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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

R E P O R T

Relating to the proposed

Erection of the

NEW COMMONWEALTH AVENUE BRIDGE

at

CANBERRA, A. C. T.

1954-55.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS.

REPORT

RELATING TO THE PROPOSED CONSTRUCTION OF

COMMONWEALTH AVENUE BRIDGE

AT

CANBERRA, A.C.T.

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.
(FIFTEENTH COMMITTEE.)

(Senators appointed 10th August, 1954, Members of the House of Representatives
appointed 11th August, 1954.)

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Senator JUSTIN HILARY O'BYRNE (Vice-Chairman).

Senate.

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EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES, No. 11,
DATED 26th AUGUST, 1954.

6. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—COMMONWEALTH-AVENUE BRIDGE, Canberra.—Mr. Kent Hughes (Minister for Works) moved, pursuant to notice, That, in accordance with the provisions of the *Public Works Committee Act 1913-1953*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for investigation and report, viz. :—The construction at Canberra of a new bridge over the Molonglo River to replace the existing Commonwealth-avenue Bridge.

Mr. Kent Hughes laid on the Table plans, &c., in connexion with the proposed work.

Debate ensued.

Question—put and passed.

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THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS—COMMONWEALTH AVENUE BRIDGE, CANBERRA.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred for investigation and report the question of the construction at Canberra of a new bridge over the Molonglo River to replace the existing Commonwealth-avenue Bridge, has the honour to report as follows:—

SECTION I.—INTRODUCTION.

EARLY HISTORY.

1. Prior to 1922 the area was served by one low-level bridge only, at Commonwealth-avenue, and by fords at Acton, Church-lane—now called Scott's Crossing—and elsewhere. Consequent upon floods and damage in 1922, and the increasing needs of the city, the provision of a high-level crossing at Commonwealth-avenue was commenced in that year, the work to be undertaken in three stages. After the second stage had been completed the 1925 floods washed out the southern abutment of the spans over the main river channel, and this was repaired, giving an overall length of 410 feet. Since 1946 major repairs and renewals have been effected at a cost of £33,000.

2. The width of the present bridge is 20 feet between kerbs, compared with a width of 30 feet on the embankment. This provides two lanes of traffic, including bicycles, but provision is made for pedestrians on a footway 3 ft. 4 in. wide on the outside of the bridge trusses.

3. As a consequence of strengthening carried out recently the present load limit permits any 10-ton vehicle to proceed over the bridge at up to 15 miles per hour. Regular inspections are needed to check the conditions of the bridge, as further deterioration must result, with consequential reduction in strength and the safe load which can be carried.

SECTION II.—THE PRESENT PROPOSAL.

THE PLANS REFERRED.

4. The proposal referred to the Committee by the Minister in the House of Representatives provided for a bridge, to replace the existing Commonwealth-avenue Bridge, consisting of seven 100-ft. spans and two 50-ft. end spans in steel and concrete, giving a waterway of 700 feet, together with appropriate approach embankments and pavement. The preliminary estimate of cost was stated to be £600,000.

5. The Minister, in submitting the reference to Parliament, particularly desired the Committee to ensure that the bridge to be constructed would provide for adequate traffic for many years to come, and to express some views on other aspects of the Griffin plan, not only regarding the capacity of the bridge, but also concerning the general question of bridges over the Molonglo River, and also to give broad leads which future planning should follow.

ALTERNATIVE PLANS.

6. In view of the fact that the Committee's inquiry was to include the broad aspects of future planning, the Department of Works added special material analysing the matter of bridge sites, and suggested alternative sites for the bridges of the future. Assuming the possibility of amending the present gazetted plan of Canberra, the Department reached the conclusion that,

owing to the unexpectedly heavy increase of traffic and the relative disposition of homes and sites of work, an additional river crossing should be included in the plan on the line of Anzac Park, near Scott's Crossing. Details were given showing immediate economic advantages from placing the bridge in this situation, and suggesting additional sites for bridges necessary in the future.

7. The present proposal therefore evolved into the use of the same bridge as that designed for the Commonwealth-avenue site, but to be placed across the centre of the lakes scheme on the line of Anzac Park. The suggestion to place the new bridge at that site was accompanied by a conclusion that, if advantages of placing a bridge in that position are not considered sufficient to justify alteration to the Canberra plan, the next bridge should be placed on the line of King's-avenue.

8. Suggested plans for bridges of three, four, or six lanes were submitted, each with a lane for cycles and a footway for pedestrians on each side.

9. The proposal provided that the waterway under the bridge should be increased by excavation to give sufficient area to cope with the maximum heavy floods calculated as possible in the future, while the level of the bridge was to allow for a normal clearance of 12 feet from the lake level of 1,825 feet above sea level. The overall width of the four-lane bridge was planned to be 62 feet.

ESTIMATED COST.

10. Pending the decision regarding the width of bridge required, according to the number of lanes necessary in relation to traffic movement, generalized estimates were provided, giving figures for alternative widths likely to be selected. For the four-traffic lane bridge, similar to that originally proposed, the estimated cost submitted in evidence for this proposal was £821,000 for the site at Commonwealth-avenue, £698,000 if constructed at Anzac Park, near Scott's Crossing and £646,000 at King's-avenue.

SECTION III.—THE COMMITTEE'S INVESTIGATIONS.

GENERAL.

11. At the outset it was realized that this inquiry, with its broad implications affecting the whole of the Canberra plan, would involve a considerable amount of evidence on matters which would also affect the reference, in relation to the extension of the water supply storage system for Canberra, being investigated at the same time. While the Committee makes its report on each of these two references independently, it is to be emphasized that the evidence is inter-related and should be studied together.

12. The Committee visited Melbourne to take evidence from departmental officials submitting the proposals, and to gather other evidence from State Government and private persons expert in the subjects under review.

13. A visit to Sydney brought evidence from State officials regarding bridge construction in New South Wales, and modern methods being adopted overseas.

Special attention was given there also to the use of pre-stressed concrete for major bridge work, particularly as applied by Freyssinet and others in Europe.

14. In Canberra the Committee took a great deal of evidence in connexion with all aspects of the bridge proposal, including detailed study of traffic problems and trends for the future, development of various parts of the city, provision necessary for cross-river peak traffic consequent upon expansion of the city until the close of the present century, and the effect of the lakes scheme upon traffic problems to be faced in the near future. Inspections were made of many points concerned with the existing difficulties, and the facilities which will be required immediately and in the years to come.

15. A great deal of time and study was given to the whole question of development and predictions for the future, and much credit must be given to the officials of the Department of Works for their keen co-operation in providing graphs and diagrams to illustrate the trends and problems involved, and in preparing at short notice additional illustrations and alternatives needed, thus helping to make the work of the Committee easier and more effective.

16. Evidence was taken in Canberra from various departmental officials directly concerned with the bridge proposals, town-planning and general development and also from traffic police, tourist representative, and members of the public interested in the subject. The proposal was affected particularly by the possibility of the implementation of the lakes scheme, and the whole question of providing bridges for the future made it essential for the policy concerning the lakes to be defined at once. Progress of the city, and planning of buildings are urgently demanding positive action with decisions in this regard, and the Committee took evidence from departmental officials, members of the National Capital Planning and Development Committee, representatives of the University, golf and racing clubs, progress associations, and members of the public interested in Canberra matters. Particular attention was given to previous investigations on the lakes scheme, and special recent reports of hydraulic engineers and other experts were studied, while all possible information likely to have a bearing on this important matter in Canberra's interests was gathered together by evidence and personal inspection of the land and other features concerned.

PRESENT TRAFFIC.

17. It soon became apparent that the research into actual traffic movements, consequent upon reference to this matter to the Committee, demonstrated surprising results, and actually caused the Department to change its original proposal to provide the bridge at Commonwealth-avenue, to the present one constructing it on the line of Anzac Park. Counts of traffic made during June, 1952, and in September, 1954, were summarized in tabular and graphical form. A feature of these figures is that, while the population has increased by 35 per cent. over the period since 1952, the volume of cross-river traffic has increased by 170 per cent.

18. The relation of vehicular traffic to the population depends on a great many factors, and these percentages can only be used with caution in forecasting the position from time to time as development proceeds. However, estimates for the future planning can only be made on the basis of present information. Assuming that present trends and policies will continue, the cross-river traffic is likely to reach the peak rate of 6,000 vehicles per hour—4,300 northerly, and 1,700 in a southerly direction in the afternoon, and the Administrative buildings are fully occupied, and

the population is 44,000. For a population of 100,000 the peak is estimated to be about 12,000 vehicles per hour (the total in both directions).

WIDTH OF LANES.

19. The effectiveness of the roadway is dependent upon the maintenance of a steady flow of traffic, and it was pointed out that, as the traffic flow is considerably impeded by cyclists, a separate lane 4-feet wide will have to be provided on each side of the roadway in order to cope with the traffic upon the basis shown in the calculations.

20. All vehicles will be normally less than 8 feet in total width, with cars considerably narrower. The width per lane on the Sydney Harbour Bridge is 9 feet 4 inches and six lanes are provided. It was stated in evidence that the new Chicago super highway provides lanes of 9-ft. 7½-in. wide, while the new tunnel to the London Airport terminal building, providing for 1,000 vehicles per hour per lane, has 10-ft. wide lanes. For speeds in excess of 60 miles per hour lanes widths of 12 feet are used. The plans of the proposed bridge provide for 11-ft. wide lanes in Canberra, and the Committee is satisfied that it is reasonable to adopt this width.

CAPACITY OF LANES.

21. The number of vehicles which can be carried in any lane, unobstructed by cross traffic, depends on the class of traffic, but reaches a theoretical maximum of 2,000 per hour, assuming a steady stream of vehicles moving at 30 miles per hour, with about 60 feet clear between vehicles. In practice it is difficult to maintain these conditions, and, under generally favorable conditions on this particular stretch of road, it should be reasonable to assume that 1,300 vehicles per hour per lane would be possible. The maximum rate recorded over the Sydney Harbour Bridge is 1,370 vehicles per hour per lane, while the maximum recorded in Canberra has been 980 for Commonwealth Bridge, and 1,350 at Scott's Crossing. For the purposes of this proposal the figure of 1,000 vehicles per hour per lane has been adopted, and a four-lane bridge has been considered the maximum for efficiency, particularly in respect to gathering and dispersing traffic on approaches.

LANES REQUIRED.

22. At the present time the one-way peak is 2,700 vehicles per hour, thus requiring six lanes, three in either direction. If floods block the low level crossings at the present time, the graphs submitted show that the single lane northward on Commonwealth Bridge is jammed for about one hour at peaks. Sound practice would point to the use of at least two high level crossings, rather than to provide one bridge of six lanes to carry the traffic.

23. Higher peaks are expected in, say, six years' time, when the Administrative Building is to be fully occupied. Further increases are calculated as the city develops towards its planned maximum population of 100,000 to 130,000 probably after the end of this century.

24. The minimum traffic volume (total for both directions—five minute peak) is calculated to be 9,000 vehicles per hour, requiring four lanes in one direction and two in the other, the ultimate could be in the order of 12,000, requiring eight lanes in one direction and four in the other.

25. The departmental submission states that 'twelve lanes would obviously be most effectively provided in several bridges to gain the many advantages of traffic dispersal, and an efficient arrangement would be a

four-lane bridge at Commonwealth-avenue, a four-lane at Scott's Crossing, a two-lane at Acton, and a two-lane at King's-avenue.

26. The Committee studied these recommendations in the light of all the other evidence, particularly in regard to immediate projected development of certain sections of the city together with the planning of roads and approaches to the various proposed bridges for the future. The fact which became prominent in the minds of the Committee was that, while the conclusions presented by the Department spring from calculations based with great precision on present conditions, with estimates on them projected into the future, the whole of the recommendations rest upon the basis of the five-minute peak of traffic in the afternoon. It was pointed out that a five-minute peak congestion could delay traffic for up to an hour, and it is recognized that the shortness of the maximum peak must not be given undue weight without special attention being given to the immediate consequences of it. However, the Committee feels that there is an urgent necessity for a bridge now, with special planning for the future needs, but provision of facilities up to the theoretical optimum would not be justified in actual practice. Further inquiries were made in an attempt to assess the practical application of peak time problems, so that reasonable provision might be recommended for future action in this matter.

27. In order to collate the information submitted in evidence so that it could be easily and quickly referred to, the departmental officials produced ten alternative schemes in diagrammatic form, showing all the details concerned in the various aspects of the bridge requirements as demands are expected to increase from the present time until the year 1990.

These schemes will be referred to later, in presenting the Committee's decision on the plan finally recommended.

28. In relating the amount of traffic to the number of lanes required, the schemes assume an increase in population to 70,000 in 1990 in accordance with a graph compiled from all statistics available; the ratio of motor vehicles to population as approximately 4 to 1 as at present, though it was emphasized that this might easily increase considerably; and traffic per lane at 1,000 vehicles per hour. On the basis of these assumptions it is shown that the number of lanes required over all the bridges combined, will rise from four now to twelve in 1990.

29. There are many factors which combine to create the demand for these traffic facilities, and the Committee studied the volume of evidence adduced in respect of such aspects as development of the various areas and locations in the city, with their possible effect upon river-crossing traffic; site of the bridges required; the main traffic generating points; the tendency to use the shortest route; the effects of floods, and many other relevant points. The possibility of staggering working hours of the occupants of government offices in Barton was weighed, but it was considered that staggering of hours, as it creates many difficulties and a considerable amount of waste and confusion, is one of the weapons which could be used, almost as a last resort, at a later date, if circumstances arise to create an urgent demand which cannot be dealt with by providing the additional facilities required. It is considered that the recommendations which the Committee can make now should provide reasonable routes to cover requirements for many years to come without staggering of hours. Although it is essential to guard against errors which have caused such difficulties in other parts of Australia and the world, it is realized that the real traffic problems of Canberra are comparatively small, and if a planned programme of construction for the

future is resolutely adopted now, it should be possible to provide adequate bridges for the future.

30. The Committee feels that, to provide the optimum number of traffic lanes, thus envisaging complete freedom from any delays which at present occur for only short periods of the day, would prove expensive and largely unnecessary. Compromise schemes were therefore called for, and two further schemes were evolved providing for an ultimate of ten lanes by 1990, four of which would not be constructed until towards the end of the period being considered. The Committee feels that the provision of a plan, by which up to ten lanes can be made available across the river in the main section of Canberra by the end of this century, will satisfy all reasonable demands during that time.

TRAFFIC DISTRIBUTION.

31. While the estimated population and proportion of vehicles can be calculated to indicate the total amount of traffic to be provided for in the future, it is a much more complex problem to analyse with accuracy the likely distribution of traffic over the various routes available under varying conditions from time to time. The traffic surveys made in the past give an indication of actual use being made of the bridges in existence, while a study of possible development of particular areas of the city will suggest possible increased needs. The method used at present, of counting vehicles passing over the bridges, is not a very reliable guide to the real demands which should be met to extract the maximum efficiency from the use of bridges and approach roads.

ORIGIN AND DESTINATION SURVEYS.

32. The "origin and destination" surveys conducted in other cities proves much more effective as pointers to the best arrangement to facilitate the most efficient movements of vehicles from source to destination. It has been suggested that much of the traffic using Scott's Crossing at peak periods does so only to avoid congestion elsewhere. Origin and destination surveys would help to show the quickest and most natural course the vehicles should use, and thus provide information as to the best position for roads and bridges as the city develops. The Committee recommends that origin and destination surveys be conducted at suitable stages, to assist in the accurate assessment of traffic requirements for the years to come, particularly as the basis of all present calculations is subject to the possibility of considerable variations.

TOURIST AND THROUGH TRAFFIC.

33. The amount of tourist traffic coming to Canberra is surprising. Evidence shows that an estimate for this year places the probable number of tourists visiting Canberra by various means at transport at 250,000, while it is expected that 20,000 cars will come to the city. The traffic is spread out fairly evenly throughout the year, with minimum periods about May and August, and it is considered that a large proportion of them use the Commonwealth-avenue bridge to cross the city.

34. Planning for the future is being carried out along the lines of providing an alternative route from the Federal Highway to the industrial areas at Kingston and Molonglo, and this will affect the distribution of traffic flowing over the city bridges. In addition to these factors, however, considerable attention must be paid to the general plan of the city and the necessity for conformity with certain fixed principles upon which the plan depends. The lakes scheme, the Government triangle, and the formal arrangement of Commonwealth, and King's-avenues effect the placing of bridges very considerably, and a good deal of investigation was carried out by the Committee in this regard.

THE LAKES SCHEME.

35. The Committee is well aware that the lakes scheme provided a most important feature in the original Griffin Plan and inquiries by the Parliamentary Standing Committee on Public Works in the past have taken cognisance of this fact, giving a great deal of consideration to the possibility of its implementation from time to time. On each occasion when the Committee has reason to investigate the position in the past, it was realized that the growth of Canberra had not reached a stage at which it was desirable to spend considerable sums on the lake scheme. It has always been affirmed, however, on the extensive evidence before the Committee in the past that the lake scheme should be constructed at the appropriate time. The present Committee feels strongly that the time has come when it can no longer postpone a concrete decision on the matter, as Canberra's development has reached a stage at which future planning for bridges, roads, buildings, and various facilities is being hampered, making some course of definite action essential now. With this in mind the Committee took evidence on the various aspects of the whole scheme.

THE EAST LAKE.

36. The East Lake, originally envisaged on the 1,845 contour level, was 20 feet above the other lakes. Its elimination was determined upon by the Committee in 1916, for a number of important reasons set out in a report at that time, and all the present evidence goes to show that the elimination of that portion of the original plan was wise and reasonable.

THE CENTRAL BASINS.

37. The central section of the lakes scheme consists of the central or Molonglo Basin, flanked by the East Basin and the West Basin covering a total area of 1,473 acres. These were envisaged as being constructed on the 1,825 level into rather formal shapes, to harmonize with the symmetrical appearance of the Government Triangle. The desirability of relaxing to some extent the rigid formality of the design, and to allow some parts of the central lakes to conform more to the natural contours of the landscape appeals to many people. It would certainly be less costly and would require a good deal less work than would be required to construct the formal boundaries. It is very largely a matter of taste, but any considerable variations should be adopted with caution. This is in conformity with the decision of the Committee expressed in the 1916 inquiry. A certain amount of earthworks and preparation will be essential to contain within reasonably formal limits the eastern extremity of the scheme forming the East Basin, and some other minor points on the 1,825-ft. contour would need treatment. These details should be planned as soon as possible, so that any consequential action could be anticipated. A certain amount has been included in the present estimate of costs to cover such developmental work.

38. The three central basins are now the only part of the original lakes scheme legally forming part of the present gazetted Canberra Plan, and it is generally accepted, by witnesses who are residents of Canberra, that this part of the scheme will come into being at some time in the future, with most people wishing that something could be done about it soon.

THE WEST LAKE.

39. The West Lake, which would be formed by a weir at Yarralumla, and would stretch through Acton to Lennox Crossing, was intended to be on the same level as the central lakes, 1,825 feet. It was reduced to a "Ribbon of Water" scheme by notice of variation of the Canberra Plan in the Commonwealth Gazette,

of 27th August, 1933, and has the approval of the National Capital Planning and Development Commission. As the Public Works Committee was not in possession of any of the reasons for this important alteration in the plan, action was taken in this inquiry to ascertain the full reasons for the recent elimination of the West Lake, and to study the effect of its development of adjacent areas. A considerable amount of evidence was taken in this regard, and the minutes of proceedings of the National Capital Planning and Development Committee were called for. This was especially desirable as the elimination of the West Lake reverses all the previous decisions of the Public Works Committee on this matter, throughout the long years that this subject has been under consideration.

40. Evidence given on behalf of the National Capital Planning and Development Committee stated that that Committee has always considered that the water area in the statutory plan of Canberra was overdone, and the West Lake should be eliminated with a view to conserving the land. It considers that the West Lake would be too expensive, as it would contain 860 acres and it would alienate a lot of valuable land which could be used for various purposes if the flood control problem could be solved. It was stated by the Chairman that the Planning Committee had asked the Works Department for a report on water control, but had not received a report yet, though it had been decided to recommend reduction of West Lake to a ribbon of water 120 yards wide, 5 miles long, and containing 240 acres of water.

41. The Public Works Committee sought evidence by which to compare the relative costs of the ribbon of water scheme with that for the West Lake, but was informed that such comparison was not made by the Planning Committee, and there was no data before them to show whether the ribbon of water scheme would bank up the water as far back as the Lennox Weir. No definite plan was in mind to treat the area left between the ribbon of water and the West Lake, though it might be useful for University expansion. Other evidence sought by the Committee showed that, although an expert hydraulic engineer was engaged in making a special report on this subject at this time, the Planning Committee had no knowledge of it, and, when his report (advising the retention of the West Lake) was made, the time had not expired during which variation of the plan could have been prevented. The report was not brought to the attention of the Planning Committee up to the time this evidence was given.

42. The Planning Committee considers the vast area of West Lake aesthetically unattractive and out of proportion, though this is stated to be a matter of personal taste. The Public Works Committee notes, however, investigations in past years, nor is this view included in the list of reasons, recorded in the minutes of the West Lake, when the matter was decided by the Planning Committee on 2nd December, 1933.

43. The Chief Town Planner for Canberra stated that he attends Planning Committee meetings when any of his submissions are being dealt with, but he was not consulted as Chief Planner regarding the elimination of West Lake.

44. As no very weighty reasons for the elimination of the West Lake, apart from the aesthetic ones, had been advanced in evidence by the Planning Committee, the Public Works Committee sought evidence from engineers, planners, private citizens of Canberra, and representatives of the interests concerned, both for and against the proposal, and a study was made of previous notices of the matter, with modern technical data bearing upon it.

THE WILSON REPORT.

45. In addition to the information collated in past years on this matter the Committee was informed of the report made by Mr. Hugh Wilson, an expert hydraulic engineer made available by the Department of Works for a special survey of the area concerned with a view to obtaining the best up-to-date information upon which to base decisions regarding the lakes scheme. A copy of his report, completed in 1933, was studied, and the author called to give evidence on the matter.

46. Mr. Wilson produced his report, giving a comprehensive résumé of previous research in this field, and presenting a great deal of valuable information regarding floods and dry periods searched out from records covering a long period. He pointed out that the results, set out after a thorough survey of the area and the factors concerned, indicated that the lakes scheme, including West Lake, with weir at Yarralumla at the 1,825-ft. level was not only very desirable, but was definitely practicable at an early date. It also affirmed that a dam on the Quambeyan River for topping up in dry seasons would be required so seldom that it was not recommended as necessary at all. It was affirmed that the maximum fall in the height of the West Lake in the driest year on record was only 33 inches; it will only occasionally fall 12 inches, and for nearly half the years the lakes will be full all the year round.

THE RIBBON OF WATER SCHEME.

47. The ribbon of water scheme as envisaged in the existing Canberra Plan is similar to the one decided against by the Public Works Committee in 1936. It would require a dam at Yarralumla at the 1,798-ft. level, and a high level weir at Lennox Crossing on the 1,825-ft. level. Calculation of comparative costs called for by the Committee, show that such a scheme, with total capitalized cost of £2,732,000, would be much more costly than the West Lake scheme with 1,825-ft. level dam at Yarralumla plus a two-lane bridge at Acton. This would have a capitalized cost of £2,885,000, almost £2,000,000 less, though the estimate includes provision for the complete West Lake and Central Basins schemes, cost of establishing new golf links, Googong Dam to replenish lake levels, £250,000 for complete treatment of the edges, and capitalized cost of constant maintenance. Evidence also indicates that the ribbon of water scheme would do nothing to control the river in times of floods, and the land surrounding it would always be subject to flooding. The large weir required at Acton would probably interfere with the present golf house, and could look unsightly in such a position in the City, while very recent tests cast grave doubts on the possibility of using the foundations there for a weir at all. The tests show positively, however, that this site would be suitable for a bridge.

48. The Chief Town Planner in evidence gave suggestions regarding the manner in which the areas, left by the elimination of the West Lake, could be used—mainly recreational purposes and landscaping, being subject to recurring floods. He did not say that he recommended the ribbon of water, but merely stated, "If an engineering foundation can be found whereby the water can be controlled by the three central basins and a subsidiary storage control, then the ribbon may remain a ribbon of water, subject also to Sullivan's Creek, which would discharge into it." This was regarded by the Committee as a reasonable statement of his opinions, in view of his position as an employee in the Department of the Interior, and the matter was not pressed further.

APPEARANCE AND PLANNING.

49. As the Planning Committee had stated its opinion that the vast expanse of water presented by the West Lake would be un-aesthetic and out of proportion, the Public Works Committee made inquiries in an effort to find to what extent the opinion of such an important body was shared with other qualified persons, independent experts, and private citizens. In some other quarters the Committee was able to find a certain amount of support for the aesthetics of a ribbon of water, but this opinion was coupled with doubts on engineering and financial grounds. The general weight of opinion expressed on this matter is summarized rather well in the quotation of the Chief Town Planner—

"The virtue of the design is reflected in the advantage taken of the natural features—an amphitheatre formed by the surrounding prominences and gentle slopes to the future main water expanse . . ."

It went on to say that the designer's skill is emphasized in the adaptation of natural contours in forming the water basins, "of the largest extent consistent with a location in the heart of the city", and followed by relating the subject to the particular view across the main central expanse. Later, when cross-examined with a view to making clear this point in his somewhat guarded evidence, he said, "I had in mind the whole lakes scheme when I referred in my statement to the virtue of the original design being reflected in the advantage taken of the natural features".

Other witnesses were horrified when they heard of the elimination of West Lake and hoped it would be replaced, as it is regarded as an essential part of the Canberra plan, making use of the natural contours of the normal flood area to provide an attractive feature coupled with sporting facilities at present lacking in Canberra.

ELIMINATION OF WEST LAKE.

50. In pursuing its investigation regarding the West Lake it appeared to the Committee that the reduction of the West Lake to the "ribbon of water" scheme had been carried out with undue haste, and without the full and thorough investigation normally expected before the various aspects of the whole lakes scheme would appear to have been essential before a change reversing all previous decisions on the matter was agreed to. The Public Works Committee took evidence and called for the minutes of the meetings of the National Capital Planning and Development Committee in respect of the occasions upon which this subject was dealt with. They show that on each of the three meetings at which this subject was discussed, amongst other matters, this very question of the necessity for technical reports was stressed particularly. The Planning Committee clearly agreed unanimously to the suggestion at the first of these meetings, but in principle only, further action being indicated when the necessary reports were available. Although the reports sought by the Planning Committee in connexion with the whole lakes scheme had been pressed for in 1951, and again on the meeting on 3rd December, 1952, action was taken by the Department of the Interior to implement the scheme consented to in principle only, and in due course the plan was varied, with the final gazettal on 27th August, 1953.

51. The Minutes do not show any actual adoption of the matter originally agreed to in principle, though members of the Committee were notified of the ministerial action being taken at the time. On each occasion, however, mention was made, at the same

time, of the technical reports being collected for further action by the Committee, giving the definite impression that the action being taken was of a tentative nature.

52. It is not considered within the province of this Committee to investigate the operations of the Planning Committee, except insofar as it has been necessary to obtain the circumstances of the elimination of West Lake with its relation to the river and essential bridges. This Committee is seriously concerned, however, that it should have been possible to push through the rather complicated legal processes, especially designed to prevent undesirable alterations to the Griffin plan, such a variation involving one of the major aspects of the original conception of the plan, before a most thorough and public investigation of the whole matter had been conducted. It is difficult to understand why the members of the Planning Committee, composed as it is very largely of independent expert planners who have always kept Canberra's interests at heart, should have received the notification of the Minister's consent to the variation without taking steps at that stage to defer further action until the investigations called for in their own minutes had been carried out fully. In this connection also it is noted that special steps were taken by the Department of Works to induce the Department of the Interior to suspend the legal processes on this matter until the Wilson report on this subject, almost completed at this time, could be made available. In spite of this the variation was allowed to proceed.

WESTBOURNE WOODS GOLF LINKS.

53. The Committee was informed that a considerable amount of preparatory work had been carried out on a site at Yarralumla in connexion with a proposal to establish the Westbourne Woods Golf Links there. The Royal Canberra Golf Club had understood that the new golf links were intended to be used as an alternative when the lakes scheme rendered the present links useless for that purpose. Certain economic reasons were given to this Committee as sufficient to justify the discontinuance of the preparations, somewhere about the time of the elimination of the West Lake from the Canberra plan. As expert opinions agree that the Westbourne Woods links would provide possibilities for first-class facilities in this field, the Committee recommends that further consideration be given to it when it becomes necessary to move from the present site of the golf links.

54. Having obtained adequate information from the various sources in regard to the most desirable treatment of the West Lake proposal, as it affects the traffic problems, the Public Works Committee feels that it has fulfilled its function, and the possibility of safeguarding the Canberra plan in all its broader aspects in the future could well be further investigated by the Select Committee of the Senate recently set up for such a purpose.

RESTORATION IN CANBERRA PLAN.

55. The Committee, in its study of the minutes of the National Capital Planning and Development Committee, gave consideration to the six reasons suggested there as justifying the elimination of the West Lake, but found that most of the reasons were advanced without adequate foundation or actually inaccurate in the light of present evidence. The following is an extract from the minutes of the Planning Committee, dated 3rd and 4th December, 1952.

Reasons briefly justifying the advancement of the proposal were—

(i) An obvious economy of engineering construction for the Lakes Scheme generally, and hence a greater possibility of any Government, sponsoring commencement of the scheme;

- (ii) The release of a square mile of excellent terrain near the centre of Canberra for permanent city development;
- (iii) Opportunities for more elastic design of the Canberra Community Hospital;
- (iv) The continued use of the Commonwealth investment in the existing Golf Course and Race-course;
- (v) The minimizing of secondary problems from flooding, i.e., surcharge over any dam;
- (vi) The assurance at all times of an adequate quantity of water for the Central Basins, their western appendage, and a cleansing flow past the Sewerage Treatment Depot at Western Creek.

56. The Public Works Committee at this time has the advantage of information and data compiled in the past, as well as details of records and investigations made more recently, and not available to those conducting the inquiries on these matters in past years. It is quite satisfied, on all the evidence, that the West Lake is desirable and practicable, that it is eliminated from the plan without adequate investigation, and that it should be restored to the official Canberra plan. With this end in view it is also recommended that the ministerial action and legal steps required to gazette variation of the plan to replace West Lake should be taken at the earliest opportunity.

THE GOOGONG DAM.

57. All previous inquiries on the question of the lakes schemes have been based upon the belief that it would be essential to have a dam on the Queanbeyan River at Googong to supply topping up water to keep the lakes at the normal river in dry periods, and to control flooding in the river. The Committee is impressed with the confident recommendations in the Wilson report, supported as they are by painstaking research and careful surveys with modern methods and information. It accepts the proposal that the lakes scheme can be implemented completely without delay and be maintained by the natural flow of the river within limits which should be generally acceptable. It does not anticipate any considerable discomfort, danger, or nuisance from occasional reductions of lake level in abnormally dry times, but it is nevertheless realized that, if years of experience with the lakes show that additional water is essential, it will always be possible to add a dam at Googong in years to come.

58. One important fact which affects this aspect of the question is the presence of soil erosion in the Googong catchment area. Several witnesses stressed the importance of minimizing this danger, as the amount of water available, as well as the amount of silt brought down to the lakes, will be affected as the years go by. The Wilson report emphasizes that gully erosion is very evident in certain localities in the area, and re-forestation is essential if satisfactory conditions are to be preserved. The Committee recommends that the Googong Dam be not constructed for flood control purposes at present, but that action, previously taken to encourage the State Government to limit destruction of trees in this area, and to plant forest areas there, be intensified, so that no stone is left unturned to prevent the spread of this menace. This will ensure the maintenance of a good supply of water, and keep the dam in reserve for use if circumstances indicate that more water is needed to satisfy demands for sewerage treatment, riparian rights, or other purposes.

THE RACE-COURSE AND GOLF LINKS.

59. In connexion with the development of the City, the evidence emphasized to the Committee that important influences can grow from temporary expedients adopted in the early stages of plan formation.

The experience of Washington shows how influences become major matters as the years go by, causing tremendous difficulties and expense in the end. Owing to the tendency to develop the West Lake area by plans for a race-course and golf links, the Griffin plan is in danger of frequent small alterations which will prove undesirable later on. It is considered that the race-course in particular is incongruous in the centre of the City and is retarding proper city planning for the future. The Committee recommends that both the race-course and the golf links should be moved out of the city area, and should be given suitable sites with adequate security of tenure to encourage full progress towards the establishment of first-class facilities worthy of the National Capital, and suitable for staging the premier events of the nation in years to come.

GENERAL ROAD PLANNING.

60. In view of the surprisingly rapid growth of traffic in the last few years, as shown in this evidence, and the possibility of further expansion in the near future the Griffin plan will need amending to provide facilities not visualized at the inception, in the same way in which a modern airport had to be included. It is essential, however, that major alterations to the Griffin plan should be carried out with the utmost care, and only after full and most thorough investigation. This Committee has given considerable study to the matter insofar as it concerns the provision of bridges and approaches, but the investigation of this matter can appropriately be extended to other sections of the City by the Select Committee of the Senate recently set up to consider the whole plan.

THE LAKESIDE DRIVE.

61. The Public Works Committee's Report of 1950 envisaged a boulevard 100 feet wide round the lake, including a drive, and such a feature has been regarded as part of the lakes scheme. The plans in existence, showing the projected development of Canberra in the years to come, do not appear to have been formed to include anything of this nature. It is recommended that ideas on this matter be crystallized at an early date, to enable the lakes scheme to proceed according to the scheme adopted.

CONSTRUCTION OF BRIDGES.

62. The details of construction of the bridge at Commonwealth-avenue, at first placed before the Committee, were stated to depend so much upon the results of the inquiry—number of lanes, most suitable site, height if lakes scheme implemented, and many other factors—that complete plans and estimates could not be set out at this stage. However, illustrations were given to the Committee of the type of bridge proposed, with alternative designs and estimates for different widths likely to be desirable, and costs based on the area of the deck, embankments and roadways.

63. Construction was assumed to be in steel, though it was pointed out that it was proposed to call tenders for alternate contracts for pre-stressed concrete or composite beams. Piers were designed to give the form of solidity with streamlined ends so as to reduce turbulence and scour as much as possible during floods. Foundation would consist of bedrock at a depth of 55-60 feet below deck level, overlain with 3-7 feet of gravel loan, sand and clay.

64. The length of the bridge is to be 700 feet with deck level at 1,843.5-ft. level—approximately 14 feet higher than the existing Commonwealth-avenue Bridge. The minimum clearance under the bridge from normal lake level would be 12 feet, and under extreme flood conditions, 5 feet.

PRE-STRESSED CONCRETE.

65. Evidence was received by the Committee that a large proportion of modern bridges in Europe and elsewhere are being constructed of pre-stressed concrete, and inquiries were made to ascertain whether this method would be suitable and more economical or desirable than the use of steel or reinforced concrete. A great deal of interesting information was received in this connexion, and the Committee was inclined to the view that pre-stressed concrete might offer a modern, progressive method whereby money could be saved, and a somewhat less severe appearance achieved. While it is stated that such results have been achieved in Europe, the opinion is strongly held by technical witnesses in Australia, and experiments used in major bridges in the initial stages. It was also affirmed that a bridge with curved soffits of attractive appearance could be built of steel, and it would be substantially cheaper than pre-stressed concrete. It was pointed out, however, that an opportunity would be given, when tenders were being called, for contractors to submit, not only tenders for units of pre-stressed or other construction, but to submit alternative designs for the bridge to suit their own methods. The Committee recommends that this should be done, in case contractors from overseas become sufficiently interested to undertake the construction of major bridges in this country.

DESIGN.

66. The tentative design submitted with the departmental proposals was put forward more as a suggestion for use at this stage, rather than as a final selection, and it was anticipated that the final design would be evolved during subsequent detailed planning of the work. Some witnesses expressed the opinion that the design illustrated in the departmental submission was unduly severe in appearance, even when the necessity for economy in these times of expensive construction is considered. The Committee made a point of investigating the matter, and finds a considerable weight of technical evidence from bridge experts in favour of the appearance, form and massing. It is generally agreed that an arch bridge would not be suitable for a bridge in this position, though a bridge of the girder type with a curve could be used.

67. Mention was made of the desirability of competitive designs for this structure, but this is looked upon as unnecessary in this case. It is pointed out that the terrain and other factors limit the scope for variation, and there is difficulty and delay in securing adjudicators of a calibre likely to be unquestionably acceptable in making a decision on this matter. The Committee is of opinion that a suitable structure can be designed in the department, with a view to providing a bridge with curved soffits to give a more pleasing appearance on closer approach, without considerable addition to the estimates given. It recommends that in view of the conditions and circumstances obtaining in this case, the bridge be designed in the department with special consideration to achieving a somewhat lighter appearance commensurate with economy of construction. It is anticipated that the departmental engineers will be able to evolve a worthy design along the lines suggested, with a minimum of delay, and, in the final stages of planning, no doubt it will be submitted in the normal way to the National Capital Planning and Development Committee for perusal. If there are radical changes from the tentative design now submitted, the Committee desires that the Minister should have this important work re-submitted to the Public Works Committee for further investigation upon the problems of design involved.

STR.

65. It has already been shown that the departmental submission was for the use of an alternative position for the immediate construction of a high level bridge. This was due to several factors, such as the trend of peak traffic to concentrate at Scott's Crossing; necessity for a second high level bridge in flood times; and minimizing of expenses and difficulties which would arise when constructing the proposed new bridge alongside the old one. The department therefore recommended the construction of the new bridge at Anzac Parkway, near Scott's Crossing. This opened up the whole question of priority for the immediate bridge construction as well as the overall requirements for the future.

ALTERNATIVES.

66. Quite a considerable volume of evidence was taken in connexion with the total requirements for Canberra for the next 100 years, and opinions of town planners, architects, engineers, and other experts were sought, with the result that some most interesting information has become available in the evidence. The trends of population, with likely proportion of motor vehicles, give a basis upon which to begin calculating the number of bridges essential. Planning for development of the main areas, and proposed highways also enter into the problem, while the possibility of the lakes scheme was a factor which had been creating considerable uncertainty in the minds of planners for some years.

70. Having decided to recommend the Central Lakes and the West Lake schemes this Committee set about consideration of the complex problem of the number of bridges required, as well as where they should go in the best interests of the capital for the future. The Committee had in mind the importance of such a decision upon the whole pattern of city growth in the years to come, and therefore called for evidence in detail of all the factors involved.

71. As mentioned in a previous section, ten alternative schemes were prepared on the basis that a total of twelve lanes would be required by 1990 to transport the estimated traffic from one side of the river to the other, and that the construction programme would be spread over that period progressively as the traffic demand warranted. The schemes were designed to provide for normal flow at peak periods, giving the optimum conditions for traffic movement.

72. The twelve lanes suggested were to be divided, in various proportions in six of the ten schemes, between bridges at the suggested sites of Scott's Crossing, King's-avenue, Commonwealth-avenue, and a site near Lennox Crossing, Acton. In the remaining four schemes the twelve lanes were apportioned to the bridges leaving out the one at Scott's Crossing, as this had been the subject of considerable difference of opinion.

73. When the Committee considered that something less than the optimum would be a reasonable and practical approach, the departmental officials were asked to produce two further schemes to incorporate the ideas more likely to be acceptable to the Committee.

74. The evidence shows that the ultimate requirements will probably be for main high level bridges across the Central Basin, plus one a little lower down the river than the present Lennox Crossing, and it was on this assumption that the various sites were suggested.

THE SCOTT'S CROSSING STR.

75. Very powerful arguments were advanced by the Department in favour of placing the first bridge at Scott's Crossing, with the proviso that, if it is un-desirable to alter the Griffin plan to include this site, the King's-avenue site should have first priority. Wide differences of opinion were expressed on the aesthetics of this site, the town planners being strongly opposed to it, while the engineers considered that the bridge would actually enhance the appearance of the area if placed right across the centre of the lakes scheme. As many other factors had to be included in weighing the evidence on the most appropriate site for the bridge, the Committee gave a great deal of study to the matter. It was advanced in favour of this site that it was the natural route as at present selected by the traffic, while it would provide a suitable division of traffic immediately. The opinion was also expressed that this site would eventually be forced by traffic development in the years to come.

76. Apart from the aesthetic aspect and serious departure from the Griffin plan, those opposed to this site pointed out that difficulties would be created by bringing a main traffic artery right into the centre of the Government Triangle, which will be a natural generating point for extremely heavy peak traffic if it is.

77. In summing up their evidence the engineers expressed strongly the opinion that there was nothing in the evidence which affected their original submission that the Scott's Crossing bridge is the best for the purpose. Some members of the Committee agreed with this view, but the vote taken on this matter, with this view, in this report, shows that while the Committee later in the report, showed the importance of the technical aspects, more weight should be given to other factors than the technical considerations suggested. The aesthetic aspect would be adversely affected by a bridge bisecting the main Central Basin; one of the main features in the conception of the Griffin plan should not be altered by the introduction of such a structure, except under circumstances of dire necessity; additional traffic should not be deliberately routed into the Government Triangle, but should use the King's-avenue route, only about one-third of a mile longer; development of the eastern sections of the city will have an important bearing on the necessity for the more easterly site at King's-avenue; and various other points shown in the evidence.

KING'S-AVENUE STR.

78. This is the second of the two main bridges provided for in the Griffin plan, and is the natural complement to that at Commonwealth-avenue. It is regarded as an essential bridge eventually, and its early construction will bring into use when the lakes are in existence, a high level bridge to carry the heavy peak traffic now using Scott's Crossing low-level bridge. It will be the cheapest of the three main bridges to construct, owing to the nature of the terrain and foundations.

79. The main opposition to the early construction of this bridge is that it would entail a longer distance and thus would not attract the traffic it was designed to carry. It was pointed out, however, that alterations are being contemplated with a view to providing an easier line of communication to Constitution-avenue than we have to-day. It is considered that a road connecting the northern end of the King's-avenue Bridge with Constitution-avenue would shorten the route for city-bound traffic, making this route only one-third of a mile longer than that by Scott's Crossing.

It could possibly be partly formed by the ultimate lake-side drive to be developed at a later stage. The Committee is of opinion that a road giving access as directly as possible from the King's-avenue Bridge to Constitution-avenue is essential to this route, and recommends that it be constructed simultaneously with that bridge.

THE COMMONWEALTH-AVENUE STR.

80. This is widely regarded as the main thoroughfare, as indeed it is at present. Several witnesses considered that it will always remain so, and it is essential to replace the present bridge with the new one beside it immediately. As one of the two main sites provided in the original plan it is unquestionable that it must always remain a principal route through the city. As the direct connexion between Civic Centre and Parliament House it will probably continue to be the most important from the ceremonial point of view. No one doubts the wisdom of providing for this bridge to be replaced eventually by a new structure, and it is naturally included in the overall plan for constructional work. The point at issue at the moment is in connexion with priority of sites, and in this respect there are factors which point to the advantage of deferring its commencement. These factors include the desirability of constructing a second high-level bridge to guard against difficulties if floods should occur during the construction period; considerable reduction of the difficulties and delays inevitable in constructing the new bridge alongside the old one, particularly as the old one has to be 14 feet higher than the old one, existing earthworks to raise the approaches; and extra cost of construction necessary to provide traffic facilities during the change-over period.

81. One of the most important reasons for delaying immediate replacement of the bridge at the Commonwealth-avenue site was the fact that the present bridge, during major repairs and renewals during the last few years costing over £30,000, could have its calculated economic life of five years extended to ten or fifteen years. Even this did not mean that the bridge would then be ready to fall down. In fact it could be kept alive as a two-lane bridge for car traffic indefinitely, if we are prepared to pay the maintenance, though this will continue to become heavier.

LENNOX CROSSING SITE.

82. The present low-level bridge at Lennox Crossing leads up to the hospital and Department of the Interior, which Department is housed in temporary wooden buildings originally intended to be vacated when the hospital buildings are extended to cover the present roadway traversing the hospital site. The roadway was planned to pass behind the present offices, and the ultimate high-level bridge envisaged in this area was to cross the river in the vicinity of the present house to bring the traffic from Commonwealth-golf house to the new road. This avenue near Hotel Canberra on from the new road. This avenue is not expected to be required until the lakes scheme is implemented; though its earlier construction is calculated to ease the peak traffic going over Commonwealth-avenue Bridge in some of the schemes under discussion.

YARRALUMBA WEIR.

83. When the weir is constructed at Yarralumla for the purpose of the lakes scheme it will be a simple matter to include a roadway on top of it, and this is looked upon as an alternative crossing over the river. As it is some distance from the city it is not regarded as very important light as a factor in solving the traffic problems of Canberra.

THE "MINIMUM" SCHEMES.

84. Of the ten schemes submitted the Committee selected Nos. 7 and 8 as those best suited for Canberra's needs on the optimum basis and they are illustrated, together with Nos. 11 and 12, at the end of this Report. Schemes 11 and 12 were drawn up for comparison with these two, but were considered to provide minimum facilities, being designed to keep construction factors and completion times within reasonable, practicable limits. The only difference between schemes 11 and 12, is that the former plans for commencement of Scott's Crossing Bridge first, while the latter places first priority on King's-avenue Crossing. The engineers representing these "minimum" schemes, particularly stressed the point that they would not completely answer the demand estimated, and certain traffic delays must be expected if the theoretical results put forward are realized in the future.

THE SCHEME CHOICE.

85. A great deal of discussion took place regarding the schemes, before the Committee came to its final decision on the matter, and the following extract from its Minutes of Proceedings shows the result of the debate—

Mr. LAWRENCE moved—That the programme of bridge construction shown in Scheme 12 be adopted.
The motion was seconded by Mr. O'Connor.
Mr. BIRN moved an amendment—That the Commonwealth-avenue Bridge be constructed before the King's-avenue Bridge, but that the remainder of the minimum Scheme No. 12 be adopted.

The Amendment was seconded by Mr. BOWDEN.

The Committee divided on the Amendment—

Ayes, 2. Nos. 6, 8.

Mr. BIRD. Senator Maher.

Mr. BOWDEN. Senator O'Byrne.

Mr. LAWRENCE. Mr. Cramer.

Mr. O'CONNOR. Mr. Lawrence.

Mr. O'CONNOR. Mr. O'Connor.

And so it passed in the negative.

Mr. BOWDEN moved a further amendment—That Scheme 11, giving Scott's Crossing first place in the construction programme, be adopted.

The further Amendment was seconded by Mr. BIRD.

The Committee divided on the further Amendment—

Ayes, 2. Nos. 5, 7.

Mr. BIRD. Senator Maher.

Mr. BOWDEN. Senator O'Byrne.

Mr. CRAMER. Mr. Cramer.

Mr. LAWRENCE. Mr. Lawrence.

Mr. O'CONNOR. Mr. O'Connor.

And so it passed in the negative.

The Committee divided on the Motion—

No. 1.

Mr. BIRD.

Mr. BOWDEN.

Mr. LAWRENCE.

Mr. O'CONNOR.

And so it was resolved in the Affirmative.

SCHEME No. 12.

86. The scheme finally adopted by the Committee can be studied by reference to the diagram illustrated at the end of this report. It provides the suggested works programme for the various bridges, dams, earthworks, and other preparations necessary for a complete, progressive schedule for lakes and bridges covering the period from the present time till about the year 1990. It also shows the factors for arriving at the basis used, including population, vehicles, traffic, lanes required, amount of expenditure required each year to carry out the schedule, the total cost, and the virtual total cost as at 30th June, 1954.

87. The advantage of this scheme is that it is flexible enough to be capable of variation to meet changing circumstances throughout. It is based on the implementation of the lakes scheme, with wear and

Yarralumla at the 1825-ft. level, at 30th June, 1963, with the present Commonwealth-avenue bridge maintained for use until that date. The first work is the commencement of a two-lane bridge at King's-avenue in June, 1965, with completion in June, 1968. The earthworks to form the edges of the lakes would be started in 1969 and completed in 1962. In the meantime, by 1960 preparations would begin on the weir at Yarralumla, as well as for the four-lane bridge at Commonwealth-avenue, both of these being completed by 1963 when it would be possible for the lakes to come into existence. In 1961 work would start on the lake edge protection, and piers to ground level only would be put in for the Lennox Crossing bridge, timed to be constructed later in the programme, by 1975.

Provision is included for the addition of two extra lanes on the King's-avenue Bridge by 1990, thus giving the total of ten-lanes estimated as essential by that date.

88. The total cost of all the bridges, as well as the lakes scheme, including weir, earthworks and lake edge protection is shown as £3,027,000. This amount is shown as spread over the years at varying sums dependent upon the work being carried out in each year, the highest amount in any one year being £648,000 in 1963, the year in which the major works and lakes scheme come to fruition. The virtual cost at 30th June, 1954, given for purposes of fair comparison with the other schemes, is £1,698,000 for the whole of the works contained in this scheme.

THE BRIDGES TO BE CONSTRUCTED.

89. The Committee feels, that, by recommending a complete schedule of proposed works to cover the essential traffic requirements of the city for many years to come, it has initiated a movement designed to assist the orderly and practical progress of Canberra. After many years of difficult evolution and promising efforts, the time seems opportune for a concerted move to plan for the completion of a national capital worthy of Australia. Keen interest by Parliament and many influential sections of Australian activities is more apparent to-day than ever before, and it is becoming generally realized that the nation's capital must be planned and constructed with a view to providing adequately for the future and avoiding the problems which have been so difficult and costly in other cities of other countries of the world.

90. In its narrower sense the reference to the Committee on this occasion is for a bridge to replace the deteriorating Commonwealth-avenue Bridge now, and in this connexion the Committee concludes by recommending that there is urgent need for the construction of a bridge, and that a two-lane bridge be constructed now at King's-avenue.

ESTIMATED COST.

91. The recommendation of the department in its original submission was in effect, for a four-lane bridge to be constructed at Anzac Park (Scott's Crossing), where the cost was estimated at £696,000. The decision of the Committee to recommend adoption of scheme 12, has the effect of approving the immediate construction of a two-lane bridge at King's-avenue at a cost of £480,000, though this will have to be followed some years hence by the additional expenditure of £821,000 for the Commonwealth-avenue Bridge of four lanes, the weir and preparations for the lakes scheme, and the Lennox Bridge in 1975. The adoption of the scheme will have the advantage of spreading the total expenditure over many years, and its relation to the provision of funds for all other works will be minimized. The total capitalized cost of the lakes scheme, included in scheme 12, embraces all preparation and construction costs, as well as an amount for perpetual maintenance of the lakes, and it amounts to

£2,835,000. The comparable capitalized cost of the ribbon of water scheme is £5,732,000. Estimates of cost are not quoted in great detail, as they are still dependent upon detailed planning connected with preparation of final drawings.

92. It appears most important to the Committee that information showing estimates of approximate progressive expenditure essential to the scheme should be kept in mind, and special efforts made to ensure that total funds for Canberra projects are provided to cover these amounts. While the scheme recommended plans for judicious spreading of expenditure over the years, it is evident that practical plans for immediate real development in Canberra on a national plane will need some additions to normal expenditure. The construction of major works is involved in this objective, and this will call for support from all concerned. The Government is urged to give this matter special attention at this vital stage of the capital's growth.

SECTION IV.—THE COMMITTEE'S DECISIONS.

SUMMARY OF CONCLUSIONS.

93. The following is a summary of the conclusions arrived at by the Committee after study of the plans and evidence, and mature consideration of the whole subject:—

- (1) There is an urgent necessity for a bridge now, with special planning for future needs, commencement to be at King's-avenue. (Paragraphs 28 and 90.)
- (2) Provision of facilities up to the theoretical optimum is not justified, as it will be expensive and largely unnecessary. (Paragraph 30.)
- (3) Eleven feet wide lanes should be adopted as proposed. (Paragraph 29.)
- (4) Ten lanes should be capable of meeting all reasonable traffic demands, at least to the end of this century. (Paragraph 30.)
- (5) Origin and destination surveys should be made as required. (Paragraph 32.)
- (6) Definite decisions concerning the lakes scheme can no longer be delayed. (Paragraph 85.)
- (7) The West Lake is desirable and practicable. It was eliminated from the Canberra plan by the Department of the Interior without adequate investigation by the National Capital Planning and Development Committee and replaced by the ribbon of water scheme involving a capitalized cost of nearly £3,000,000 more. The lake should be restored to the plan, and the necessary ministerial action is recommended as soon as possible. (Paragraph 56.)
- (8) Detailed planning of the lake edges should be crystallized immediately to facilitate consequential action. (Paragraph 37.)
- (9) When the golf links have to be moved, further consideration should be given to completing the Westbourne Woods location, where considerable expenditure has already been incurred. (Paragraph 53.)
- (10) The Googong Dam is not considered necessary for the lakes scheme, but should be reserved for use in the light of possible future needs. (Paragraph 55.)
- (11) Early action should be taken to encourage the State Government to limit soil erosion on the Googong area by afforestation and all other available methods. (Paragraph 58.)
- (12) The golf links and race-course should be moved out of the City area and given suitable sites with security of tenure. (Paragraph 59.)

- (13) The Lakeside Drive should be planned in connexion with development of the lakes scheme. (Paragraph 61.)
- (14) Further investigation of the possibilities of safeguarding the Canberra plan in the future is a matter which might appropriately be considered by the Select Committee of the Senate. (Paragraph 54.)
- (15) This Committee's inquiries concerning roads and development connected with traffic problems could be extended by the Select Committee of the Senate to include the remainder of the City. (Paragraph 60.)
- (16) Opportunities should be given for contractors tendering for the bridge to submit their own designs for the structure, to encourage pre-stressed concrete or other modern methods. (Paragraph 65.)
- (17) The design should be drawn in the Department, having in view the possibility of achieving lighter appearance commensurate with economy of construction with re-submission if radical changes in design are involved. (Paragraph 67.)
- (18) An access road from King's-avenue to Constitution-avenue is essential and should be constructed as soon as possible. (Paragraph 79.)
- (19) Scheme No. 12, showing comprehensive construction programme of bridges and lakes, required up to the year 1990, should be adopted. It is flexible enough to permit variation according to changes in basis of calculation through the period. The cost is not excessive and is spread over the years (Paragraph 85, 27 and 88.)
- (20) Support of the Government, by providing some extra funds to permit orderly planning of Canberra on a national scale is urged at this vital stage. (Paragraph 92.)

J. O. CRAMER, Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Parliament House, Canberra, A.C.T.
20th January, 1955.

MOLONGLO RIVER BRIDGES MINIMUM SCHEMES

WEIR COMPLETE 1963

YEAR	POPULATION OF CANBERRA	REGISTERED MOTOR VEHICLES IN A.C.T.	PEAK CROSS-RIVER TRAFFIC VEHICLES P.M.	BRIDGE LANES NEEDED	SCHEME II			SCHEME 12				YEAR		
					BUDGET			BUDGET			WATER SUPPLY			
					LAKES	BRIDGES	TOTAL	LAKES	BRIDGES	TOTAL				
30th JUNE												30th JUNE		
19 54	28,000	65 00	NORTHERD 3700 SOUTHERD 1700 TOTAL 5400	2/4								19 54		
55								3,000	3,000					
56								3,000	3,000					
57	37,000	8,600	NORTHERD 3890 SOUTHERD 1890 TOTAL 5780	4/6				3,000	3,000	143,000	143,000	390,000	57	
58								225,000	225,000	163,000	163,000	500,000	58	
59								303,000	303,000	183,000	183,000		59	
19 60	44,000	10,200	NORTHERD 4800 SOUTHERD 1890 TOTAL 6690					3,000	3,000	3,000	3,000		19 60	
61								80,000	3,000	83,000	80,000	83,000	25,000	61
62								250,000	203,000	453,000	230,000	203,000	433,000	62
63								310,000	383,000	693,000	310,000	342,000	652,000	63
64								290,000	396,000	686,000	290,000	358,000	648,000	64
65								60,000		60,000	60,000	60,000	500,000	65
19 65	52,000	12,100	NORTHERD 5000 SOUTHERD 2000 TOTAL 7000	6/8				60,000		60,000	60,000	60,000	500,000	19 65
66														66
67														67
68														68
69														69
19 70														19 70
71														71
72														72
73														73
74								100,000		100,000	100,000	100,000		74
19 75	62,000	14,500	NORTHERD 6000 SOUTHERD 2400 TOTAL 8400	8/10				170,000		170,000	120,000	120,000		19 75
76								121,000		121,000	149,000	149,000		76
77														77
78													106,000	78
79													100,000	79
19 80														19 80
81														81
82														82
83														83
84														84
19 85														19 85
86														86
87														87
88														88
89			NORTHERD 6780 SOUTHERD 2720 TOTAL 9500					100,000		100,000	100,000	100,000		89
19 90	70,000	16,200		10/12				180,000		180,000	108,000	108,000		19 90
								200,000		200,000	108,000	108,000		
								200,000		200,000	108,000	108,000		
								TOTAL	1,030,000	2,392,000	1,422,000	2,963,000		

VIRTUAL COST AS AT 30-6-54:

BRIDGES £ 1,426,000
LAKES £ 720,000
TOTAL £ 2,146,000

VIRTUAL COST AS AT 30-6-54:

BRIDGES £ 1,278,000
LAKES £ 720,000
TOTAL £ 1,998,000

B. Jones
1/12/54

MOLONGLO RIVER BRIDGES & LAKES ALTERNATIVE SCHEMES

WEIR COMPLETE 1966

YEAR	POPULATION OF CANBERRA	REGISTERED MOTOR VEHICLES IN A.C.T.	PEAK CROSS-RIVER TRAFFIC VEHICLES PER HOUR	BRIDGE LANES NEEDED		SCHEME 7			SCHEME 8			YEAR
				a	b	BUDGET			BUDGET			
						LAKES	BRIDGES	TOTAL	LAKES	BRIDGES	TOTAL	
30TH JUNE												30TH JUNE
19 74	28,000	6,500	NORTHERD 3,700 SOUTHERD 1,100 TOTAL 3,800	2 1	2			5,000	5,000			19 74
75				3	4			5,000	5,000			75
76								205,000	205,000			76
77	40,000	9,300	NORTHERD 3,900 SOUTHERD 1,750 TOTAL 5,470	3 2	3			220,000	220,000			77
78				7	6			286,000	286,000			78
79								5,000	5,000			79
19 60	44,000	10,200	NORTHERD 4,200 SOUTHERD 1,700 TOTAL 7,900	4 2	6			5,000	5,000			19 60
61				6	6			5,000	5,000			61
62								5,000	5,000			62
63								40,000	5,000	45,000		63
64								210,000	805,000	715,000		64
19 65								270,000	375,000	645,000		19 65
66	52,000	12,100	NORTHERD 5,000 SOUTHERD 2,000 TOTAL 7,000	4 2	4			350,000	881,000	711,000		66
67				6	8			40,000		40,000		67
68								40,000		40,000		68
69								40,000		40,000		69
19 70								40,000		40,000		19 70
71								20,000		20,000		71
72												72
73									80,000	80,000		73
74									80,000	80,000		74
19 75	62,000	14,700	NORTHERD 6,000 SOUTHERD 2,400 TOTAL 8,400	5 3	10			95,000	95,000			19 75
76				8	10							76
77												77
78												78
79												79
19 80												19 80
81												81
82												82
83												83
84												84
19 85												19 85
86												86
87												87
88									100,000	100,000		88
89			NORTHERD 6,700 SOUTHERD 2,750 TOTAL 9,750	6 3	6			180,000		180,000		89
19 90	70,000	16,200		9	12			200,000		200,000		19 90
TOTAL £								1,050,000	2,742,000	3,772,000		

VIRTUAL COST AS AT 30.6.54:

BRIDGES £1,511,000
LAKES £ 619,000
TOTAL £2,130,000

VIRTUAL COSTS AS AT 30.6.54:

BRIDGES £1,576,000
LAKES £ 619,000
TOTAL £2,195,000

NOTE:
a - MINIMUM NUMBER OF LANES IF MOVABLE CENTRE LINES USED.
b - DESIRABLE NUMBER OF LANES TO OBLVIATE USE OF MOVABLE LANES.

R James
1/12/54