,450 and 2,250 respectively.

19. The Territory's population has increased at about 7% per annum in recent years and there is every indication that a high rate of increase will continue in the future. Darwin's population grew at 11% per annum between 1966 and 1970 and it is now estimated that its population could reach 80,000 or more by 1980. Alice Springs grew at the same rate in

the 1966/1970 period and its population could reach 25,000 by 1980. Tennant Creek and Katherine are expected to contain 7,250 and 5,000 people respectively by 1980.

20. Indicative also of the increased use of the roads is the increase in the registration of motor vehicles in the Northern Territory. In the 15 year period to June 1970, registrations grew from 5,041 to 25,354. We also noted the significant fact that the number of vehicles per 1,000 population rose from 220 in 1962 to 275 in 1966 and to 356 in 1970. The growing ownership and use of vehicles by Aboriginals is expected to continue this trend in the foreseeable future.

21. Cattle Industry The programme of development road construction in the Northern Territory amounting to over $30 million since 1961, has increased the road transport of cattle from about 3% of the annual turn off in 1957, to 40% in 1960 and to over 90% in 1969. As all development roads link into the Stuart and Barkly Highways system, their construction has naturally had the effect of increasing the volume of traffic using the highway.

22. The annual turn off of cattle is rising and in 1969/70 it was 261,000 head compared with 136,000 head in 1966/67. The cattle population in the Territory is now about 1.1 million. The Committee noted that because of improved management techniques and pastures and also due to the increasing use of road transport, cattle numbers are expected to rise to about 2.5 million in 15 years with a turn off of at least 500,000. Besides contributing more to export income, the growing cattle industry will result in much greater use of the highways.

23. Mining Industry Mining is the main economic industry in the Northern Territory, the production value, excluding uranium, increasing from $9.5 million to $38.5 million in the 10 years to 1970. With known contracts and expected development, we noted that this could rise to $120 million by 1974 and continue to grow after that. Expenditure on mineral exploration, other than petroleum, which has risen from $2.4 million in 1965 to $6.2 million in 1968/69 also indicates the increasing interest in mining in the Territory.

24. Some mining projects depend significantly on the highway for their operation. Copper concentrates are moved over 300 miles along the Stuart Highway by ore 'road trains' from Tennant Creek to the rail head at Alice Springs. However, the construction of a smelter at Tennant Creek to be operating by 1974, will reduce the amount of concentrates moved by road but it will be replaced by up to 25,000 tons of blister copper ingots. When the smelter is operating, an additional 7,000 tons of fuel oil per year will need to be road transported to Tennant Creek.

25. Tennant Creek is also an important gold producing area with an output of 124,000 fine ounces in 1969/70. The highways play an important role in the movement of materials and supplies for this operation. Other future developments in the area include a new mine and concentrator at Warrego, and a new copper/gold mine at Gecko.

26. Iron ore is mined at Mt. Bundey and Frances Creek, and whilst the ore is moved by rail to Darwin, the Stuart Highway is used extensively in support of the mining operations.

27. Other mineral deposits in the area of influence of the Stuart and Barkly Highways which are at present under investigation include deposits

of uranium, wolfram, silver, lead, zinc and iron ore. The search for oil and gas is also continuing over a wide area including off-shore, and any success in these operations is likely to be followed by increased road movement of resources.

28. Tourist Industry Tourism is emerging as a major factor in the economy of the Territory. The estimated value of direct spending by tourists was $19 million in 1970 compared with only $3.8 million in 1962/63. Over the same period, the number of tourists visiting the Territory increased from 18,000 to 73,000. Increased tourist promotion and improved road access to the tourist attractions will assure a steady increase in the number of visitors, as it is estimated that 66% of visitors travel overland within the Territory by private car or tourist coach.

29. As an indication of the Territory's tourist potential, recent projections suggest that the number of visitors to Alice Springs alone could increase from 38,000 in 1969 to 260,000 by 1980. As there are also important tourist attractions in the Top End of the Territory, the number of visitors to these areas can also be expected to increase, resulting in growing use of the Stuart and Barkly Highways.

30. Road Transport Industry This industry has been expanding rapidly in recent years not only in response to the increasing development of the Territory but also in competition with sea transport where delays have occurred and difficulty has been experienced in obtaining ready shipping space. The introduction of the container method of cargo handling, the construction of new port facilities in Darwin and the introduction of permanent employment for waterside workers is expected to improve sea freight arrangements. However, with rapid population and industrial growth there will be a need for additional freight capacity

from the southern States and it is considered there will always be a significant demand for the highways to be used for interstate freight.

31. Whilst the Committee was not provided with statistics on the amount of freight carried by road, it is known that the co-ordinated rail/road service operating on the highways from both Alice Springs and Mt. Isa to Katherine/Larrimah rose from 13,000 tons in 1967/68 to 45,000 tons in 1969/70. These figures, whilst only a part of the freight carried on the highways, are a good growth guide.

32. A proportion of the Territory road transport is carried on vehicles registered in other States but the number of commercial vehicles other than cars or station wagons registered in the Northern Territory has increased from 4,148 in 1960 to 11,594 in 1970.

33. Committee's Conclusion The recent history of development of the Northern Territory and the indications of continuing population, industrial, pastoral and tourist growth indicate the importance to the Territory of the Stuart and Barkly Highways. We believe that as the principal means of surface communication, the highways should be upgraded in step with the growth of traffic and maintained in a safe and trafficable condition.

USE OF THE HIGHWAYS

34. Type and Volume of Road Traffic Recent manual traffic counts have highlighted the significant use of the highways by heavy road transport. Compared with the total number of vehicles, the percentage of trucks, semi-trailers and buses varied between 20% and 30%. This compares, for example, with the Hume Highway in New South Wales and Victoria where figures are similar away from large towns, and other New South Wales highways which have about half this level.

35. Due mainly to the fact that the Top End has no railway link with the rest of Australia and in order to provide a satisfactory 'road train' service, the limit for the length of truck and trailer combinations in the Northern Territory is 145 ft. These vehicles make passing and overtaking by other vehicles difficult as well as being severe on the road shoulders. To achieve some degree of safety, reasonably wide roads and satisfactory alignments are necessary.

36. Automatic traffic counts show the yearly increase in the use of the highways to be of the order of 15% to 25% which is significantly higher than the 5% growth rate used in national road surveys for Australia as a whole. A further indicator of the dramatic growth occurring in traffic volumes is the consumption of motor spirit. In 1963/64, 4.2 million gallons of motor spirit was consumed. This rose to 5.4 million gallons in 1966/67 and to 11.8 million gallons in 1969/70. During 1968/69 and 1969/70, the annual increase was 35% and 33% respectively compared with 7% and 6% respectively for Australia as a whole.

37. Disruptions to Road Traffic Heavy monsoonal rains usually fall on the northern and busiest half of the Stuart Highway in the months of January, February and March and interruptions due to flooding are common. For example, the Newcastle Waters Creek flooded over the Stuart Highway for 60 consecutive days and was impassable for up to 17 days, in February/March 1967. In February 1968, flooding caused numerous interruptions to highway traffic.

38. During periods of high rainfall, the highways can be closed to traffic at low level bridges and causeways for varying periods. Each year the Stuart Highway at river crossings is completely closed for varying periods

and generally for about two months of the year there is no guarantee of being able to drive from Darwin to Alice Springs without being delayed. During February 1968, the Cullen, Edith and King Rivers were impassable for four consecutive days and 37 vehicles and 60 people were trapped between the Edith and Cullen Rivers without access to a town.

39. An additional problem associated with heavy rain and flooding is pavement damage and deterioration. The road is weakened when conditions are very wet and during exceptional rainfalls loaded vehicles have actually bogged in the pavement and shoulders. The general deterioration of the highway necessitated special load restrictions on commercial operators for about three weeks in 1967, in 1968 and again in 1971.

40. A number of accidents have occurred in the past 12 months which have resulted in the highways being completely blocked for periods up to a day. In addition, there have been cases of semi-trailers and road trains losing power on inclines and jack-knifing as they roll backwards, thereby closing the road until they can be removed by a crane or other heavy vehicle.

41. All but one of the 14 bridges on the Stuart Highway and the one bridge on the Barkly Highway are only a single lane wide and most of them are poorly aligned. They were satisfactory when the volume of traffic was light but they are now a distinct traffic hazard in the face of the increased traffic volume. The Northern Territory has the worst accident rate per motor vehicle registration in Australia and it is clearly necessary to improve out-dated alignment and road surface conditions and eliminate single lane bridges, all of which contribute to this most unsatisfactory accident rate.

42. Load and Other Limitations The Control of Roads Ordinance limits the size and weight of vehicles. In 1971, the Government considered the result of a study of vehicle weight limits undertaken to determine the economic balance between construction and maintenance costs on roads, and the cost of vehicle operation. It was decided to raise the legal road limits to the levels applicable to transitional permits and the transitional permit system was further extended until the amending ordinance becomes effective.

43. Loadometers and weighbridges are used to measure axle loadings as a check on whether the vehicles are within the prescribed ordinance limits or those of transitional permits.

44. Committee's Conclusion The Committee received ample evidence of the increased volume of traffic using the highways and their resulting inadequacy for such use. In addition, the delays caused to traffic by floodwaters and the disturbingly high accident rate show upgrading to be necessary.

ORDER OF PRIORITY FOR IMPROVEMENTS

45. Many sections of the highway have a priority need for reconstruction because of deteriorating pavements but sectional re-alignment or relocation is proposed if it is cheaper than reconstruction on the existing alignment. In addition, progressive relocation or re-alignment is proposed on a priority basis to reduce hazards such as substandard curves, crests and dips or deficient sight distances. Rail crossings will be improved, or if possible, eliminated by re-alignment.

46. The three year programme of work proposed is the first stage of progressive improvement of the highways to provide a satisfactory facility not only for the existing traffic but also for the growth of future traffic. The Committee were told that besides the condition of the road surface and its other physical features, the factors which determine a suitable standard of improvement to the highways are the volume and type of traffic and the rate of growth. We were given figures which substantiated the adoption for design purposes of 10% per annum for a long term growth rate for traffic on the Barkly Highway and the Stuart Highway south of Katherine and of 15% for the Stuart Highway north of Katherine.

47. The Committee also noted that the principles considered by the Department of Works in determining the nature and cost of the improvements required were:

(i) establishment of the desirable minimum standards for the highways;

(ii) a detailed inventory of the Stuart and Barkly Highways to record their existing condition;

(iii) comparison of the present conditions on a mile by mile basis with appropriate tolerable standards to determine deficiencies and also to assess the further deficiencies expected within the period 1969/79 as a result of deterioration or increasing traffic;

(iv) consideration of the work necessary in the 10 year period to eliminate these deficiencies including design provisions for traffic 15 years into the future, and preparation of the cost figures; and

(v) determination of the works of highest priority which should be carried out in the first three years.

48. We noted also that in addition to the need for highway improvement works, there will continue to be the basic requirement for day to day maintenance such as pavement patching, repairs and cleaning of the table drains, culverts and bridges, shoulder regrading, flank clearing, sign and guidepost maintenance etc. Sealed pavements also require regular resealing and experience in the Territory has indicated that this is required at 7 to 10 year intervals.

THE PROPOSED WORK

49. The proposal submitted to the Committee involves resealing 455 miles of existing pavement, strengthening 218 miles and re-aligning 55 miles, and the construction of 12 bridges and 9 large culverts. Where strengthening or re-alignment work is to be carried out between Darwin and Tindal, south of Katherine, the pavement will be sealed to 24 ft with 8 ft shoulders and elsewhere, to 22 ft with 6 ft shoulders. Widening the remaining sections of the highways is proposed in later programmes.

50. The design speed used will depend on the type of terrain but generally will be 70 m.p.h. in flat country, 60 m.p.h. in undulating country and 50 m.p.h. in hilly country. Road pavements will be designed in accordance with the higher vehicle weight limits recently approved for the Territory and generally will be constructed from local gravel materials.

51. Bridges will be designed to carry two lanes of traffic and will be of composite steel and concrete construction, pre-stressed concrete or cast in situ concrete.

52. There are a number of major items in the reference including a bridge to be constructed over the Manton River, 42 miles south of Darwin to replace the existing causeway which regularly floods each wet season. In the section between 54 and 72 miles south of Darwin, re-alignment work and new bridges will be constructed to replace five single lane bridges and numerous sharp curves. Between Hayes Creek and Corkscrew Pass, 115 to 119 miles south, the road will be reconstructed to eradicate the numerous sharp curves and very steep grades. Between 175 and 199 miles, the highway will be re-aligned and a new bridge will be constructed over the Fergusson River to replace a single lane low level bridge. The re-alignment will replace a poorly aligned section of the highway and eliminate two blind railway crossings.

53. As part of the re-alignment between 187 and 190 miles, a new bridge will be constructed over Edith River. Re-alignment will also occur between 218 and 220 miles south of Darwin and a high level bridge will be constructed over the Katherine River immediately upstream of the railway bridge. The re-alignment and the bridge will shorten the highway by 5 miles, replace the low level single lane crossing and elminate two railway crossings and a two mile section of sharp curves.

54. Immediately south of Renner Springs, between 543 and 563 miles, re-alignment will occur to overcome the sharp curves and grades of this section.

55. Small bridges are planned at King River (245 miles), Tennant Creek (632 miles), McLaren Creek (687 miles), Dixon Creek (700 miles) and Wycliffe Creek (717 miles) and large culverts will be constructed at South Tomlinson Creek, Kuerschner Creek, Kelly Creek, Edinburgh Creek, Skull Creek, Burt Creek and 16 Mile Creek. All these streams close the highway during periods of heavy rain.

56. Committee's Conclusion The Committee recommend the construction of the work in this reference.

ESTIMATE OF COST

57. The estimated cost of the work when referred to the Committee was $16 million made up as follows:

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Routine maintenance	1,500,000
Aggregate	1,040,000
Sealing	1,390,000
Strengthening	6,060,000
Re-alignment and bridging	5,560,000
Miscellaneous works	450,000
	16,000,000

PROGRAMME

58. After an approval to proceed is given, the work is planned to be commenced in the 1971/72 financial year and be completed by early 1976.

RAIL/ROAD CROSSINGS

59. During the course of the enquiry the Committee considered the number of rail/road crossings, particularly in the section of the Stuart Highway south of Pine Creek and the requirement for road traffic to stop at such crossings notwithstanding the relatively infrequent rail traffic. We consequently took supplementary evidence in Canberra after the meetings in the Northern Territory had been finalised to enable the views of the Commonwealth Railways on this matter to be examined.

60. The Committee noted that as part of the work in this reference a number of rail/road crossings are to be eliminated including two dangerous crossings near the Fergusson River. We also noted the considerable difficulties and operating penalties that would be incurred if trains rather than road traffic were required to give way at crossings.

61. There obviously has to be a balance between the safety factor, the degree to which crossings are developed toward the ultimate of grade separation and the availability of funds for capital works. In this instance, we believe progress is being made towards minimising the risk of accidents at rail/road crossings by eliminating some crossings. We are concerned, however, to see that those crossings which remain are made as safe and convenient as possible for the motorist.

RECOMMENDATIONS AND CONCLUSIONS

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

		Paragraph
1.	THE RECENT HISTORY OF DEVELOPMENT OF THE NORTHERN TERRITORY AND THE INDICATIONS OF CONTINUING GROWTH INDICATE THE IMPORTANCE TO THE TERRITORY OF THE STUART AND BARKLY HIGHWAYS.	33
2.	AS THE PRINCIPAL MEANS OF SURFACE COMMUNICATION, THE HIGHWAYS SHOULD BE UPGRADED IN STEP WITH THE GROWTH OF TRAFFIC AND MAINTAINED IN A SAFE AND TRAFFICABLE CONDITION.	33

		Paragraph
3.	THERE IS AMPLE EVIDENCE OF THE INCREASING VOLUME OF TRAFFIC USING THE HIGHWAYS AND THEIR INADEQUACY FOR SUCH USE.	44
4.	UPGRADING HAS BEEN SHOWN TO BE NECESSARY.	44
5.	THE COMMITTEE RECOMMEND THE CONSTRUCTION OF THE WORK IN THIS REFERENCE.	56
6.	THE ESTIMATED COST OF THE WORK WHEN REFERRED TO THE COMMITTEE WAS $16 MILLION.	57

(C.R. KELLY)
Chairman

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

7 October 1971.