

1924.



THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA *brought up by Senator Lyndall*

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CLERK OF THE SENATE

21st May, 1924

PARLIAMENTARY STANDING COMMITTEE ON
PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED

CONSTRUCTION OF A RAILWAY TO
CONNECT CANBERRA WITH YASS.

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fourth Committee.)

The Honorable HENRY GREGORY, M.P., Chairman.

Senate.

House of Representatives:

Senator John Barnes.†
Senator Hattie Spencer Foll.†
Senator Patrick Joseph Lynch.†
Senator John Newland.†
Senator William Plain.*
Senator Matthew Reid.†

* Ceased to be a Member of the Senate 30th June, 1923.

† Appointed 6th July, 1923.

‡ Resigned 28th June, 1923.

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COPY OF EXECUTIVE COUNCIL MINUTE No. 42 OF 5TH SEPTEMBER, 1923.

Department of Works and Railways,
Melbourne, 3rd September, 1923.

Departmental
No. 65.
Executive
Council No. 42.

Approved in
Council
(Signed)
L. L. Littleton,
General
Secretary,
5th September,
1923.

MINUTE PAPER FOR THE EXECUTIVE COUNCIL.

Subject:—Reference to Public Works Committee.

Recommended for the approval of His Excellency the Governor-General in Council that, in accordance with the Commonwealth Public Works Committee Act 1913-1921, the following work be referred to the Parliamentary Standing Committee on Public Works for investigation and report thereon to the House of Representatives.

Canberra to Yass Railway.—Construction within Federal Capital Territory.

(Sgd.) LITTLETON E. GROOM,
For the Minister of State for Works and Railways.

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

CANBERRA-YASS RAILWAY.

R E P O R T.

The Parliamentary Standing Committee on Public Works, to which His Excellency the Governor-General in Council referred for investigation and report to the House of Representatives the question of the construction of that portion of the Canberra to Yass Railway, which is to be within the Federal Capital Territory, has the honour to report as follows:—

INTRODUCTORY.

1. The railway from Melbourne to Sydney passes the northerly boundary of the Federal Territory at a distance of approximately 30 miles, and under the terms of section 9 of the agreement made on 18th October, 1909, between the Commonwealth and State of New South Wales, and embodied in the First Schedule to the *Seat of Government Acceptance Act* 1909, it was agreed that—

"In the event of the Commonwealth constructing a railway within the Territory to its northern boundary, the State shall construct a railway from a point near Yass on the Great Southern Railway to join with the said railway, and the Commonwealth and the State shall grant to each other such reciprocal running rights as may be agreed upon or as, in default of agreement, may be determined by arbitration over such portions of that railway as are owned by each."

2. The Goulburn to Nimmitabel Railway forms portion of the easterly boundary of the Federal Territory, and from a point on that line in the vicinity of the town of Queanbeyan the Commonwealth completed, in May, 1914, at a cost of £45,619, the construction of a branch line, 4 miles 7½ chains in length, to Canberra, terminating at a point near the Power House, a little to the south-east of the City area.

3. In 1915 a proposal was referred to the Parliamentary Standing Committee on Public Works for the construction of the Canberra City Railway, to extend from the vicinity of the Power House to the neighbourhood of the Civic Centre, a distance of 5 miles 16 chains, at an estimated cost of £378,072.

4. After investigation, the Committee reported against the expenditure of this large amount, and recommended instead the construction of a temporary surface line, 5 miles 14 chains long, which would traverse the southern portion of the City, and approach close to Parliament House and the Governmental Group before crossing the river. Such a line, it was thought, would be capable of handling building material and light traffic, and could be constructed at a cost of approximately £37,000.

5. In 1921 the line from Queanbeyan to the Power House was extended as far as the Civic Centre as a surface line or "tram line," at a cost of £5,156. This line was of standard construction, and of 4 ft. 8½ in. gauge, and, crossing the Molonglo River on a temporary bridge, followed approximately the approved route for the permanent line, but was not built as a depressed line, to conform to the City plan.

PRESENT PROPOSAL.

6. The proposal now submitted to the Committee is to abandon the existing surface line from the Power House to the Civic-Centre, and, commencing from a point about a mile to the east of the Power House, on the existing line from Queanbeyan, to construct a permanent line through the City to the northern boundary of the Federal Territory. From this point it will be the obligation of the State of New South Wales to continue the line to connect with its system in the vicinity of Yass Junction, as agreed to in the *Seat of Government Acceptance Act 1909*.

DESCRIPTION OF LINE.

7. The route of the proposed railway starts at a point marked 199½ miles on the existing line from Sydney to Canberra, and distant approximately 3 miles from Queanbeyan, and 3 miles from the City boundary. The line then runs in a westerly direction, following for some distance Lakebourne-avenue, crosses the Jerrabomberra Creek, at a point higher up than the existing crossing, turns north through a deep cutting into East Lake Circle, crosses the Jerrabomberra Creek again, and then runs almost due north to cross the Molonglo River at 202½ miles, at a point about a quarter of a mile to the east of the Power House. A high embankment, the average height of which will be 16 feet, will cross the flat country lying on either side of the Jerrabomberra Creek, and between the creek and the Molonglo River. Beyond the river the line bears away in a north-westerly direction on a 1 in 73 grade, on a route which is a slight departure from the route originally laid down in Mr. Griffin's plan, and also from the temporary line he built to the Civic Centre. It runs about midway between the two, passing the junction of Capital Terrace and The Parade. At this point it will pass through what is described as a tunnel, but which will actually be an open cutting, covered so as to enable the two streets to cross at this spot. It then proceeds across Prospect Parkway, dropping down a little until it reaches Civic Centre. It is proposed to put the principal station on Ainslie-avenue, close to the Civic Centre, and below surface level, to avoid interference with street crossings. At this point Mr. Griffin's original design provided for a curve, but a straight line has been substituted, in order to avoid having a station on a curve. After leaving the Civic Centre the line turns again almost in a northerly direction, and, following the railway reservation, crosses Interchange-avenue at 206 miles 8 chains. Near the 207-mile point, the line leaves the City area, and bends away to the north-west, following that direction to about 214 miles, where it again turns to the north, crossing the Federal Territory boundary at 216 miles 8 chains; about 1½ miles to the west of the village of Hall.

8. The total distance from the point of departure from the existing line to the boundary is 16 miles 48 chains. The line suggested is a single-track railway, 4 ft 8½ in. gauge, laid with 80-lb. rails, and timber sleepers 8 feet by 9 inches by 4½ inches. The ruling grade will be 1 in 66, and the sharpest curve will have a 20-chain radius.

9. Provision is made for stations at East Lake Circle, Prospect Parkway, Civic Centre, and at three points between the Civic Centre and the village of Hall. It is proposed to place the goods shed at 206½ miles, about 1½ to 2 miles north of the Civic Centre.

ESTIMATED COST.

10. The estimated cost of the railway, as submitted to the Committee, is set down at £433,000, made up as follows:—

Clearing and grubbing, including fencing, cattle grids, &c.	£	5,516
Earthworks, including cuttings, side cuttings, side ditches, and surface formation		174,382
Bridges and minor waterways		121,492
Permanent way		70,292
Traffic and locomotive accommodation, water supply, telegraphs, and signalling, including station buildings		54,898
Housing accommodation for settlers, &c.		5,670
Surveys		750
Total		433,000

Or an average cost per mile of £26,084; and the time fixed for completion is about two years from date of commencement.

COMMITTEE'S INVESTIGATIONS.

11. The Committee, having taken evidence in Melbourne from the Commonwealth Railways Commissioner, the Chief Engineer for Ways and Works, Commonwealth Railways, and others, visited Canberra, inspected the existing line from Queanbeyan to the Power House, and the so-called tram line from the Power House to the Civic Centre, and traversed the route of the proposed railway. Evidence was taken at Canberra from the Director-General of Works, and the Commonwealth Surveyor-General, and in Sydney from Messrs. Sulman and Ross, members of the Federal Capital Advisory Committee, and from the Chief Traffic Manager, New South Wales Railways.

REQUIREMENTS OF RAILWAYS ACT.

12. At the outset of its inquiry the Committee pointed out that the terms of the Railways Act had not been fully complied with.

Section 59 of the *Commonwealth Railways Act 1917* stipulates that:—

"59. (1) "Where there has been referred to the Parliamentary Standing Committee on Public Works any public work involving the construction of a railway the Commissioner shall transmit to the Minister under his official seal, the following information, namely:—

- (a) a plan of the railway and of the lands through which it is to pass;
- (b) a book of reference in which shall be set forth the names of the owners of the said lands so far as can with reasonable diligence be ascertained, a description of the said lands, showing the bearings of the railway and the nature and quality of cultivation, the state of the enclosures (if any), and the quantity of such land required for the purpose of the railway;
- (c) the estimated cost of the railway, including station buildings, signalling, &c., when completed;
- (d) the additional rolling-stock (if any) likely to be required for the working of the railway, and an estimate of the cost thereof;
- (e) the estimated working expenses of the railway, including traffic, locomotive, and maintenance charges;
- (f) the probable revenue which would be derived from the traffic on the railway;
- (g) any other special advantages which are likely to accrue to the Department generally from the construction of the railway; and
- (h) a general statement of the primary and other industries, and the possibilities thereof, of the district served by the proposed railway.

(2) If the public work involves the construction of the railway along, over, or across any public reserve or road, the plans, sections, and books of reference shall also contain particulars of the levels, and specify the several areas required to be taken for the purposes of the railway."

13. The information furnished by the Commonwealth Railways Commissioner to the Minister for Works and Railways, and by him transmitted to the Committee, showed that the land required for railway purposes would be a minimum width of 150 links, and would amount in all to about 320 acres, all of which would be Crown land. Under the headings (d), (e), (f), (g), and (h), the particulars supplied were:

"The rolling-stock of the New South Wales Railway Department will be availed of for working the railway.

The construction of the railway is associated with the building of the Federal Capital. The need for its construction is not governed by local traffic or local conditions.

The estimated working expenses and the probable revenue cannot be quoted at present. The building of the Capital is the governing factor so far as traffic on the railway is concerned, and an approximate estimate even cannot be submitted at present."

The Committee regarded this as unsatisfactory, but endeavoured to elicit the information in the course of examination of the various witnesses called.

ROUTE.

14. The accepted design for the City indicated a route which any railway traversing the City should take. This route is being substantially followed, with some minor modifications, so as to conform to better railway practice, avoid interference with the lay-out of the streets of the City, and tend to economy. The main points of divergence are:—

- (a) In the original design the railway was to be carried over a proposed lake system at the 1,870-ft. level on an immense causeway, which served also as a dam to form the proposed East Lake, at the 1,845-ft. level. As at present projected the railway will cross at almost the same point, on a bank, at the 1,841-ft. level, with a bridge in that bank of three 40-ft. spans over the Jerrabomberra Creek, and one with eight spans of 60 feet over the Molonglo River.

It was explained in evidence that the general opinion is that the ornamental basins within the City will not be completed for many years, and that probably the East Lake will never be formed, so that to carry the railway across at the 1,870-ft. level at present would involve the Commonwealth in a large expense, which could not be justified, and create a feature in the City which would be most unsightly.

- (b) After crossing the Molonglo River the railway is kept a little to the south, to avoid the long tunnel which was shown in the accepted design, thus saving a considerable sum in earthworks.
- (c) Slight deviations are made near Canberra Gardens and in the vicinity of Federal Avenue, to avoid cutting and expense in earthworks.
- (d) In the vicinity of the Civic Centre a straight line is proposed, to avoid having an important station on a curve.

CHARACTER OF LINE.

15. It was explained in evidence that this work is not being approached from the point of ordinary railway construction, but that the line has been designed to meet the wishes of the Federal Capital Advisory Committee, and following upon the idea laid down in the accepted design of the City. The cost of the line is consequently increased by the necessity for adapting the route to the design of the City, and by grading it to suit the various thoroughfares, thus requiring heavier cuttings, and necessitating going further below the surface that would otherwise be necessary; the object of this being to avoid having level crossings in the City area. Outside the City area the railway has been graded according to ordinary railway practice, and level crossings will be provided for. An endeavour will be made, however, to so arrange that roads will cross at the most convenient points of the line. The reason for the high embankment approaching the Molonglo River from the south is to keep the line well above flood level; this embankment will be about three-quarters of a mile long.

16. The Committee ascertained that the average cost per mile of the portion of the line running through the City proper works out at £42,714, while the rest of the line within the Federal Territory is estimated to average £13,963 per mile.

17. The Commonwealth Railways Commissioner intimated that if he had been instructed to build a line purely for railway purposes, selecting his own route and grades, without having regard to the City thoroughfares, a similar class of line could have been built for approximately £296,000.

BRIDGES.

18. The estimate submitted includes the cost of eleven over-bridges and one road under the railway. It was explained, however, that the only bridges of any consequence are those which will cross the Molonglo River and the Jerrabomberra Creek. The former will be 480 feet long, and the latter 120 feet long. It is proposed to construct these bridges of concrete pillars and steel girders. Possibly, however, examination may decide in favour of cast-iron piers and steel girders in the case of the Molonglo River, on account of the different foundations to be dealt with there.

19. It was explained to the Committee that the actual design of the Molonglo bridge had not yet been adopted, but that its cost would be in the neighbourhood of £31,600.

NEW SOUTH WALES SECTION.

20. The Committee made inquiries from the Chief Traffic Manager, New South Wales Railways, regarding the portion of the line to be constructed by the State of New South Wales. It was ascertained that a survey has been made of that section, and that the most convenient point to junction with the New South Wales railway system would be Yass Junction.

21. It was stated that there would be 27 miles 54 chains of the line within New South Wales territory, and that it was proposed to construct such section on a ruling grade of 1 in 66, with a minimum curve of 20 chains. The total estimated cost is set down at £310,725, including £33,000 for a bridge required over the Yass River. The time required for completion would be two years from date of commencement.

22. In response to inquiries made by the Committee as to whether the New South Wales Government was prepared to proceed with the construction of its section of the work the following letter was received:—

Public Works Department, New South Wales,
Sydney, 27th February, 1924.

DEAR SIR,

YASS-CANBERRA RAILWAY PROPOSAL.
Following upon my letter of 25th instant, I am directed to inform you that the subject matter of your letter of 23rd *idem* was considered by Cabinet to-day.

Ministers recognise their obligations under the Seat of Government Surrender Act, and are prepared to meet them, but, as the question of finance is at present a very serious one so far as the Government of New South Wales is concerned, Cabinet cannot see its way clear to give a definite promise that an immediate start will be made on the work.

Respecting the financial aspect of the question, I might point out that recently the Honorable Austin Chapman, when at Yass, stated that, while the Federal Government had no intention of meeting the cost of the railway from Yass to the Federal boundary, he would endeavour, if necessary, to persuade his Government to lend Mr. Ball the money.

In this connexion I have to state that, if the Federal Government is agreeable to assist the New South Wales Government in the direction indicated, this State will be prepared to proceed with the construction at once.

I might add that Cabinet made a suggestion that, if the Federal Government were willing to loan the money, it should be provided at the same rate of interest as the Commonwealth is paying the State in respect of the transferred properties.

Yours faithfully,
T. B. COOPER,
Under Secretary.

The Secretary,
Commonwealth Parliamentary Standing Committee on Public Works.

CIVIC CENTRE STATION.

23. It was stated in evidence that the principal station within the City would be on Ainslie Avenue, in the vicinity of the proposed Civic Centre. To conform to the lay-out of the City, and to avoid level crossings, it is proposed that this station, which is about 600 feet long, shall be wholly below surface level, the railway formation at this point being 25 feet below road level.

The Committee gave much consideration to this question, but it was strongly urged by all members of the Advisory Committee examined that a low-level station at this point was essential, and that a level crossing at this spot would be detrimental to the whole lay-out of the City.

To carry out this project involves a considerable amount of excavation, the cost being something in the nature of £26,000.

The Committee anticipated that the existence of a station at this level might produce difficulties in dealing with stormwater drainage and sewerage at this point, but was assured that any such difficulties could be satisfactorily overcome.

LACK OF INFORMATION.

24. Throughout the course of its inquiry the Committee found it was somewhat hampered by the paucity of information made available. In addition to the details specified in the Commonwealth Railways Act, and mentioned above, which were not furnished, no steps appear to have been taken to approach the State of New South Wales with a view to suggesting an arrangement under which all sections of this railway should be constructed, or even a basis of agreement for working the railway when completed.

Further, no particulars were available to the Committee as to the class or style of station buildings proposed; no separate estimate could be furnished of the various bridges proposed to be constructed, nor could any plan or particulars be furnished of the design of the important bridges over the Jerrabomberra Creek and Molonglo River. Apparently no thought had been given, either by the officials of the Railway Department or by the members of the Federal Capital Advisory Committee, as to the width of land which it would be advisable to set aside for railway purposes along the route.

REVENUE.

25. An endeavour was made by the Committee to arrive at what possible return might be expected from the proposed line, but the opinions obtained were not reassuring. Owing to the class of country between Yass Junction and the Federal Territory boundary, the scattered population, and the small amount of production, it is not anticipated that much freight will be available in that locality, while the distance from Melbourne and the existence of a break of gauge at Albury militate against supplies coming from Melbourne rather than from Sydney.

No great amount of passenger traffic can be looked for, at any rate for some time, as it is thought that most visitors from the north and even many from the south will prefer travelling via Goulburn and Queanbeyan, while, of course, members of Parliament and others who travel regularly are covered by season tickets, for which no greater sum will be paid than at present.

NECESSITY FOR THE LINE PROPOSED.

26. Both Commonwealth and State railway officials made it plain that the proposed line was not warranted from a railway point of view, and could only be considered from a civic aspect, or as a matter of policy.

The Federal Capital Advisory Committee, which was appointed to advise the Government as to the best and most economical means of arranging for the early transfer of the seat of government to Canberra, recommended in its first report that the extension of the railway from the Civic Centre to the Federal boundary should be deferred until a later stage. At that time railway communication existed from Queanbeyan as far as the Civic Centre, the latter portion by a temporary line, but in a flood, which occurred later, the railway bridge was washed away, severing railway connexion between East Lake and Civic Centre, and the Advisory Committee recommended that it be restored, and, in restoring it, that the bridge be put above flood level. Following upon this, consideration was then given to the rest of the route beyond Civic Centre.

PROPOSED MOTOR ROAD.

27. Seeing the huge capital cost involved in the provision of a railway from Yass Junction to Canberra, the Committee made inquiries as to the advisability of serving the needs of the Capital, at least for some years, by motor transport.

Many arguments were adduced to show the advantages of motor vehicles for the transport of passengers, their greater flexibility, comfort and speed, and lower cost. The Committee travelled by motor over the road from Yass Junction to the Capital, and found it in fair condition, although it was realized that after heavy rain it would be difficult, while the occurrence of floods would make it impossible.

28. Evidence showed that it would be possible to construct a first-class modern concrete motor road for from £8,000 to £10,000 a mile, but that a good road, suitable for all the traffic likely to pass over it for many years, and with suitable bridges where required, would be built for about £100,000.

If this were done, it was suggested that a railway would be unnecessary for some considerable time, and the State of New South Wales, being relieved from its obligation to construct at present its section of railway, might reasonably be asked to contribute a proportion of the cost of the motor road.

29. On the other hand, the fact that the hours of departure of the expresses from Sydney and Melbourne are fixed for the convenience of through passengers, and timed to permit of their arriving at reasonable hour at the break-of-gauge point at Albury, necessitates the trains from Melbourne reaching Yass Junction at 5.27 a.m., and the trains from Sydney reaching the same station at 1.54 a.m., and it was thought that the majority of passengers would be averse from changing into a motor vehicle to complete the journey to the Capital, especially in bad weather. If a railway were constructed from Yass to Canberra arrangements could be made to drop the sleeping and other cars required, to be picked up by another locomotive, and brought direct to the Capital without changing.

RECOMMENDATIONS OF COMMITTEE.

30. After carefully examining the matter in all its aspects the Committee was convinced that no necessity exists at the present time for a through railway from Yass Junction to Canberra. The City can be reached by rail from Goulburn, and but little inconvenience and loss of time would be occasioned to visitors from the south by having to travel over such line, and it is considered that, even with a line from Yass Junction, most travellers from the north would prefer the existing route rather than the extra time and distance involved in approaching the Capital through Yass Junction. On the other hand, some members argued that the motor vehicle must be regarded as the coming method of transportation, and that, instead of giving further railway communication, an effort should be made to provide better roads, and cater for the travelling public by motor vehicle. The majority of the Committee, however, consider that it is essential, if the best value is to be obtained from the sale of leases north of the river, and development of the City is to proceed on the lines laid down in the accepted plan, that this can best be done by bringing the railway into the heart of the City, and by fixing such an important focal point as the Central Railway Station will be.

31. The Committee feels, however, that much expense could be saved by utilizing for as long as possible the line already in existence. It was, therefore, decided to recommend that the existing railway be utilized for the present to as great an extent as practicable.

32. The Committee was opposed to the reconstruction of the river crossings in anything but a permanent manner, as evidence showed that it was difficult to get a good foundation, and danger was to be apprehended from flood. It was, therefore, of opinion that the railway should be carried over the Jerrabomberra Creek and the Molonglo River on the permanent bridges as proposed, at the level of 1,841 feet suggested for the completed line.

CENTRAL RAILWAY STATION.

33. The question of the situation of the Central Railway Station is one to which the Committee gave much thought, as it is realized that the experience of cities in other parts of the world have been that the main railway station has become the point of central focus of the life of the city, and has materially affected the direction of its growth. In the case of Canberra, it is probable that the railway will be a much more powerful factor in determining the growth of the City than anything else, and, in fixing the position of the Central Railway Station, the Committee recommends that ample reservations should be made to meet all possible future needs, and care should be taken to provide for access on all sides, and avoid anything in the nature of congestion. The fact that the stations at Canberra will eventually be through stations, and not terminal stations, simplifies the position.

34. The unanimous testimony of four members of the Federal Capital Advisory Committee that the whole scheme of the commercial centre of Canberra depended upon the establishment of a station at Civic Centre, which would not interfere with the important streets to be formed in that locality, influenced the Committee in agreeing that the principal railway station be constructed at its permanent low level.

35. If the line is brought to the Civic Centre, the Committee considers that there will be sufficient railway facilities to serve the city for a lengthy period, and that no additional expense should be incurred to take it any further for some time. It is, therefore, recommended that the line be terminated for the present as near as practicable to the 205½-mile point.

36. The decision arrived at by the Committee in connexion with this matter is shown by the following extracts from its Minutes of Proceedings :-

Mr. Blakely moved :-

That the proposal to construct a low-level railway, as submitted to the Committee, be adopted, with the following modifications :-

- (a) Eliminate cutting on north of Molonglo River, using present line from the bridge to a point close to the Civic Centre.
- (b) Provide the proposed under-surface station at Civic Centre.
- (c) Bring the line to the surface again after passing Civic Centre Station as quickly as a safe grade will allow.

Seconded by Mr. Mathews.

The Committee divided on the motion :-

Ayes (3).

Noes (5).

Senator Barnes.
Mr. Blakely.
Mr. Mathews.

Senator Lynch.
Senator Reid.
Mr. Gregory.
Mr. Jackson.
Mr. Mackay.

And so it passed in the negative.

Mr. Mackay moved :-

- (a) That, as the existing railway from Queanbeyan to Canberra will supply all the needs of the Capital for many years, the Committee recommends that, in lieu of carrying the proposed railway beyond the existing Canberra Station, an 18-ft. wide road-bridge, with permanent concrete piers and timber decking, be constructed over the Molonglo River at Federal Avenue.
- (b) That the road from Yass Junction to Canberra be improved so as to enable an efficient motor service to be provided between these two centres, and that the State of New South Wales be asked to contribute a proportionate share of such expenditure, the total cost of same not to exceed £100,000.

Seconded by Mr. Gregory *pro forma*.

The Committee divided on the motion :-

Aye (1).

Noes (7).

Mr. Mackay.

Senator Barnes.
Senator Lynch.
Senator Reid.
Mr. Blakely.
Mr. Gregory.
Mr. Jackson.
Mr. Mathews.

And so it passed in the negative.
E2479-2

Senator Lynch moved :—

That the construction of a railway, as submitted to the Committee, be recommended, subject to the following modifications :—

- (a) That the existing railway from the 190½-mile point, on the Queanbeyan-Canberra line, be utilized for the present, and made to junction with the route of the proposed permanent railway in the vicinity of the 202-mile point.
- (b) That the bridge crossing the Jerrabomberra Creek and the Molonglo River, together with the approach banks, be so constructed as to carry the railway across at the 1,841-ft. level.
- (c) That, after crossing on the permanent bridge, the existing railway be utilized from the Molonglo River northwards to its point of intersection with the route of the proposed permanent railway, and be made to junction with it at that point.
- (d) That the permanent railway from this point be carried through the City in such a way as to permit of the station at Civic Centre being placed at its permanent low level.
- (e) That for the present the terminus of the railway be left as near as practicable to the 205½-mile point.

Seconded by Mr. Jackson.

Ccarried unanimously.

GOODS SHEDS.

37. To meet the convenience of the inhabitants of the city, it is recommended that provision for the handling of goods be made on the south side of the Molonglo River in the vicinity of the Power House, and on the north side in the vicinity of the Civic Centre.

GRADE.

38. The proposed ruling grade is 1 in 66. The grade suggested by Mr. Griffin when advocating his route for a City Railway was 1 in 200. After hearing the evidence of representatives of the Commonwealth Railways Department and of the New South Wales Railways, the Committee is satisfied that there is little likelihood of the railway now suggested being anything more than an extension of the through lines from Melbourne and Sydney, and as the ruling grades of both those lines are not less than 1 in 66, it is not considered that the expense involved in providing for a flatter grade on the Canberra section is warranted.

NEED FOR FORESIGHT.

39. Throughout its investigations, the Committee has endeavoured to realize that the line under consideration is intended to be a main line of communication, and should be designed to meet not merely present requirements but be capable of providing for an indefinite period of the future. To make the city worthy of Australia, it should be kept in mind what it may become in a hundred years or more, and in the expectation that by that time it may have developed into one of the big cities of the world, the Committee has tried to anticipate what the conditions and requirements will be then, and to avoid any tendency to cater for present day needs to the detriment of future efficiency.

A single track is provided for the present, but possibly quadruple tracks may in time be necessary, and as there is now plenty of land available, it is considered that ample provision should be made for both lines and stations, not only in respect of the line at present under consideration, but also in respect of any other practical route traversing the city which is likely to be availed of in future to give railway communication to the southern and westerly parts of the city. It has been common experience that towns frequently grow at a very rapid rate from causes which it is impossible to forecast, and, for that reason, in planning for Canberra it has been considered advisable to keep in view the prospect of the city being larger than can be estimated at the present.

RESERVATIONS.

40. Experience in older countries inclines to the view that railways tend to destroy the residential value of land immediately in their vicinity, and the consequence is usually a poor type of small residence with unmistakable back yards and general unsightliness. The Committee is, therefore, of opinion that in all cases along the route of the railway, especially where it traverses residential districts, a generous strip of land should be reserved on each side of the line for plantation or recreation purposes.

SAVING EFFECTED BY THE COMMITTEE.

41. The estimate obtained from the Commonwealth Railways Department of the line recommended by the Committee sets it down at £131,000, which is a reduction of £302,000 on the proposed Commonwealth section, plus the amount of £310,725 which would have to be spent by or on behalf of the State of New South Wales, or a total saving of £612,725.

SUMMARY OF RECOMMENDATIONS.

42. Briefly summarized, the Committee's recommendations are :—

- (1) Utilize the existing line to Civic Centre for as long as possible (page 9).
- (2) Build permanent railway bridges over the Jerrabomberra Creek and Molonglo River to take railway across at 1,841 feet level (page 9).
- (3) Provide for low-level station at Civic Centre as proposed (page 9).
- (4) Provide facilities for handling goods on south side of the Molonglo in the vicinity of the Power House, and also on the north side in the vicinity of the Civic Centre (page 10).
- (5) Adopt 1 in 66 grade proposed (page 10).
- (6) Reserve generous strip of land on each side of line, especially in residential districts (page 10).
- (7) Make ample provision to meet all future needs of Central Railway Station, and provide for access from all sides (page 10).
- (8) Terminate the line as near as possible to the 205½-mile point (page 9).

H. Gregory
H. GREGORY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,

Federal Parliament House,

6th May, 1924.

MINUTES OF EVIDENCE.

(Taken at Melbourne.)

THURSDAY, 7th FEBRUARY, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Cook
Senator Lynch	Mr. Jackson
Senator Reid	Mr. Mathews.
Mr. Blakeley	

Norris Garrett Bell, Commissioner, Commonwealth Railways, sworn and examined.

1. To the Chairman.—The route of the proposed railway from Canberra to Yass has largely been determined by the requirements of the Federal Capital Advisory Committee. It has not been decided upon from a purely railway point of view, but has been designed to comply with the lay-out of the Capital. For instance, the grades have had to be set out so that there will be no level crossings within the city area. It is proposed to abandon portion of the existing line running from Queanbeyan to the Power-house. That is to say, the line to Yass will leave the existing railway at a point about a mile from the Power-house, and 3 miles from the Territory boundary towards Queanbeyan. From this point the route will run due west along Lakebourne-avenue, cross the Jerrabomberra Creek at a point higher up than the existing crossing, turn north through a deep cutting into East Lake-circle, cross the Jerrabomberra Creek again, and then run almost due north to cross the Molonglo River at a point about a quarter of a mile to the east of the Power-house. A high embankment—the average height of which will be 16 feet—will cross the flat country lying on either side of the Jerrabomberra Creek, and between the creek and the Molonglo River. The river will be crossed by a square bridge. Beyond that point, the line will rise on 1 in 75 grade, and follow a route which is a departure from Mr. Griffin's original route, and also from the temporary line he built and the proposed route past the market centre. It will run midway between the two, and rise gradually to a summit, where two roads cross each other midway between the Molonglo-bridge and the Civic Centre. At this point, it will pass through what is described as a tunnel, but will actually be an open cutting covered over to enable the two streets to cross at that spot. Beyond this point, the line will drop down for a little distance to the civic centre. It is proposed to put the principal station on Ainslie-avenue, close to the Civic Centre. At this point, the original design provided for a curve, but I have designed a straight line here in order to avoid having the station on a curve. Beyond the proposed station, the line will proceed in an almost northerly direction until it gets beyond the city as designed. Provision has been made for numerous overhead bridges at different streets, and all through this section of the city the greater portion of the line will be below the surface. A goods station will be provided at a point near the northern boundary of the city. Beyond that boundary, ordinary railway survey practice has been followed, with a grade of 1 in 66, which is the ruling grade we have adopted by agreement with the New South Wales Railway Department. Within the city area, the line will be graded to suit the various crossings, and the steepest grade will be 1 in 70 at a point between the Molonglo

bridge and the Civic Centre. That portion of the line which lies to the north of the city has already been surveyed and pegged, so that the Surveyor-General may proceed with the task of cutting up the land; but the portion of the line to the south of the north boundary of the city has not yet been definitely pegged out. Because the country is too broken, we could not get the line right into the township of Hall, at the northern boundary of the Federal Territory, and it will pass the township about a mile away, just at the point on our boundary where we have agreed with the New South Wales Department to meet the New South Wales line. The length of the proposed railway within the Territory will be 10 miles 48 chains, and the estimated cost is £433,000. The portion of the Queanbeyan to Canberra line already constructed and designed to be utilized is about 3 miles. This portion will not require to be regraded or altered, except that we may require to strengthen one or two of the bridges. There are one or two temporary bridges on this section where washaways have occurred. The cost of these alterations is not included in the estimate I have given. The portion of the existing line beyond the point at which it is proposed to deviate will be pulled up, and the material will be utilized. Allowance has been made for this in the estimate I have given; but I do not suppose that the material thus pulled up and utilized will be worth more than £2,000. About 2 miles of the existing line will be used in this way. There is also some material in Mr. Griffin's line beyond Molonglo River of which use can be made. The proposed railway will be a single line; the rails will be 80-lb., and the sleepers will be 8 feet long, in accordance with the practice of the New South Wales Department. It is proposed to have more stations than one. The main station will be at the civic centre, but it is possible that a station may be required at the East Lake end. There is now a temporary station with a goods siding near the Power-house which should serve for many years to come. The siding now running towards the Power-house will remain. Provision is made for any sidings which may be found necessary between the goods yard and Hall. There will also be a station at Hall. Mr. Griffin proposed to make a station at the market centre, just beyond the Molonglo crossing; but I do not know that it was to be the principal station. I do not think that the Advisory Committee wished to have a station at that spot at the present moment. In any case, as the grade at that point is 1 in 75, it would not permit of the building of a station there. The sharpest curve on the line will have a 20-chain radius. The cost of the line is increased by the necessity for adapting the route to the design of the city, and by grading it in order to suit the thoroughfares of the city, thus causing us to provide for heavier cuttings, and for going down further below the surface than would otherwise be necessary. The object of this is to avoid having level crossings in the city area. The reason for the high embankment approaching the Molonglo from the south is to keep the line above flood level. The embankment will be about three-quarters of a mile long. The level of the bottom of the girders of the bridge has been fixed by the Advisory Committee, who were in possession of information relative to the height of the recent flood. I do not think that it is intended to use the embankment for the purpose of enabling a second series of lakes to be created at the east end of the city. I believe that the Advisory Committee have kept in mind the possibility

of having these lakes in years to come; but, so far as I know, they have no intention of recommending that they be gone on with at the present time. The reduced level of the bottom of the girders is 1,833 feet above sea-level, which is 7 feet higher than the recent flood level. We are not building up to the Upper Lake level of 1,943 feet. We are simply getting a clearance of 7 feet above the last flood level, which, I think, will give ample height to obviate the dangers of flood waters affecting the line. We are not putting the line at an extreme height for that purpose. It is a common practice to allow 4 feet, 5 feet, or 6 feet between the flood level and the bottom of a bridge. The actual clearance depends upon the quantity of timber likely to come down the stream. The sole factor that I have considered is that the bridge will be perfectly secure from liability to damage from flood waters. I have not given any consideration to any proposal to construct a series of lakes to the east of the city. I have not done so because I understand that for the present that proposal has been abandoned. The quantity of excavation required on the line will be about 530,000 cubic yards. I have no record of the actual quantity of spoil that will be required for embankments, but it will be several thousand pounds less than the quantity that will have to be removed from the cuttings. I believe that borings have been taken along the flat at the civic centre. As a matter of fact, we know fairly well that we must expect to get into rock. The estimated cost of excavating is 4s. 6d. per cubic yard. Seven years ago I estimated this cost at 3s. per cubic yard, but since that time wages have increased by 50 per cent., that is to say, they have risen from 10s. to 15s. 2d. per day. In removing this earth, we shall make use of the five steam navvies which are now in the Territory. I believe that they will be available. One of them belongs to my Department. The bridges will be constructed of concrete piers and steel girders. Possibly, we may have to use cast-iron cylinders on the Molonglo-bridge, but that point has not yet been definitely decided. No concrete piles will be driven at the Molonglo-bridge. Cylinders will be sunk on to the rock and filled with concrete. The cause of the recent collapse of the bridge built over the river was insufficiency of depth or ground to support the piles. There is only a comparatively shallow layer of gravel on top of the rock there, and there was nothing to hold the piles when the flood came. That these piles appeared to have been pounded into pulp, is probably due to the fact that when they were driven the drivers continued to hammer them long after the rock was reached. The estimated cost of the bridge over the Molonglo is £31,600. From present information it is proposed to have eight 60-ft. spans; but later investigations may induce us to have 50-ft. or 100-ft. spans. The estimate I have given of the cost of the bridge is quite reliable, and is not likely to be affected by the design. So far as the rest of the line is concerned, the estimate is based on an actual survey, because, with the exception of the Molonglo-bridge, a standard design will be adopted for all openings. It will take some little time to prepare the design of the bridge; but in a few months Mr. Hobler will be in a position to present it to the Committee. I cannot say whether the Government will carry out the work by contract or day labour, but I shall make a recommendation in that regard. My present intention is that the portion of the line within the Federal Territory should be built in a series of small-contracts, and the balance from the Federal Territory boundary to Yass should be built by the New South Wales Government in any way it thinks fit. I do not anticipate any difficulties in connexion with rolling-stock.

2. *To Senator Reid.*—In designing the line, we have had to conform to the views of the Advisory Committee and the necessity for maintaining the original lay-out of the city; but we could have built a line for

£137,000 less if we had been permitted to select our route and our own gradients without paying regard to city thoroughfares. To a certain extent, a line built under those conditions would have been a departure from the route recommended. We would have crossed the Jerrabomberra Creek once only, and would have kept further to the east of the city; but, of course, such a line would have disfigured the city from a civic point of view. We have been obliged to preserve a headway of 16 feet from the rail to the bottom of the girders of overhead bridges, which actually means at least 22 feet from the street roadway to the formation level of the line. When a large section of a railway is run through cuttings, it is a difficult matter to deal with surface waters. At one point towards the northern portion of the city, there will be difficulty in taking the drainage off an area of about 900 acres, the water from which will have to be taken below our line at one point. The line will run underground at the spot I have mentioned where two roads will cross. It is described as a tunnel, but it will really be an overhead bridge.

3. *To Mr. Jackson.*—I have not separated the cost of building the line outside the city area, but I shall get Mr. Hobler to do so. The total cost of the line works out at about £28,000 per mile. The building of the line through the city area will be a very costly undertaking.

4. *To Mr. Mathews.*—From the starting point of the projected railway we make a detour instead of following the existing route. I believe that the original intention was to keep clear of any proposed lake. The Advisory Committee had several reasons for adopting the deviation. One reason was that if the Upper Lake were constructed the existing portion of the line would be under water. Another reason was the fact that the material required to make the big embankment would have to come from the cutting at East Lake circle, where it is proposed to have a station. There was also a proposal to have a station at Lakeside. The earth required for the embankment could not have been got elsewhere if the line had run straight across to the river. The hill at East Lake circle is the closest point on the south side of the river where this material can be secured. Of course, if I were considering the railway point of view only, I would not have taken the line to East Lake circle, but would have gone straight across from the existing line to the river in a north-westerly direction, and thus avoided crossing the Jerrabomberra Creek twice. It would have been cheaper than the proposed route, which crosses that creek twice. It is necessary to pull up portion of the existing line. The Advisory Committee desires it to be done. As the railway will be mostly below the surface, I have not the least doubt that trees and gardens will be planted alongside it. The tunnel originally proposed near the market centre has been abandoned. I had nothing to do with any of the bridges in the Capital Territory which have been washed away, but it is a difficult place to build bridges there, because the hard rock is only a few feet below the surface. Two bridges have been washed away, but one of them was built before the Commonwealth had anything to do with the Territory. I believe that an embankment at one end of the bridge crossing the Murrumbidgee river was washed away. The knowledge we have gained of the causes of the destruction of these bridges has been of value to us in designing our proposed bridge. That bridge will be absolutely safe. Ample space will be left for trees to pass underneath it. I am quite sure the railway will be safe. We know what the record flood has done, and we have made ample allowance for even a bigger flood.

5. *To Mr. Blakeley.*—Sleepers are very much dearer than they used to be. Mr. Hobler can supply the Committee with information as to what the sleepers will cost landed at Canberra. As the line is in ironbark country, we shall probably use ironbark sleepers, if we can

get them at a reasonable price. What are called pot sleepers have been in use in India for many years. A concrete pot sleeper like an inverted ball has also been used in sandy country in India, where white ants are a serious cause of trouble. I have not travelled over a line laid in the cup style of sleeper, but I have seen illustrations of them. I saw them being shipped from Glasgow 40 years ago. Those sleepers are suitable for the north of Australia. The Department has illustrations of them in use in India. I would not recommend their use at Canberra. They are more suitable for narrow-gauge lines than for broad-gauge lines along which fairly fast traffic will run. The world has been experimenting for years with concrete sleepers. Nearly every State has sections laid with them. The Broken Hill Proprietary Company, or Hoskins, will be in a position to supply us with rails. The Australian price for rails is the same as the overseas price. It is about £12 per ton at Newcastle, but the price varies from £11 10s. to £12. It is the policy of the Commonwealth Railways Department to utilize Australian material as long as it can be obtained at a reasonable price. The radius of a curve on a railway depends upon the nature of the country traversed. There are many sharp curves in New South Wales than 20-chains radius, but they are not desirable if they can be avoided. The country through which the proposed line will pass is quite suitable for 20-chain curves. In regard to the area outside the city proper, the Surveyor-General is cutting up the land alongside the proposed route, and in doing so he is endeavouring to fix the routes of his roads to cross the line by overhead bridges at cuttings. We have a sketch design of a bridge to cross the Molonglo to enable us to decide what will be the most economical style to adopt, and when we know the depth to which we must sink our cylinders, we can decide upon the length of the spans. The greater the depth to which we have to sink the cylinders, and the greater the height of the piers, the longer should be the spaces between the piers. The cost of the substructure should equal the cost of the superstructure, and once we know the length of the piers, we shall fix the length of the spans. I know the torpedo-shaped piers on the Murrumbidgee River. They are practically direct on the rock. There was no necessity to sink cylinders there. On the other hand, we shall be obliged to sink cast-iron cylinders through the water on to the rock. Our bridge construction will be similar to the bridges across the Hawkesbury, along the northern line from Sydney, which are sunk through sand and water on to a rock bottom. When a cylinder is sunk in this way, a concrete pier can be built on top of it, or, if necessary, the cylinder may be continued to the bottom of the girders. In every case the cylinder is filled up with cement. It is slightly sunk into the rock. I shall have no choice between a cement-filled cylinder and a cast-iron cylinder. I shall have to sink a cast-iron cylinder filled with concrete; but above water-level I may carry up the cast-iron cylinders to the bottom of the girders, or build concrete piers on to the top of the cylinders. If we can hire rolling-stock at a reasonable rate from the New South Wales Railway Department we shall do so for the work of construction, but it is more than likely that we shall bring over engines and trucks from Port Augusta for this purpose. When the railway is built, we propose to allow the New South Wales Railway Department to run the traffic, while we maintain the line and staff the stations. The most difficult part of the line to grade will be near the civic centre station, but to the north-east of the line there is an area of about 900 acres which all drains towards it. Nearly all that surface water will have to be carried below the line. An outlet drain will have to be provided for some little distance, so that that drainage may gravitate to the river. I do not know that it will be possible to get rid of it in any other way. Colonel

Owen has cut a storm-water drain, and has diverted a considerable portion of drainage water; but I do not think it will be possible to divert it from this particular area unless it passes under the line.

6. *To Senator Barnes.*—My present inclination is to recommend the Government to have the line built by contract, but not in one contract. I am inclined to recommend that a section of the cutting be let to one contractor, and another section to another contractor, and perhaps the culverts and bridges to still another contractor.

7. *To Senator Lynch.*—I had no definite instructions from the Minister for Works and Railways to work in accordance with the ideas of the Advisory Committee. He referred to me the work of preparing the necessary plans and sections for the Committee, and when the plans and sections were prepared, they were forwarded to the Minister, and subsequently passed on to this Committee. The Advisory Committee conveyed to me their idea of the route of the railway. I have had three conferences with that Committee, and last week Mr. Hobler met them and went through the plans and sections. The route which I have described, and its characteristics, conform to the wishes of that Committee. It is also very close to the route laid out by Mr. Griffin. It is capable of serving a city with a population of 250,000 people. Of course, it may be necessary to duplicate it when the population reaches that figure; but so far as the route is concerned, and the lay-out generally, a city of those dimensions would be amply served. It is true that the provision of railway facilities will almost reach the maximum development of the city in one jump, as compared with other features now under construction in the city. That point was considered by the Advisory Committee, but we have either to do what is proposed or to make a surface line with level crossings. There is no intermediate course. The railway which I said I could build for £130,000 less than this cutting will cost, would have level crossings and less costly cuttings, and would be built purely from a railway point of view. It would not conform to the future requirements of the city, and would have to be radically remodelled in order to fall in with the recommendations of the Advisory Committee. The proposed station will be right at the civic centre. The estimate of £26,000 a mile will cover the cost of stations, sidings, and all equipment except rolling-stock. The point at which we shall connect with the New South Wales system is the best possible place from a surveying point of view; that is to say, it is the most suitable place so far as grading and earthwork are concerned. It will not be possible to get the line closer to the township of Hall without going into a lot of heavy earthwork. There is some very heavy, ridgy earth at that point. We have gone as near to Hall as we possibly can without incurring undue expense.

8. *To Mr. Cook.*—The only manufactured articles we shall have to purchase are rails, fastenings, and cement. Our estimate of the cost of these materials is based on the current prices for them. We know what the States are paying for girders, but when we require them we shall call for tenders, and it is possible that we may get a cheaper quotation from manufacturers abroad. I am aware that there is a considerable difference between the Australian price and the foreign price for bridging material, but we have based our figures on the most recent prices paid for this material by other Railway Departments. Most of the material for girders is made in Australia, but when we actually come to buy we may more than likely accept the lowest tender. The bridge construction will not be a particularly heavy item. The only bridges of any consequence are those which cross the Molonglo River and the Jerrabomberra Creek. One bridge will be 480 feet long and the other 120 feet long. In my estimate, I have made no allowance for the

duplication of the line. It would probably be an advantage to make the tunnel sufficiently wide to take two roads, but the best plan to adopt so far as banks and cuttings are concerned is to widen them when they are required to be widened. So far as the bridges are concerned, we can easily put down another row of cylinders and another set of rails when it is necessary to duplicate the line. The heavy cost of building this railway is not warranted from a railway point of view, but it may be warranted from a civic point of view, or as a matter of policy, upon which I cannot express any opinion.

9. *To the Chairman.*—The New South Wales Government know exactly where our survey terminates. I know that they have made a trial survey of the route the line will follow from the Territory boundary to Yass, but I am not sure whether they have finished a working survey or not. We have sent them our plans, and there can be no misunderstanding on their part as to the terminal point of our section. We prepared a plan of the railway which we were recommending in the earlier stages, and which would have cost £130,000 less than the proposed line; and recently, in connexion with this proposal, we prepared a rough plan showing the grading and the route we would adopt. It is not customary to get instructions from the Government as to what should be done in a case like this. I received instructions to prepare certain plans, and I had several consultations with Colonel Owen and the Advisory Committee. To the best of my knowledge, the Minister for Works and Railways knew what was going on, and knew that the plan I was submitting was based on the requirements of the Advisory Committee. The railway plan to which I have referred merely showed the grading of a line we would have built if we had not been obliged to consider the requirements of the city; in other words, it was proposed to grade it as if there were no city there. On the other hand, the plan now submitted conforms to the views of the Advisory Committee. We expect to have the line built two years after the commencement of operations. There will be a certain amount of revenue from it, but it is very difficult to estimate what this will be. We expect to get wheat, wool, and live stock traffic from within the Territory itself. If development necessitated the duplication of the line, the excavations and bridges will have to be altered. A road from Canberra to Yass, capable of carrying heavy motor traffic, would probably be as expensive as a railway. From what I have read of the high cost of concrete road construction in Great Britain, I gather that it is more costly than railway construction. The civic centre station will be nearly 2 miles from Parliament House, and the goods sheds will be a mile further north. In my opinion, these sheds will be too far from the main centre, but it would not be an easy matter to get another site while keeping the line below the surface, as it is intended to do. No excavation for the goods sheds will be required on the site selected by the Advisory Committee, and from that point to the civic centre the line is nearly all in cuttings, so that considerable excavation would be necessary to shift the goods sheds closer to the city. There is a goods shed and a small station near the Power-house which can be utilized for some time to come. There is no objection to having bridges for rail traffic and road traffic fairly adjacent. The route proposed some time ago, by which the line would pass about a quarter of a mile from Parliament House, and cross the Molonglo to a point much further west than is now projected, was ruled out because it cut through the scheme of the layout. From a railway point of view, it was a good proposal, but as it was likely to spoil the design of the city, it could not be accepted.

10. *To Senator Reid.*—In working the railway, the idea is to make use of the New South Wales rolling-stock. Quite a number of railways are worked by companies who do not own them.

(Taken at Melbourne.)

FRIDAY, 8TH FEBRUARY, 1924.

Present:

Mr. GREGORY, Chairman;	Mr. Cook
Senator Barnes	Mr. Jackson
Senator Lynch	Mr. Mathews.
Senator Reid	
Mr. Blakeney	

George Alexander Hobler, Chief Engineer for Works and Ways, Commonwealth Railways, sworn and examined.

11. *To the Chairman.*—In accordance with instructions, I have prepared plans and estimates for a railway in the Federal Capital area to conform to the accepted design of the city, and the requirements of the Federal Capital Advisory Committee. Those plans are before you. They show a slight departure from Mr. Griffin's original lay-out as required by the Advisory Committee. The proposed route of the railway starts at a point marked 193½ miles on the existing line from Queanbeyan to Canberra, and distant approximately 3 miles from Queanbeyan Station. The line then runs in a westerly direction, following for a considerable distance Lakebourne-avenue. That is on fairly level country. The line curves round to the north on East View-avenue, and passes through East Lake Centre at about 201½ miles. Still maintaining a northerly direction, it runs along East View-avenue, crosses the Molonglo River at about 202½ miles, and then bears away in a north-westerly direction. This is a slight departure from Mr. Griffin's proposal. The line passes the junction of Capital-terrace and the Parade, and then proceeds across Prospect Parkway, reaching Civic Centre at 204½ miles. Thereafter the line turns again in an almost northerly direction, and follows the railway reservation to about 207 miles, crossing Inter-range-avenue at 206 miles 8 chains. Near 207 miles, the line leaves the city area and bends away to the north-west, following that direction to about 214 miles, where it again turns to the north, crossing the Federal Territory boundary at 216 miles 8 chains. The total distance from the point of departure from the existing line to the boundary is 16 miles 48 chains. The point at which the proposed route crosses the northern boundary is about 1½ miles west of the village of Hall. The total length of line, including the existing railway, will be about 104 miles. The estimates provide for a gauge of 4 ft. 8½ in., and a single track laid with 80-lb. rails, and sleepers 8 feet by 9 inches by 4½ inches. Were this an ordinary railway proposition, we would probably suggest a slightly different and less expensive route. The total estimated cost of the railway is £423,000. Provision has been made for stations at East Lake Centre, Prospect Parkway, Civic Centre, near the township of Hall, and at two points between Civic Centre and the village of Hall. Parliament House will be equidistant from the stations at East Lake Centre and Civic Centre—practically 2 miles. The estimate includes the cost of providing railway stations. The present siding into the Power-house will remain and be connected with the new line. The earthworks will be a very heavy item. There will be 530,000 cubic yards of cutting, and 70,000 cubic yards of side cutting. Of that total, about 356,000 cubic yards from cuttings will have to be run to spoil, inasmuch as it will not be required for the making of embankments. It is probable, however, that a good deal of it will be used for filling work by the city construction authorities. The quantity of earthwork is unusually large for a railway in that class of country, but that is due to the fixing of the grades in such a way as to allow the main avenues and streets of the city to be led over the railway

by bridges instead of having level crossings. The embankments are not unduly large. The total quantity of material in the banks will be approximately 328,000 cubic yards. The details of the estimates are—clearing and grubbing, including fencing, cattle grids, &c., £5,510; earthworks, including cuttings, side cuttings, side-ditches and surface formation, £174,382; bridges and minor waterways, £121,492; permanent way, £70,592; traffic and locomotive accommodation, water supply, telegraphs and signalling, including station buildings, £54,898; housing accommodation for fettlers, £6,670; surveys, £2,000, total, £283,000; or an average cost per mile of £26,064. In the estimate for the intermediate stations, an amount for goods sheds and loading banks has been included, but we cannot specify what size this accommodation will be until the final plans are made out. The present proposal is to place the main goods sheds at 206½ miles, which will be from 1½ to 2 miles from Civic Centre. Consideration of grades and earthworks make this site the most suitable. The formation on the bank crossing the Molonglo River will be at a level of 1,841 feet. The flood level at that point is 1,830 feet, so that the formation level will be 11 feet above the flood. That height was fixed in conference with the Advisory Committee, so as to allow the proposed length of 480 feet of bridging across the Molonglo, with the assistance of Jerrabomberra Creek, to pass the whole of the flood waters. The level of 1,841 feet would give a clear way under the girders of the bridge of about 7 feet. Mr. Griffin's original scheme provided for a very lengthy embankment at a level of 1,870 feet. The present proposal represents a considerable economy. It ignores the intention to create East Lake, the water level of which was fixed at 1,845 feet. The railway formation will be actually 4 feet lower than the level of Mr. Griffin's proposed East Lake. The present proposals are sufficient to obviate any danger from floods after a weir has been built across the Molonglo River lower down to create ornamental waters. Mr. Griffin provided that the railway through the city should follow a grade of 1 in 200, but I am proposing 1 in 65, with compensation for curvature. That is a reasonable grade for a city line. Immediately after crossing the Molonglo River the route rises 1 in 73 to the Parade, and then falls 1 in 70. If a grade of 1 in 100 were adopted, the cost of earthworks would be largely increased. That grade could be attained at the same cost as the grade of 1 in 65 only by altering the route of the line in order to bring it into lower-lying country. Such a deviation would not conform to the requirements of the Advisory Committee. Outside the city area, a general reservation of 1½ chains on each side of the railway is proposed. Until the permanent survey is made and laid down on the city plan, it will be impossible to state the exact width required inside the city area. When the permanent working sections are drawn, we shall indicate to the city constructing authorities the reservations required, and no doubt the matter will form the subject of conference between the Railway Department and the city constructing authorities. It will be essential that the reservation shall be of sufficient width to allow of the construction of a double track whenever it becomes necessary. The subsequent construction of a double track may be slightly more expensive than if the work were carried out now; but that extra cost will be more than counterbalanced by the saving of interest on an immediate increased capital cost. Nothing more than a single line is warranted at the present time. The station sites are on grades that are either marked on the sections as suitable, or can be adjusted when the permanent survey is made. It is not essential to have a level track at the stations; a grade of 1 in 300 is suitable. The average cost per mile of construction after the railway leaves the city proper will diminish considerably. I am having figures prepared showing the cost of construction within

and without the city. Test bores were sunk some years ago on the top of a rise just across the Molonglo River, where there will be a heavy cutting through rock. At the big cutting near Civic Centre there is no rock to cause any trouble. The sections submitted to the Committee show the over-bridges which the Advisory Committee has indicated as necessary at the present time. Eleven over-bridges are estimated for, and one road under the railway. These bridges will be of steel and concrete. Before the widths are finally decided, we shall confer with the Capital constructing authorities; but they have been tentatively fixed at about 100 feet. The cost of these bridges is included in the estimate for the construction of the railway. If the spoil from cuttings is used for filling elsewhere in the city, the city constructing authority will probably take charge of it at a certain point on the railway, and distribute it. My estimate provides for a lead of not more than 40 chains, as it is contemplated that beyond that point the city constructing authority will dispose of the spoil. The point at which the railway crosses the boundary of the Federal Territory has been absolutely fixed, and permanent surveys have been made by both the State and Commonwealth authorities. The railway would have been constructed through the village of Hall, but the grades would not permit that to be done. No provision for rolling-stock has been made in the estimate. Probably the Commonwealth will make some arrangement with the State Railway Department to work the line.

12. *To Senator Reid.*—The width of the over-bridges will be finally determined by the Federal Capital Advisory Committee before final preparation of working plans for the construction of the railway. A sunken railway is not the cheapest method of construction. From a railway point of view, I would prefer for the line to be run through cuttings as shallow as possible, but the matter is placed beyond our discretion by the decision that the line shall be in accordance with the design of the city. Level crossings are dangerous to be avoided in populous centres, but they are not so undesirable in rural areas and small towns. In some places, it would be impossible to carry the railway on a high level above the roads owing to the grades. The grades shown on the section are, as nearly as possible, the best that can be got, while conforming to the necessity for taking the main avenues of the city over the railway. The embankment will be formed with spoil from the cuttings, the deepest of which will have a maximum depth of about 35 feet. These embankments will withstand heavy rains so long as proper waterways are provided. The country generally is suitable for embankments and earthworks.

13. *To Mr. Mathews.*—Shortly after the proposed new railway first turns to the north, there is an embankment, the top of which was just reached by flood-waters some time ago. The proposed big railway embankment across Molonglo River will be quite safe, because there will be a bridge and openings to allow of the passage of the flood waters. At maximum flood, there may be a stream running along the embankment, and if necessary the lower portion of the bank to flood level on the upper side will be pitched. If that is done, any run of water along the bank will not be likely to cause much damage.

14. *To Mr. Blakeney.*—The railway twice crosses Jerrabomberra Creek. Were it not for the fact that the Advisory Committee has asked for the route of the line to be taken through East Lake Centre, it could be diverted across the Molonglo River and avoid the crossings of Jerrabomberra Creek. My instructions were to draw plans for a railway to follow a route conforming to the design of the Federal Capital. The line could not be carried direct to the foot of Mount Ainslie, avoiding the crossings of Jerrabomberra Creek, except by extensive tunnelling on the north side of Molonglo River. The estimated cost of the bridge across the

Molonglo River is £31,600. The existing bridge over Jerrabomberra Creek is small compared with the one that is proposed, because the latter must be designed to take flood waters from Molonglo River as well as from Jerrabomberra Creek. We have been able to arrive at a tentative estimate of the waterways that will be required outside the city area without waiting for the usual watershed area surveys. The route of the line has been pegged permanently from present rail head, and no doubt the survey of the subdivisions and roads will be made to fit in with the route of the railway, taking advantage of the crossings provided on the railway plan. The railway constructing authority will pay for the road bridges and level crossings. Included in the estimate is a certain amount for level crossings between the city area and the Federal Capital boundary. The railway has been graded according to ordinary railway practice, and the Surveyor-General, when cutting up the land, will endeavour to so arrange the roads that they will cross over the most convenient parts of the line. Not many bridges will be required along that portion of the line. In several places, the roads will pass under the line through the bridge provided. Two over-bridges have been estimated for outside the city area. The Commonwealth Railway Department has several designs for fettlers' cottages. They represent comfortable dwellings of three and four rooms. A lot of the cheap accommodation of employees along the East-West Transcontinental railway was provided because of the disinclination of the employees to pay high rentals; but every year we are spending considerable sums of money in improving the housing. Many of the cottages are small, but very comfortable, and the employees are quite satisfied; in fact, when we built twenty temporary cottages at one station, the employees complained bitterly of being required to pay 10s. per week for them. Some time had to elapse after the completion of the East-West railway before the site of permanent camps could be fixed where the construction of permanent accommodation would be justified. The tent houses which were used temporarily were made very comfortable. I will supply the Committee with plans of the cottages proposed to be erected at Tarcola. Probably those to be built in the Federal Capital Territory will be of similar type. If the price of bricks is reduced, we shall probably use them instead of timber. The estimate provides for six cottages, to cost £800 each; but I may be able to erect houses for £600. The stationmasters' houses are provided for in the amount set down for station accommodation.

15. *To Senator Lynch.*—The present length of railway at Canberra is conveniently situated for the carrying on of works on the south side of the Molonglo River, but it is rather far away from the Civic Centre, which is on the opposite side of the river. If the bridge across the Molonglo River were repaired, the line to the Civic Centre could be used for construction purposes, but it will not be of much use after the city is built and occupied by a large population. My instruction was to lay down a railway route and prepare an estimate of cost in accordance with the plans supplied. Those plans showed a route which, I understand, was selected by the Advisory Committee to conform to the design of the city. An alternative estimate of the cost of a line graded in accordance with ordinary railway practice, instead of being lowered to allow of overhead street crossings, was also prepared. The proposed new railway is part of a scheme to connect Canberra with Yass, and thus give visitors from the southern States quicker access to the Capital. Northern visitors will probably continue to avail themselves of the shorter means of access via Queanbeyan. At the present time, there are railways running past the Federal Capital on two sides, and the proposal before the Committee is merely to connect the two railways by a line running through the Capital city. There has been a considerable development of

motor transport in America, especially as feeders for railways, wherever good roads have been built. In Norway, at the present time, motor transport in connection with the railways is being encouraged. Every day this form of transport is becoming a greater factor in the development of the country, and no doubt in time will compete with existing railways as well as obviate the construction of new lines. It is possible that the day will come when motor transport will successfully compete with any railway that is built in the Federal Territory except in the carriage of live stock. I do not anticipate that the Federal Capital railway will improve the finances of the Commonwealth railway system, but the results will depend upon the rate at which the city develops.

16. *To Mr. Jackson.*—So far as I know, the Commissioner of Railways has not made any estimate of the traffic that may be expected on the Federal Capital railway. The cost of construction from the Federal Capital boundary to Yass will probably be about £9,000 per mile. Probably the total cost of the Canberra-Yass connexion will be in the vicinity of £650,000. I am not in a position to express an opinion as to whether or not that expenditure will be warranted. I have not given any consideration to the amount of freight that will be carried to and from Canberra. Until I have, in accordance with instructions from the Commissioner, prepared estimates of working expenses and revenue, I shall not be justified in expressing any opinion regarding the probable financial results of the operation of the proposed line.

17. *To Senator Barnes.*—A single line will be sufficient for many years to come; but the over-bridges will probably be built so that a double track may be laid down at any time. The ordinary railway bridges that carry the road will be built for a single line only, because they can be widened subsequently at slight additional cost. Embankments also can be widened without great trouble. It would not be economical to build them at the present time wide enough to carry a double line when only a single line is required. If the city constructing authority does not require the whole of the spoil from the cuttings, we shall probably consider it safe to use it for widening the adjacent banks in preparation for the time when a double track will be necessary.

18. *To the Chairman.*—No arrangement has been made with the State of New South Wales in regard to the construction of that portion of the line which will run through the Federal Territory; but I do not think it would be wise to ask the State to build that section. It would be possible to carry the railway over the Molonglo River at the 1,441-ft. level, and to temporarily substitute railway grading and level crossings for the proposed sunken track. The total estimated cost of a line to conform to the City design is £433,000. The approximate cost of a railway following the same route, but graded regardless of the City design, and in accordance with ordinary railway requirements, would be £296,000, or £137,000 less. I should like to add that level crossings are being obviated wherever possible in populous centres, because of their menace to public safety.

(Taken at Melbourne.)
MONDAY, 11th FEBRUARY, 1924.

Present:

Mr. Gregory, Chairman;

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Jackson
Senator Reid	Mr. Mathews

John T. Shillington, manager for Victoria of Dalgety's Motor Department, sword and examined.

19. *To the Chairman.*—Prior to occupying my present position I had extensive experience in railways

transportation of goods and passengers. I have been directly associated with the motor transport business for about six months, and I have studied closely this problem in America and England. Given good road surfaces, there is no limit to the distance over which passengers may be conveyed by motor with convenience and profit. It should be possible, provided good roads were available, to carry on such a service between Melbourne and Sydney. From the study of literature on this subject, I learn that American railway authorities are complaining seriously of motor competition over long distances, even up to 1,000 miles. I visited the country between Canberra, Yass, and Queanbeyan some years ago, and I have a fair idea of its nature. Good roads are essential for the successful development of motor traction. From my experience, and from what I know of the country, and in view of the fact that there is already a fairly good road-bed there, I should say that, for an expenditure of about £3,000 per mile, it should be possible to have an excellent road for motor passenger traffic between Yass and Canberra. Reinforced concrete roads are not essential for motor passenger traffic, because the approved type of car is fitted with pneumatic tyres, and is not excessively hard on road surfaces. A reasonably well-made macadamized road, top-dressed with tar, is admirably suited for motor passenger traffic, and I am confident that £3,000 per mile would cover the cost, bearing in mind, as I have already said, that there is already a fairly good road-bed there. The type of car I have in mind is known as the De Luxe Tourer, with a seating capacity of twenty, fitted with pneumatic tyres, electric light, heating, and all the comforts of a high-grade motor car, with a speed of 45 miles per hour. There are one or two already in Australia. I saw one in Sydney, and I understand that the Withers Company, Melbourne, have one similar in type. It has a limousine body, and may be closed in the cold and rough weather, and opened in fine weather, to insure the comfort of passengers. I estimate the cost of these cars at about £3,000. Their operating costs are particularly low. The number necessary for an effective service between Yass and Canberra would depend entirely upon the volume of business. I take it that at the opening of each parliamentary session it would be necessary to move a considerable number of people from Yass to the capital city. If, for instance, there were 200 people, ten cars would be required. The traffic could then be handled expeditiously and satisfactorily. I have not had time to go minutely into the question, as this proposal was brought under my notice only on Saturday last, but it has occurred to me that the convenience of the travelling public would be served if passengers could entrain at Melbourne and Sydney in sleeping-cars which could be disconnected at Yass. The passengers could remain in bed until breakfast time, and then be conveyed direct to the capital in motor vehicles, arriving there at about 10 o'clock. This would obviate all the discomforts of rising at an unearthly hour in the morning to leave the train at Yass. This system is in operation in America and England. It appeals to the travelling public. Suppose 60 members left Sydney on Monday night. What objection would there be to detaching their sleeping-cars at Yass? From a railway point of view there could be no objection whatever, because in all probability other sleeping-cars could be picked up there for the Melbourne run. It would simply mean an exchange of sleeping-cars. As a railway man, I have worked this system, and I know it is a convenient arrangement. I should say that the motor charge for the Yass-Canberra run would not be so heavy as railway fares, and one great advantage would be that the passengers could be landed right at the hotel door and their luggage, forwarded by special luggage conveyance, would be ready for them in their rooms. If they made

the journey to the Capital by train they would then have to engage a taxi to convey them to their hotel, so the suggestion I make is more convenient in every respect. The capital cost of the proposed railway, including equipment, would, according to Mr. Hobler's figures, be very heavy. Roughly it would come out at about £650,000. To some extent, also, Canberra as a railway centre will be isolated. For the effective working of the line there would have to be at least two locomotives at Canberra, and these cost £20,000 each. Given good roads, there is no limit to the number of passengers that may be carried by motor vehicles. The capital cost of a twenty-passenger touring car would be, at the outside, £3,000, and its upkeep would be particularly low. The maintenance of a road for motor traffic would also be much lighter than the maintenance of a railway line. As a matter of fact, the maintenance per mile of railways in Australia averages between £300 and £400 per mile, including overheads. It would be necessary to have garages both at Yass and Canberra, but not in any point in between. There should be no difficulty about arranging for at least two trips per day for each car, so that ten cars, with a seating capacity of twenty passengers, could move them four times per day. That would mean a car mileage of only 160 miles per day per car. In my judgment all the advantages are with motor propelled vehicles for transportation purposes. In Victoria this system is in its developmental stages. Those financially interested are having a hard fight on account of the opposition of certain authorities and prejudiced to any advancement in transportation systems.

20. *To Senator Lynch.*—I studied the transportation problem in America, and I am now keeping in touch with the matter by means of literature on the subject. Motor traffic as a competitor with the railways is just as effective over short as over long distances. Motor carrying services are beating the railways in Australia to-day. The Western Australian Railways Commissioner, in his last annual report, complained of the competition by motor vehicles. In this State the Geelong motor service has been well established, and the passenger service to St. Kilda is so affecting railway figures that the Commissioners have been obliged to institute a five-minute service to hold the business. Generally speaking, motor traffic is cheaper than by railway, pretty well right throughout Australia. Unless the local governing authorities prohibit the use of motor vehicles, they will come into competition with the proposed railway to Canberra, and I am afraid the railway will not earn axle grease. As an old railway man, that is my view. I cannot, at the moment, recall any instance of a railway line having been pulled up again on account of competition by motor vehicles, but I have read of an American street railway, 20 miles in length, being put out of commission by motor buses. Of course, motor fuel is very much cheaper in America than in Australia. In this country the cost is 200 per cent. higher. At present the motor transport system is really in its infancy. With the possibility of revolutionary developments in regard to the production of fuel, it is impossible to put a limit upon its progress, so I suggest that instead of spending a huge sum of money on the proposed railway to Canberra, the Government should be watchful of the happenings in the motor world. The railway authorities in the eastern States are becoming concerned with regard to competition by motor vehicles. There have been guarded references to this problem by the Railways Commissioners in Victoria, and, as nearly every one knows, the Railways Commissioners in New South Wales have imposed all kinds of penalties on motor bus companies with the idea of strangling them, because they are taking business away from the railways in that State. One great advantage of motor transport is that the traveller is not tied down

to a time-table, as is the case when undertaking a railway journey. From what I know of the country between Yass and Canberra, I should say that a modern motor bus could do the run easily in an hour and a half. I do not think a train could do it in that time. Motor cars are beating express trains everywhere, even from Adelaide to Sydney. Goods traffic is also being taken from the railways now. A concrete road would cost about £10,000 per mile, and would carry anything that can be put on rubber wheels, and, as for its life, I do not think any man knows how long it would last. The rate at which motor traffic is expanding is beyond the comprehension of those not directly interested in the industry. If the fuel costs could be cut down by one-half, the possibilities of motor transport in Australia would be quadrupled.

One of the handicaps to its development is the heavy duty on cars, and the duty on petrol. There is also a prejudice in certain quarters, and for obvious reasons, against motor transport. The number of cars necessary for the transport of passengers to and from Yass and Canberra would depend upon the distribution of the traffic. If 200 people had to be picked up at Yass at a certain time and landed in Canberra, we should require ten cars of the type I have mentioned, but if the traffic were spread over the day it could be handled with fewer buses. Generally speaking, ten buses would move 200 people every four hours, and 5-ton baggage wagons would carry the luggage. It would be advisable to have one or two stand-by cars in the event of any mechanical trouble. The same precaution would have to be observed by a railway manager. He would find it necessary to have a spare locomotive for the same reason. A stand-by motor car would not cost nearly as much as a stand-by locomotive, and, moreover, a motor is available for service at any moment, day or night. It may be moved inside of five minutes. I should say that the transportation charges between Yass and Canberra would be less by motor than by railway.

21. *To Mr. Mathews.*—The motor buses in Melbourne are suited for city work, but would be entirely unsuited for the traffic between Yass and Canberra. They are fitted with solid tyres, and their design is not suitable. The type of car I have in mind has pneumatic tyres, and in every respect is as comfortable as a high-grade motor car.

22. *To Senator Reid.*—A surface railway in the city of Canberra would be an objectionable feature, although it may be necessary for the transportation of heavy material which could not be taken into certain areas by any other means. In my opinion the present facilities at Queanbeyan should be ample, and the development of the city should be by motor traction. It is impossible to say what alterations in our transportation system may be made in the near future. A concrete road would cost about £10,000 per mile, but its maintenance cost would be practically nil. Similarly, a railway line of heavy rails and sleepers, and on a concrete foundation, would be light in maintenance costs, but not so light as a concrete road for motor traffic, because, in the case of a railway, all the traffic would be on one set of rails, and the wear and tear would be heavier, whereas, in the case of motor traffic, it would be distributed over a wider road surface. I feel confident that the majority of people will use motors to travel through the Federal Capital Territory. There is the possibility also of business firms in Canberra employing motor lorries for the carriage of their goods. If vehicles fitted with pneumatic tyres are used, there need be no anxiety about the wear and tear of the road surface. Recently there have been certain developments in connexion with the use of balloon tyres, which, I think, will help to solve the problem of road maintenance costs. I see no objection to goods traffic by motor vehicles provided they are fitted with pneumatic tyres.

23. *To the Chairman.*—In the initial stages of the Federal Capital I would recommend development by motor traction, because I believe that nine out of every ten visitors will use the car, and, in any case, even if the railway line were built, it will be necessary to maintain a good road.

24. *To Mr. Mathews.*—If I could get into a sleeping-car and travel by rail direct to Canberra, I would certainly prefer that method of transport to getting up at 4 o'clock in the morning at Yass and completing the journey by motor. But my suggestion is to have the sleeping-cars detached at Yass, allow the passengers to have breakfast there, and complete the journey by motor, arriving at Canberra at, say, 10 o'clock. This would obviate any discomfort.

25. *To Senator Reid.*—The break of gauge at Albury really governs the time of departure of trains from both Melbourne and Sydney. If they leave Melbourne later than 5 o'clock they would reach Albury at an unreasonable hour for the change. Similarly, if they left Sydney any earlier, passengers would have to get out at an unearthly hour at Albury to change into the Victorian train.

The witness withdrew.

Alfred Percy Withers, manager Pioneer Tourist Coaches Proprietary Limited, Melbourne, sworn and examined.

26. *To the Chairman.*—I have been associated with the motor transport industry since 1912, and as manager of my present company for the past eighteen months. There has only been one attempt, so far, to compete definitely with the Victorian Railways, and that is in connexion with the service to Geelong, the owner of which is running to capacity daily and is doing well. We are running our cars over a number of routes daily. I produce for the information of the Committee a sketch of the routes covered by our vehicles. We have a monthly service to Sydney over the Prince's Highway and returning via Albury; a weekly service over the Alps from Omeo to Bright; a weekly service to the Gippsland Lakes; a fortnightly service to the Western District; a service to Mount Gambier in South Australia; frequent services from Melbourne to the Grampians in the spring season; extended tours through Tasmania with cars which we take across the Straits; and daily services to Marysville, Alexandra, Flinders, and Sorrento. Altogether we have fifteen extended tours in Victoria, South Australia, and New South Wales, in addition to the daily services in this State. The last-named are developing very satisfactorily. Originally there was only one motor car running to Flinders and Sorrento. Now there are from ten to fifteen cars employed daily on this route, and numbers of cars are running to Narbethong, Marysville, and similar places. We employ the open char-a-banc type of car, fitted with pneumatic tyres, and with a seating capacity of from fifteen to twenty. I agree with the evidence given by Mr. Shillington as to the type of car that should be used for the proposed Canberra service. Cars fitted with solid tyres are quite out-of-date for passenger traffic. For the last five years our business has been built up on pneumatic tyres. We were making no headway so long as we used solid tyres, and we had then been in business ten years, but since we fitted pneumatic tyres to our vehicles we have gone ahead without a stop. The comfort of the passenger is the principal factor in the development of a motor service. When we were running our solid-tyre vehicles on the Middle Park bench, complaints were being made continually by householders about vibration caused by our cars, but since we have fitted them with pneumatic tyres we have heard of no objections. Our experience is that the majority of people will do anything to avoid travelling by train. The success of our business has

been due to the fact that our patrons have a chance to do an entire holiday by motor. We usually start about 9 o'clock each morning, so our travellers are not inconvenienced by early rising. Mr. Shillington mentioned that ten vehicles could transport 200 people from Yass to Canberra, assuming they all wanted to travel at the same time. If, however, twenty of those people wanted to leave at different times during the day they could do so, because they could be accommodated in one car, without adding to the transportation cost. This could not possibly happen with a railway service. They would all have to travel at a stated time. Motor traffic can beat the railways. In the Geelong service which I have mentioned, the motor fare is 7s. each way, compared with a railway fare of 8s. 7d. first class. We estimate that a 10s. return fare from a guaranteed full load for the run to Geelong will show a profit, and as the owner of the Geelong service gets 1s., for what is practically a guaranteed full load—because he is running to capacity every day—it follows that he is doing very much better than was anticipated. For the maintenance of roads we pay the ordinary taxation charges, £4 4s. per annum for small-powered engines, and £5 6s. per annum for high-powered engines.

27. *To Senator Lynch.*—I have read recently of long stretches of railway lines having been pulled up in America to make way for free road vehicles, but I cannot give the direct reference except in regard to one section, namely, the Youngtown to Warren tramline—a distance of 11 miles. The motor bus company did such good business that the tramway authorities decided to put on their own motor coaches, using the type described by Mr. Shillington as suitable for the Yass-Canberra run, and although they charged double the fare charged for the tram ride, the latest figures showed that the motors were absolutely taking away the whole of the business from the trams. Our intention is to include the Federal Capital in our circuit. At present we pass through Yass, but we propose shortly to make a break there and run our tourists down to Canberra and back in a day. All classes of people patronize our services, but we draw the bulk of our support from the middle classes. Many of our services are along definite railway routes, but we arrange for deviations. The traffic by our vehicles to Sydney is increasing. We make a luggage allowance of 28 lbs. per passenger. Our smaller cars will run up to 55 miles an hour, and the twenty-passenger cars are capable of a speed of 45 miles per hour on level open roads. The number of cars to handle the traffic between Yass and Canberra would depend upon whether all the people wanted to travel at the same time. The road from Melbourne to Sydney is, on the whole, bad, but it is better on the New South Wales side. Macadamized roads with tarred surfaces would be quite good enough for motor passenger traffic. The motor industry is expanding at a very rapid rate, and, generally, is very prosperous. We are continually coming into closer competition with the railways. At present the industry is handicapped by the import duties. The increased cost of cars due to import duties means that we have to write off a larger sum each year for depreciation. We are also handicapped in our business owing to the attitude of the Government Tourist Bureau. As we are in opposition to the railways, and, unfortunately, the Government Tourist Bureau is a branch of the Railway Department, the officials of the Bureau will do anything rather than assist us. They go so far as to refuse to allow us to put out pamphlets on the Tourist Bureau inquiry counter. I thought that the Tourist Bureau was for the benefit of tourists, not for the railways alone.

28. *To Senator Reid.*—For commercial cars the cost of fuel represents about one-fifth of the running charges. If fuel prices could be reduced by one-half the running costs of motor transport would be reduced from one-tenth to one-eighth per mile. In the case of privately-owned cars the cost would come down by 25 per cent. We take nine days on the run to Sydney and six days for the return journey. Our purpose is not to make speed, but to give our patrons a pleasant holiday. It is hard to say what would be the upkeep of cars running between Canberra and Yass. This would depend upon the condition of the road. A good road cuts the maintenance bill by 80 per cent. The vehicles mentioned by Mr. Shillington and our cars are undoubtedly heavy, and they require good roads. A bad road would soon go to pieces, but very little damage would be done by a motor vehicle with pneumatic tyres to a well-made macadamized road with a tarred surface.

29. *To the Chairman.*—Wood alcohol has been proved suitable for motor traction, but I understand that its use is discouraged for fear that the revenue would suffer.

30. *To Senator Reid.*—Motor spirit costs 8d. per gallon in the United States of America, and 2s. 2d. in Australia.

31. *To Senator Lynch.*—With the type of car we are using our business is influenced by the weather, but, using the limousine type suggested by Mr. Shillington for the Yass-Canberra traffic, the weather would have no effect whatever. The comfort of passengers could be insured in all weathers.

32. *To the Chairman.*—If the traffic between Canberra and Yass were handled by motor vehicles, these could also be employed when not required for the Yass-Canberra run, in conveying visitors over the Federal Capital Territory to the various points of interest. But there would be a certain amount of business every day to and from Sydney, so smaller vehicles could be made available for other tours. The cars would certainly not be idle.

33. *To Senator Lynch.*—The run between Sydney and Canberra could be made in a day, and from Melbourne to Canberra, the roads not being so good, in a day and a half. Given a good road, we could do the trip from Melbourne in a day.

(Taken at Melbourne.)

WEDNESDAY, 13TH FEBRUARY, 1924.

Present:

Mr. Gregson, Chairman;

Senator Barnes Mr. Cook

Senator Lynch Mr. Jackson

Senator Reid Mr. Mathews

Mr. Blakeley

George Alexander Hobler, Chief Engineer for Ways and Works, recalled and further examined.

34. *To the Chairman.*—I shall bring under the notice of the Railways Commissioner that the report which he has submitted in connexion with this proposed railway does not contain certain information which must be supplied in accordance with section 59 of the Commonwealth Railways Act. I understand that the information specifically desired in greater detail is embodied in paragraph (c) of sub-section (1) of section 59 of the Act, which reads, "The estimated working expenses of the railway, including traffic, locomotives, and maintenance charges." Definite information is also desired, I understand, in connexion with paragraphs (f), (g), and (h) of the same section, which read, "(f) The probable revenue which would be derived from the traffic on the railway"; "(g) any other special advantages which are likely to accrue to the Department generally from the construction of the railway"; and "(h) a general statement of the primary and other industries, and the possibilities thereof, of the districts served by the proposed railway." You

have so far as to refuse to allow us to put out pamphlets on the Tourist Bureau inquiry counter. I thought that the Tourist Bureau was for the benefit of tourists, not for the railways alone.

have also directed my attention to the indefinite nature of the information given concerning a working agreement with the New South Wales Government regarding the running rights over the railway. I understand it will be essential that an agreement should be entered into between the Commonwealth and the Government of New South Wales, stating what the running rights will be, and that you think it essential that that should be in the hands of the Committee before its report is submitted to Parliament. I shall endeavour to obtain the estimated cost of constructing a railway which would give through transit from Yass to Queanbeyan on a 4-ft. 8½-in. gauge, after allowing for the construction of a bridge over the Molonglo on a permanent level, under the conditions desired by the Advisory Committee and the Minister, but providing a line at a lower cost. That estimate, I understand, would ignore the request of the Advisory Committee that there should be no level crossings. I think it could be arranged to carry the line to the 1,841-ft. level from the present route.

35. To Mr. Cook.—I believe that a railway could be constructed to meet the requirements for many years at a considerably lower cost than that suggested. A line which would be capable of carrying passengers and goods to and from Canberra could be constructed, but I am not in a position to say how many years such a line would be of service, as everything depends upon the policy of the Government in developing the Federal Capital.

36. To the Chairman.—In connexion with the bridge itself, I am afraid I cannot give the Committee any definite information at present in regard to the class of construction. When it is decided to construct a line, the working plans of the bridge will be prepared. In these circumstances, the Committee will not have an opportunity of examining the plans, or have any opportunity of expressing an opinion in regard to the type of the bridge, which it will take some months to design. The general type of structure we have in mind is one consisting of latticed girders on cast-iron cylinders or concrete piers. So far as the Commissioner is concerned, attention has been given solely to the question of constructing a railway bridge, and no provision has been made for providing facilities for vehicular or pedestrian traffic to use it. Although it may be worth considering whether it would not be wise to have a platform for pedestrian traffic, it must be remembered that such additional work would add considerably to the cost. I am doubtful if such an addition would be of much utility at present. There is a bridge not

very far down the river from the proposed site which will carry all the traffic that is likely to cross the river for some time to come. So far as I am conversant with the progress of the construction of the Capital, I understand that there will not be a road for many years leading across the river at the railway crossing.

37. To Mr. Mathews.—The detour of the line is rendered necessary by the contour of the country, and the route selected is about the best that can be obtained over a 1 in 60 grade. The grade and curvature practically compel us to take the line over the mountain on the plan. When the bridge is crossed, following the present proposed route, deep cuttings will be necessary. It would be possible to divert the line and reduce the cuttings and other earthworks; but that would take the route away from that asked for by the Advisory Committee. Your Committee has, I think, plans showing the various routes which have been suggested. Up to the present, motor transport has not affected our railway system, and it is difficult to say whether such a means of transport would affect the traffic on the proposed railway. Motor transport, at present, is attracting a good deal of attention, both in the matter of feeding existing railway lines, and also in dispensing with the necessity of the extension of existing lines. I think it will be readily admitted that motor transport will be utilized for extending services and developing country which could not be developed owing to the cost involved in extending existing lines. So far as I can see, the proposed railway, if constructed, will not be expected to develop a large tract of country, but is being built principally to serve the Federal Capital. It is largely a question of the extent to which the Government intend to develop the Federal Capital. If there were a good road alongside the railway, possibly we would have to contend with competition from motor vehicles; but it must be remembered that a good deal of the traffic to Canberra will be long-distance traffic. The Federal Capital will attract tourists, who will go from Sydney and Melbourne particularly; and travellers of this type would, I think, prefer to travel the whole distance by rail. In the case of the Federal Capital line, the question of motor transport cannot be compared with one where now country is to be developed.

38. To Mr. Blakely.—In response to a request submitted on a previous occasion, I now submit, for the information of the Committee, a statement showing the number of persons killed and injured at level crossings on various railway systems throughout Australia. The statement is as follows:

Period	Commonwealth		Western Australia		South Australia		Victoria		Tasmania		New South Wales		Queensland		Totals		
	K.	I.	K.	I.	K.	I.	K.	I.	K.	I.	K.	I.	K.	I.	K.	I.	
Year ended—																	
30.6.22	2	3	2	12	12	12	2	1	3	3	3	5	24	36	
30.6.23	6	4	5	20	11	11	..	1	3	9	3	3	28	45	
Totals 2 years	8	7	7	32	23	23	2	2	6	12	6	8	62	84	
Totals 10 years ended	41	48	42	125	89	132	5	22	*	*	*	*	177	427	
30.6.23..															

Note.—No detailed statistics available for New South Wales or Queensland prior to year ended 30.6.22.

K. signifies killed; I. signifies injured.

In the first place, I was unable to obtain this information for more than ten years back, and in the case of New South Wales and Queensland, we have a return for ten years ended 30th June, 1923. Information was also desired concerning the quantity of material to be removed from the cuttings, and that required for embankments. The quantity to be removed from cuttings is estimated at approximately 530,000 cubic yards, the cost of which has been set down at 4s. 6d.

New South Wales and Queensland, we have a return for ten years ended 30th June, 1923. Information was also desired concerning the quantity of material to get it for eight years prior to the 30th June, 1923. We have details, however, for the whole of the States for two years, namely, those ending 30th June, 1922, and 30th June, 1923. For all the States excepting

per cubic yard. The quantity in connexion with side cuttings is estimated at 70,000 cubic yards, the estimated cost of which will be 2s. 6d. per cubic yard. For side ditches, it is estimated that 12,000 cubic yards will have to be removed, at a cost of 2s. 6d. per cubic yard.

The quantity of spoil is estimated at 356,000 cubic yards, which is the quantity over and above that required for embankments. Some of this material, however, may probably be required by the constructing authorities at the Federal Capital; but so far as the railway is concerned, we have to regard it as spoil.

Mr. Jackson asked, on a previous occasion, the average cost per mile of the proposed line. Within the Federal Capital, the cost is estimated at £29,714 per mile for 7 miles; and outside the city area, £13,963 per mile for 9½ miles. Those two mileages make up the total.

I am unable to explain why it should cost £13,963 per mile to the border of the Federal Territory, and only £8,000 per mile from Yass to the Federal Territory, as I am not conversant with the details of how the amount of £8,000 per mile is made up. I have been over the country; but without having a plan or taking out the quantities, I could not give the information.

From the border into Yass there is, however, a large stretch of easier country from a railway construction point of view, which would enable the cost per mile to be reduced. When I stated that tourists from Melbourne and Sydney would visit the Capital, I was well aware that possibly many tourists from Sydney would not use the proposed railway, but I had in mind the fact that some would come one way and return the other. I do not consider it a serious drawback for train travellers to have to travel 2 miles by car, and I am of the opinion that long-distance travellers particularly would use the train from Yass to Canberra instead of motor transport, if it were available.

39. To Senator Lynch.—When the permanent survey is completed, through the city area especially, we will then have the exact quantities of earthworks and other details in connexion with the construction of the line. We should then be able to give an approximate estimate of the cost. I think we can reasonably say that it should be constructed within a margin of 10 per cent. either way. As the construction of the Capital proceeds, as well as the building of the railway, certain works may be necessary which at present cannot be foreseen. Regarding the other type of railway, which works out at a reduction of £137,000 on the estimate made in conformity with the Advisory Committee's plan, I may explain that the reduction could be made owing to a difference in the grades. It would not affect the Molonglo bridge, nor the bridges outside the Capital City site. It would eliminate the cost of about nine other bridges which would otherwise have to be provided if the line were sunk to the levels desired by the Advisory Committee. Concerning the Chairman's suggestion for a further estimate by the Railways Commissioner of a railway of a cheaper pattern, I understand the Chairman to ask for an estimate of a line that would be practically on the same grade allowed for on that part of the line from the Molonglo River to the Civic Centre, with the addition that it is desired by the Committee to still further reduce the estimate by using the existing line right up to the present Canberra railway station, and eliminating that portion of the proposed route which runs through Eastlake Avenue to the starting point of the proposed line. The grading, under the reduced estimate, would be the same as has been proposed from the Molonglo bridge to the Civic Centre, which is the part affected. From the Civic Centre on to the border the cost could not be reduced. From where the line leaves the Federal Capital city area, at about 207 miles to the boundary of the Federal Territory, the estimate will remain. A reduction could only be effected on that portion of the line within the city area.

(Taken at Canberra.)

FRIDAY, 15TH FEBRUARY, 1924.

Present

MR. GREGORY, Chairman;
Senator Barnes | Mr. Blakely
Senator Lynch | Mr. Cook
Senator Reid | Mr. Jackson.

George Alexander Hobler, Chief Engineer for Way and Works, Commonwealth Railways, recalled and further examined.

40. To the Chairman.—If I were asked to construct a railway from Yass to Queanbeyan, without considering the design for the Federal Capital, and viewing the subject purely from a railway point of view, I would design the railway to save as much earthwork as possible. I should use the existing line up to the railway station, and I would then follow the proposed permanent route across the Molonglo River. I would make the crossing of the Molonglo permanent. I would then follow the existing line to the end of it. From there I would build the line as an ordinary railway to the Territory boundary.

41. To Mr. Blakely.—I would probably get enough spoil for the embankment from the cutting at the end of the bridge. I might make an extra width of cutting close to the bridge. I would build the bridge first and bring the spoil back over it.

42. To the Chairman.—The present railway from Queanbeyan to the Power House is above flood level except at the crossing of the creek. The lowest level of the rails will be at the Civic Centre. If the present railway is allowed to remain the whole of the line will be above flood level, except where it crosses the Jerrabomberra Creek. It would be possible to join up with the existing line and provide for a level of 1,841 feet above sea level, without getting a grade steeper than 1 in 60. We would cut into the hill at the level of 1,842 feet, which is well above flood level. The present station is approximately 1,850 feet above sea level. There is good material in the district for making concrete. I would not care to say, at the present juncture whether it would be best to use reinforced concrete or cast iron for the standards of the bridges. I have still an open mind on that matter. We are using concrete in culverts. It is cheaper to use concrete piers and steel girders than concrete girders. We know the depth of the rock both in the river and the creek. Speaking from memory, it will be necessary to go about 20 feet below the bed of the creek to get a seating for piers. The rock section across the Molonglo runs fairly level. On both banks we shall have to go down to the same level as in the stream. The ruling grade of the existing line is 1 in 50. That grade would be satisfactory if we allowed the existing line to act as part of the proposed line for the time being. The present line is already laid for about a mile beyond the proposed station site. If that railway is retained I approve of the suggestion to straighten the curve. From a purely railway point of view I have no objection to using the existing line as portion of the new line, subject to the straightening suggested. Without taking into consideration the work which is going on at Canberra, I would be quite satisfied to use the existing line for the time being. When the plans were being drawn for the excavation at the Civic Centre station site we would confer with the constructing authorities of the capital regarding the amount of passenger accommodation required, and the station would be made accordingly. In preparing our estimate we have allowed for a double track at the station site, and for about 25 to 30 chains of extra excavation. We have made no provision for a goods shed, which it is considered should be situated further along the line. I would not approve of a low-level goods shed

at the Civic Centre station site. If the line is sunk 20 feet, it will be difficult and expensive to make approach to a goods shed at the station. It would be better to place the goods shed on the surface of the ground. It is always objectionable in railway work to place goods sheds in cuttings. I would not say that a goods shed 2 miles farther north would be more suitable, but as it is proposed to sink the line at the Civic Centre for the sake of the artistic appearance of the Capital, it would be quite inconsistent to place a goods shed in the middle of the principal station. Its presence there would necessitate extra sidings. For goods sheds, passenger traffic, one siding, I would need about 3½ chains in width on one side of the line. From the point of view of excavating, the ground at the Civic Centre is fairly good for an average depth of 5 feet, 12 feet to 14 feet. Schist, which is harder ground, is then encountered, but it is less expensive to remove than rock. A 20-ft. excavation would extend about 5 or 6 feet into hard material. I have estimated the cost of removal at 4s. 6d. per cubic yard. Personally, I cannot see that to have a station at a higher level would place any insurmountable obstacle in the way of the settlement of the Civic Centre, but I am inclined to defer to the opinion of this Advisory Committee, and to do what can be done to sink the line at the Civic Centre in conformity with the design of the city. I do not hold similar views regarding other parts of the line for the time being. I would adhere to the low-level grading until I was well clear of the proposed station site. I would then steepen the grade upwards, and come to the surface as soon as possible without exceeding the ruling grade for the rest of the line. I would need to make some investigation before stating how much could be saved by using the present line and erecting permanent bridges. There is no disadvantage in having a ruling grade of 1 in 66 on such a line. It is a very good grade for railway purposes. It is not necessary to go to the expense of constructing a grade of 1 in 100, 1 in 200, or 1 in 500, when other parts of the line have a ruling grade of 1 in 66. We would not follow practice like that in ordinary railway construction work. The New South Wales Government, in building its section of the line, will, no doubt, make the ruling grade the same as that on the Commonwealth section of the line. I would not entertain a proposal for a ruling grade of 1 in 200. It would involve the Government in a much unnecessary expenditure. A grade of 1 in 66 will reduce the cost of excavation as compared with a flatter grade. Such a grade will be sufficiently economical, considering the grades of the railways adjacent to the Federal Territory. Trains coming to or travelling from the Territory will have to pass over State lines with similar grades. It would therefore be uneconomical to build our lines to a flatter grade than the other lines. If the city should grow to such an extent that a large suburban passenger traffic develops, it might then be profitable to make the grades flatter. The area of land that it will be necessary to resume for railway purposes has not yet been decided upon. As soon as definite proposal has been obtained for the construction of the final drawings for the station yards, &c., will then be made, and will then decide the width of land required and arrange with the construction authority of the city for it to be handed over to us. Along the permanent survey which has been made outside the city boundary we have marked off an average width of 3½ chains. Arrangements have been made with the Surveyor-General's Department to have that reservation shown on our plans as the land we shall require, with one or two reservations for station yards, notably at Hall. I have not considered the ultimate possibility of the line in the city being operated by electricity. The possibility of ultimate conversion to electric traction would make no difference to my present proposal. No arrangement has been made with the New South Wales Government regarding the operation

of the railway. Negotiations in that connexion would be carried on by the Commonwealth Railway Commissioner. Such an agreement might be made before the railway is constructed. As soon as it is decided to build the railway I assume that the Railway Commissioner will enter into negotiations with the State Government with a view to making an agreement for the operation of the line.

43. To Mr. Jackson.—The Railway Department would place the station where the city construction authorities say it is required.

44. To Mr. Blaikley.—I could work out the difference between the cost of the present scheme and a scheme in which the rock-cutting is omitted, and the line comes out as near to the station as possible. I would be strongly in favour of using the existing line, and the only reason why I suggest a departure is that side-cutting would be required for the bank over the Molonglo. I cannot use material taken from the flat; it is too silty, sandy, and unstable. It would, moreover, be unwise to disturb the surface of the flat because the water would then be more scurvy, and serious trouble might result. That is one reason why I would like the line to go through East Lake centre. In following the Advisory Committee's wish, and coming round East Lake centre I may be able to reduce the earthwork by using more surface grades, but going deep under East Lake centre to provide an over bridge, there would be a crossing on the Canberra side of East Lake. I propose not to consider the necessity for an overhead bridge there, but to have a surface crossing if necessary. That would enable me to get enough earthwork for the crossing of the Molonglo River. I might be able to reduce the earthwork by a few thousand yards. I can provide the Committee with a statement showing the least possible amount of earthwork required if the railway is provided with an over-bridge at East Lake-avenue, but without considering the necessity for bridges farther along the line.

45. To Senator Lynch.—Instead of adhering to the existing line, I would be satisfied to build that portion of the line which is asked for from the point of divergence on present Queanbeyan railway through East Lake, so as to give the side-cutting required for the bank. If side-cutting has to be taken out it might as well be removed from the place from which it will have to be excavated in the construction of the final line. The proposed line is clear of flood, except at the crossing of the Jerrabomberra Creek. The flood there is only a local creek flood. The line is above the level of the river flood. It must be built above river flood level. If the earth were taken from the site of the east basin it would have to be moved across the river. Earth from the bed of the creek would be very bad material to use in the construction of a bank which will have to withstand the very heavy rush of flood water. I would have preferred to have used the existing line temporarily, but must get side-cutting for the bank. That being so, it may as well be taken from portion of the line proposed to be built. To use the material from the big rock cutting a bridge would have to be built to get it over the river. This would delay the construction of the line by about nine months. The Advisory Committee desires to put a station at East Lake to serve that portion of the town. It would not be profitable to make a temporary bridge over the Jerrabomberra Creek. If it is possible to do so I would have recommended the temporary restoration of the river which was washed away to get material for the river. Whatever we do we must go down to rock with the foundations. The Molonglo bridge level will not lend itself to the construction of an upper lake. The railway bank would have to be raised another 15 or 20 feet to make a lake on the upper side, and then the bridge would be in use. In adopting the present level for the bridge as a permanent structure it is assumed that the Advisory Committee has abandoned the idea of an upper lake. The adoption of the 1,843-ft. level will determine future

policy in regard to lakes unless at some future date the expense is incurred of raising the bank and the bridge. If earth were not used from the site of East Lake we would have to incur an expenditure of several thousand pounds to protect the upper part of the bank with stone-ground pitching.

14. To the Chairman.—The ground in the river bed is all slate. We might dig out the material and go to great expense to sheath the bank with stone, and then time might come when the final line through the city would have to be built. We would then have to excavate the material at East Lake and throw it away. There would be ample material for the bank and it would reduce the amount required to the least possible. I would not recommend any inadequate provision for crossing the river.

47. *To Senator Lynch.*—The existing line from the point of the proposed deviation to the approach to the Molonglo River would serve the purposes of the city without the necessity for constructing the circular deviation, which involves so much heavy work, but side-cutting must be provided for crossing the Molonglo River. The best place to get that side-cutting is at East Lake centre, and the taking of it out performs an operation which is required in the future development of the city.

48. *To Mr. Cook.*—The location of the underground station does not concern the Railway Department. It was decided by the designers of the Capital. A temporary station could be built, but whether that would be wise I am not prepared to say. I would not, however, consider an expensive undertaking to

48. *To Mr. Cook.*—The estimated cost of £42,000 per mile is approximate. It may vary a few thousand pounds one way or the other. The estimate is as accurate as possible on the information at present available. I would build the line at the Civic Centre to meet the wishes of the Advisory Committee. There is practically no difference between bridging the Molonglo River at right angles and diagonally. The same length of bridge would be required in either case. If the bridge waters remained within the banks of the river it would be a good idea.

would be best at right angles, and it could then be shorter. The difficulty is that when the flood water gets over the banks of the river the main current does not run in the direction of the channel, but straight down the flat. There are two currents, one diagonal across the bridge, when the water is over the bridge, and the other at right angles to the bridge, when the flood is over the flats. The bridge spans will be made as long as possible, so as to give ample room for the flood water to pass through. There are two estimates before the Committee, one showing a very considerable reduction on the other. One is for £293,000, and that other for £433,000. The smaller one represents the cost of constructing the railway from a purely railway point of view, without reference to the wishes of the Advisory Committee. I cannot say for how long such a railway would give satisfaction, because I do not know what the policy of the Government is with regard to the building of the Capital. I do not know what the population will be here in fifteen years. The more expensive proposal provides for future development, and nothing done in the early stages would have to be undone later.

49. *To Senator Reid.*—I had nothing to do with the construction of the bank across the Jerrabombera Creek. If the creek were bridged at the level of the present line the difference between that level and the high level bridge over the Molonglo River would be 11 feet. Such a railway might be washed away again in the next flood. I would not advise departing from the 1,841-ft. level. If 80-ft. spans are provided for the bridge across the river, the bottom of the girders will be about 4 feet below the rail level, and there will be about 7 feet of clearance between the bottom of the girders and the 1,830-ft. flood level. There would probably be a similar clearance across the Jerrabombera Creek. The bank could be cut the water and raise the flood level under the bridge slightly higher than 1,830 ft. The clearance will be sufficient to provide for any water rising of the flood level. If the bridge were built at a lower level, a greater length would have to be allowed. There is no backwater in the Jerrabombera Creek.

Crook, which, in times of flood, has a very swift current. I would not consider any proposal that did not provide for raising the bank to a safe level. We cannot afford to trifle with the heavy floods that occur in the river. There is plenty of evidence in the existing line of the danger of playing with a river crossing. There is not time, if the railway is required in two years, to bring material from the cutting on the north side of the Molonglo River for building up the bank on the flat. If I were building the line as an ordinary railway I would not think of sinking it under the ground. If it must conform to the design of the city there is no other alternative but to sink it under the ground. As far as the Railway Department is concerned the whole of the line and the station could be placed above ground. The Department can build the line on the surface or sink it as required. I cannot give an opinion on the advisability of sinking the railway now or leaving it until a later stage. That is a matter for consideration by those who are building the city.

50. *To Mr. Cook.*—The location of the underground station does not concern the Railway Department. It was decided by the designers of the Capital. A temporary line and a temporary station could be built, but whether that would be wise I am not prepared to say. It would not be a seriously expensive undertaking to sink the station.

51. *To the Chairman.*—If the line was a purely railway proposition, without reference to the Federal Capital, it would not cross the river where it does. I reported against that crossing several years ago. I wanted to bring the railway more into the city and cross on the opposite side of Circular Lake. I do not think the plan for a railway round Circular Lake has been examined in connexion with the present proposal. I understand that that proposal was rejected at the time it was made. Since then I have not been asked to suggest a route, but to report on a particular route.

52. To Senator Lynch.—If the proposal to use the existing line be adopted the bridge across the Molonglo River will be a permanent part of the line. I would leave the level of the existing line as it is. It is above flood level.

53. *To the Chairman.*—The length of the existing line is $8\frac{1}{2}$ miles.

(Taken at Canberra)

MONDAY, 18TH FEBRUARY, 1924

Present

Mr. GREGORY, Chairman;
Senator Barnes | Mr. Blakeley
Senator Lynch | Mr. Cook
Senator Reid | Mr. Jackson.

Percy Thomas Owen, Director-General of Works,
Canberra, sworn and examined

54. To the Chairman.—The Advisory Committee made a suggestion to the Commonwealth Railway Commissioner regarding the route of the railway, and approximately that route was adopted. The Committee is working under definite and decisive instructions from the Government regarding the lay-out of the city, and these instructions do not leave any choice to the Committee, but to adopt the route shown. Although the Committee informally discussed other possibilities, it felt constrained to agree to the route shown on the plan. I cannot say that the Advisory Committee is opposed to the proposal, but it has not recorded any opinions on the subject. To deviate from the proposed route would entail radical departures from the plan adopted for the city. What reservation of land for other railways may be required at some future date has not been considered by the Committee, although it is a subject to which I gave a good deal of

thought many years ago. A railway from East Lake in a westerly direction, thence northerly and back to the main line from the city, so as to provide a circular system, would necessarily be largely through tunnels. A suggestion for making the necessary reservations could do no harm. The position is obscured to some extent by the fact that the lay-out of the city has been determined upon. If the railway location in the city is disturbed there may be far-reaching consequences. Present indications are that the road motor vehicle will become an important collecting and distributing medium in the future, but I would not care to advise the Public Works Committee to recommend to Parliament that trams and motor cars should be used instead of railways to serve the needs of Canberra. The suggested reservation would be useful for meeting any possible future outlays on of suburban traffic. In almost all large towns it is obvious that the railway needs of the present time have not been reasonably anticipated. In the course of time there may be a circular underground tube in Canberra. One of the functions of that tube would be to pick up traffic closer to Parliament House than the proposed railway station. The most important activity at Canberra will be the function of government, and it is possible that a tube could pick up close to Parliament House and develop the city to the west of the Molonglo River, through the easier country lying to the north west of Capitol Hill. The Advisory Committee has not considered or come to any conclusion regarding the proximity of the railway to Parliament House. It has been bound by the plan of the lay-out of the city. I have not given serious consideration to this matter for many years. I believe that an undertaking has been given by the New South Wales Government that when the Commonwealth Government has built the line as far as the Territory boundary, the New South Wales Government will immediately continue the line to connect with the main line at Yass. I have had no conversations or correspondence with the New South Wales Railway Department on this matter. The negotiations have been carried on by the Government or the Commonwealth Railways Commissioner. I do not know of any negotiations that have taken place. I have heard that assurances have been given that not only will the New South Wales Government construct the railway, but that it is anxious to do so. That statement, however, is based only on hearsay. It is a question that should be taken up at once. It has never come within the scope of my work as Director-General of Works. It is a departmental responsibility of the Railway Department. I am afraid that if the Advisory Committee butted in and negotiated with the New South Wales Railways Commissioners it would be taken to task. In its first report the Committee suggested that the making of the railway from Civic Centre to Hall should be deferred until a later stage. The Committee was asked by the Government to what would be the least possible time required for construction and the lowest cost of construction compatible with Parliament meeting here. Among the items considered in that connexion was the railway. At that time the tramway, as it has been called, across the Molonglo River, communicating with Civic Centre and the Committee thought fit that it would be compatible for Parliament to sit at Canberra without any further connexion being made to Civic Centre. It was recognised that some inconvenience would be caused to members of Parliament and the public, but it was thought that the expenditure on the new line could be postponed for a long time. The Committee, therefore, did not propose any expenditure on the existing line as far as the Civic Centre. As it is on a high level we thought we would leave it there and build a temporary station to the north of the proposed future station at Ainslie avenue. The Committee indicated in its report that the cost would be about £85,000, which would be sufficient to provide for a railway to Hall and for yard extensions. The Molonglo River was crossed by a

bridge at that time. There were two bridges over the river; one, which is in a fairly shaky condition, carried road traffic, and the other was the railway bridge. The Committee apprehended that something might go wrong with the road bridge, and proposed to construct a bridge on the line of Federal-avenue, so as not to put up another bridge alongside the one on Commonwealth-avenue. Plans were prepared, and the flood came and took all the life out of the Commonwealth-avenue bridge. The Committee then abandoned the idea of a bridge on Federal-avenue, and decided to advise the Government to construct a bridge at a safe level over Commonwealth-avenue. Railway communication having been destroyed between East Lake and Civic Centre, the Committee advised the Government to restore it, and, in restoring it, to put the bridge above flood level. Subsequently, consideration was given to the rest of the route from the Civic Centre. The Committee thought that while railway construction was in progress the track level at Ainslie-avenue should be lowered, and the line regraded to avoid level crossings at other points on the route. There is no doubt that the dominating consideration was to avoid the level crossing at Ainslie-avenue. There will be a fair amount of passenger traffic from the intervening country between Yass and Canberra. Why there should be freight traffic except for Canberra I cannot imagine. The passenger traffic will be considerable. Mr. Scrivener, late Director of Lands and Surveys, proposed some years ago, in order to avoid the bad length of railway between Queanbeyan and Goulburn, to construct another line between Canberra and Bungendore. Surveys were made. I was opposed to the idea on the ground that its adoption would have meant the expenditure of a large sum of money, and that we could put up with the Goulburn route for a while. There was also the possibility of the Goulburn route being improved. I saw Mr. Fraser, Engineer-in-Chief of existing lines in New South Wales, and asked him what could be done to improve the gradients and curves on the line. He told me that it was a difficult piece of country, and that it would be very expensive to do anything. His Department had examined it and did not see what could be done. Canberra, unless it be connected by railway with Yass, will be handicapped by that bad length of track. A train travelling over it rocks badly. Beyond Bungendore it is hardly possible to stand up in a train. The people of Canberra, apart from members of Parliament, will take the alternative route via Yass. There is very little difference in the distance, and when the Yass line is built almost all the traffic will go that way. I cannot say what amount of freight traffic will be offering. Freight for Canberra will be heavy for some years. There is a possibility that with the bad gradients and bad curves on the line to Queanbeyan a lot of our freight from Sydney will come through Yass. I cannot see that there will be much freight from the South. Coal is our heaviest item at present. Large quantities of building materials will be required for several years. Much of the timber used may come from the South. The proposed railway will lend itself to a connexion with Jervis Bay. The take-off from the Goulburn-Queanbeyan line would be somewhere near Bungendore. The establishment of a capital port at Jervis Bay is very important. I have never allowed the port question to be a factor in my mind. I am not sanguine about making that railway a payable proposition. The country between Canberra and Yass will grow sheep, and may grow wheat, but I would not regard it as a valuable tract of country from a railway point of view. In estimating the future population of Canberra, the Advisory Committee did not take into consideration any possible large influx of people who might come here for residential or health reasons. It arrived at the conclusion that at the end of the first stage of development there would be 6,000 people here. That was computed on the basis of a movement of 1,000 civil servants. It was estimated that by the time all the civil servants to be moved had been moved, the

population would be 18,000. That will be at least three years after Parliament first meets here, or eight years from now, allowing a wide margin for eventualities. After that the city will be continually growing. The main source of growth, namely, the introduction of the central administration of the function of government, would then be exhausted, but the city would have attributes which would attract some people, although it is difficult to say how many. My view is that the city will grow quickly. The fact that it will be the seat of the Government of Australia, that it is a beautiful place, that it has a good climate, and that New South Wales has not many such places except the Blue Mountains and the South Coast, will induce many people to reside here. The Advisory Committee, however, did not rely upon that factor in making its forecasts. I am told that I am an optimist, but no one has thought more about the future of Canberra than I, and I do not consider that I am optimistic. The Advisory Committee believes that when the seat of Government is established here Parliament will insist upon the railway, no matter who says it is unnecessary. The railway will not need a double track for a very long time. Portion of the track between C. & G. Centre and the southern end of the town may be doubled in the course of thirty or forty years. My personal desire is for a single track. One reason for the suggested deviation towards Lake View circle is that we require the spoil for the Causeway. Another reason is that we have a railway which is not in conformity with the city plan, and it was thought that it would be an advantage to make it conform to that plan as soon as was reasonably possible. The present track is low-lying, and when the Jerrabomberra Creek is flooded it is submerged. I am not sure whether that submergence has been due in the past to the small water-way left in the bridge. With an improved water-way submergence might be avoided. The bridges should be well above flood level, and should be permanent structures. A track level of 1,841 feet above sea level would allow for carrying out an ornamental lake scheme in the future without interfering with the railway or bridges. The Advisory Committee has not considered or discussed the question of the construction of ornamental lakes. The bridges will have single tracks. Doubling the track would mean nearly doubling the immediate expenditure. If the single track remains for thirty or forty years before being duplicated a heavy interest charge will be avoided. The bridge over Commonwealth-avenue is 1,830 feet above sea level. That bridge will take flood discharge, but will not admit of ornamental lakes. Mr. Griffin's proposal was for a height of 1,850 feet. Such a bridge would have been a tremendous undertaking. If the bridge lasts for fifteen years it would then only be necessary to remove the greater joists and tynes. The Committee deliberated upon the matter for several days, and decided that on economical and artistic grounds it could not recommend the construction of a bridge at a height which would be architecturally correct for the lake scheme. We erected scaffolding at what would have been the height of the bridge supposing the ornamental water was there. It was 25 feet higher than the present bank. It was preposterous. The future bridge will not be in exactly the same location. Our bridge is at the northern abutment of Mr. Griffin's future bridge. The Committee decided that all that was necessary at present was a bridge for the flood discharge. The 1,830 feet level would not do for the railway bridge over the Molonglo River. The bridge over Commonwealth-avenue provides for a 20 feet roadway and two 5 feet footways. It is more than a temporary bridge, and will last probably for thirty to fifty years, or until the ornamental lakes are formed. To make a bank 25 feet higher than the present bank would be an inducement to proceed immediately with the construction of the ornamental lakes. The bank would be so hideous as to constrain the Government to make dams for the lakes. The impounding dams above

Queanbeyan would cost £250,000, and the dam at Yarralumla would cost £200,000. The Committee deferred decisively from Mr. Griffin in his view that the dam above Queanbeyan would not be necessary. With a series of gates the level might be lowered five feet, bringing it down to 1,820 feet. The river slope above the Molonglo bridge is such that with or without locks the 1,841 feet level should be adopted for the tracks over the Molonglo. There is a timber bridge over a billabong. During floods there is a heavy discharge across the flats, and it becomes cumulative. Piles have been driven down to a hard foundation, and we do not anticipate any trouble. Not to have put the bridge there would have thrown the whole discharge into the Molonglo. The length of the embankment is approximately 1,900 feet, including the billabong bridge, which is roughly 430 feet long. It is 72 feet wide at the base, and has a slope on the sides of 1 in 1½. The upper side will be beached near both bridges. We should not need very high or very long beeching. We should use fairly heavy stone. The earthwork cost 2s. 9d. per cubic yard. The spoil was brought an average distance of about 1,000 feet. The removal of it will not appreciably assist the formation of the future lake. It will be a help in the river channel. To raise the embankment from the 292 mile-point to where it meets the bridge over the Molonglo River we would use the hard red material for spoil. The silt from the river flats washed away almost like sugar. The road bridge is a different proposition from the railway bridge. With such floods as are experienced it would not be safe practice to use silt for the railway embankment. If the lower bridge should wash away traffic would be dislocated, but it would not be so serious as would the washing away of the railway bridge. The road bridge could be quickly restored, and people would be able to get across as soon as the flood subsided. I strongly oppose using silt for the railway embankment.

55. *To Senator Reid*—Even if the silt were used on the inside, with heavier material on the outside, I doubt whether it would stand the water pressure. There will be flood pressure right along the bank up to the 1,831-ft. level. The red soil is a good proposition for a bank, but I have seen better material.

56. *To the Chairman*—I entirely disagree with Mr. Hill. If he advises that material from the river flat should be used for the embankment. In the construction work I would start from the East Lake end. It would be wise to bring the earth from the cutting towards East Lake. Even then there will be one obstacle here. Mr. Griffin's proposal was for a height of 1,850 feet. Such a bridge would have been a tremendous undertaking. If the bridge lasts for fifteen years it would then only be necessary to remove the greater joists and tynes. The Committee deliberated upon the matter for several days, and decided that on economical and artistic grounds it could not recommend the construction of a bridge at a height which would be architecturally correct for the lake scheme. We erected scaffolding at what would have been the height of the bridge supposing the ornamental water was there. It was 25 feet higher than the present bank. It was preposterous. The

future bridge will not be in exactly the same location. Our bridge is at the northern abutment of Mr. Griffin's future bridge. The Committee decided that all that was necessary at present was a bridge for the flood discharge. The 1,830 feet level would not do for the railway bridge over the Molonglo River. The bridge over Commonwealth-avenue provides for a 20 feet roadway and two 5 feet footways. It is more than a temporary bridge, and will last probably for thirty to fifty years, or until the ornamental lakes are formed. To make a bank 25 feet higher than the present bank would be an inducement to proceed immediately with the construction of the ornamental lakes. The bank would be so hideous as to constrain the Government to make dams for the lakes. The impounding dams above

the upper lake when formed.

57. *To Mr. Cook*—Extra spans in the bridge would relieve the pressure somewhat, but even without a bridge the water rises over the flat. The best way is to build with the span of the bridge recommended. The lower level of gravel may be allowed to remain with a view to seeing what happens. Mr. Noble Anderson suggested retaining the upper lake level by a bank without a puddle core. I stake my reputation that such a thing would be madness. Mr. Griffin proposed syphons to discharge the water over the dam from the upper lake when formed.

58. *To the Chairman*—I do not know what procedure was followed when the temporary line was put over the Jerrabomberra Creek. I had nothing to do with Canberra at that time. An embankment was put across the creek and it was washed away. My Department was not responsible for the building of

the bridge over the Molonglo River. Before the old bridge gave way there was a difference of three feet in the up stream and down-stream levels, owing to the obstruction. The level was 1,827 feet on the lower side. A heavy flood occurred many years ago before the Commonwealth was interested, but careful records of it were not kept. Some people think that the last flood was the highest ever experienced. We have allowed three feet over the highest flood level that we can compute. The expense involved in grading the railway to 1 in 200 would be unjustifiable. For the purpose of withstanding floods, the 1,841-ft. level is all right, but it is for the railway authorities to say whether it is satisfactory from the grading point of view. I do not know whether they would regard a grade of 1 in 73, in the suburbs, as unsatisfactory. I recommend a concrete pier bridge over the Molonglo River, but whether it will be trussed or latticed girders I cannot say. That point must be worked out in relation to the economics of steel construction. We would not be justified in following the route suggested by Mr. Griffin, for it would necessitate a long tunnel. The Advisory Committee regarded it as important that a level crossing should be avoided at the Parade and Capital Terrace. I would not like to say what it would cost to make the cutting proposed by Mr. Hobler, unless I knew exactly what had to be removed. I would not like to put the figure down at less than 10s., but I believe it could be done for that amount. We made a long cut round the side of Ainslie, through a similar class of country. The ground was not all hard. I have seen no record of the cost of the excavation at Adelaide-terrace; it was not carried out by the branch under me. I wanted to know the cost of it some time ago, but was unable to find out. A platform, 600 feet long, will be required at the central station with, at first, two tracks. There will have to be a parcels office, the usual railway accessory rooms, and a goods yard fairly close to the station. Without further consideration, I cannot say what width the excavation would need to be. I would recommend placing the goods shed on the southern side until such time as the city develops. If the people had to go two miles to the goods shed they would call the authorities mad. To sink the goods shed on the northern side would be a heavy expense, and would interfere with the development of the town. The southern side will not be the first to develop. The people would not object to the goods shed as an eyesore. There will be a goods shed near East Lake. We have a depot there now, and it is certain to expand. The heavy freight will be on the north side. Two stations will be necessary in the city area, one at Civic Centre and one at East Lake. Reservations will be made for other stations. The city plan determines those. My suggestion for the goods shed will avoid the necessity for excavating to provide for it. It may be within 3,000 feet of the Civic Centre. On the north side it would be on the down grade to the station. On the other side there is practically no down grade. The cutting can be drained, but how to do it is a matter for further consideration. The water might be removed by cross drains. The catchment area will not extend beyond the track. The present line, with a permanent bridge over the Molonglo River, and a slight alteration in the curve at Civic Centre, will not meet the needs of Canberra for ten years. The people would never forgive the Government if it put a level crossing at Ainslie-avenue. It would be an inconvenience and a blot on the whole town. If the route from the Molonglo River to Prospect is adhered to, and there are level crossings north of Civic Centre, it will not matter very much, but it is a *sine qua non* that the track should be at a low level at Civic Centre. A level crossing there would affect our building scheme, and the crystallization of the whole plan. A temporary railway sunk at Civic Centre is a compromise to which I would not object. Level crossings to the north would

be inadvisable, but they would not be serious. If the bridge over the Molonglo River had not been washed away the request for a permanent railway would not have been made so soon. It would cost from £3,000 to £4,000 per mile to make a good motor road between Yass and Canberra. Motor cars would do the journey almost as quickly as trains, but they would not be so convenient. With a good road the traffic could be managed, but road traction would not be continued for many years. There are two or three places on the road where fairly heavy bridging would be necessary. If the railway was not completed by the time Parliament assembled, and there was a demand for a temporary service, it would cost from £30,000 to £40,000 to put the road in moderately good condition.

59. *To Senator Lynch.*—A sum of about £3,000,000 has been spent on the Territory. The revenue from the Territory is received by the Home and Territories Department. I do not know how much it is. My "compromise" would not apply to the point where the line intersects Ainslie-avenue. Whatever else happens the line must be sunk there. The surface could be reached more quickly than is now proposed, and this would avoid the necessity for two level road bridges north of Civic Centre. The city station will be at Ainslie-avenue. I would like the line to be at the low level at both Ainslie-avenue and Federal-avenue. The bridge at the 1,814-ft. level will provide for a greater take off than the greatest on record. The bridge across the old course of the Molonglo River is to provide a get-away for that portion of the water which is thrown off the flood discharge on to the left bank of the river. In flood time there is a tendency to throw debris across the flat. The capacity of the Molonglo bridge will be sufficient to take the flood discharge. The railway bridge over the Molonglo River will consist of eight 60-ft. spans. The Advisory Committee would like to have the railway built at its permanent level. The plan proposed is like the original plan, with a slight deviation at Civic Centre. It does not adhere to the city plan at Market Station. Other features of the city will take years to reach completion, but the construction of a railway is different from an avenue of trees or the lay-out of parks. Many towns are suffering to-day because their railways are badly located. The railway should preferably be built once and for all in its correct location. I do not think the Public Works Committee realizes how inferior the silt bed is. The Government would be very unwise to use any of the silt in the bank. The increased cost of living at Canberra will not deter people who want to make their homes here. Why should the cost of living at Canberra be any higher than it is in any other inland town? Why should it be higher than at the Blue Mountains? Canberra has attributes not possessed by Washington. There are not many places in New South Wales where city people can have a country home away from the coast, but there are numerous such places in America, apart from Washington. How many inland towns are there in Australia with electric light, a sewerage system, a water supply, and a good climate within easy reach of a capital city? Canberra will be unique in Australia, apart from being the seat of Government. The railway to Yass will have a marked effect on development. The only asset we have is our lands. By the time the railway is commenced the value of property will go up 10 to 15 per cent. at the Civic Centre. The Committee must use that asset from the start. People should be induced to bid for it. If works are carried out in advance of leasing the land the Government will receive the increment. If the railway is built five years before it must be built a credit should be allowed for utility and the enhanced value of the city. The railway will not directly pay for axle grease for many years. I attach considerable importance to the possibility of aeroplane communication.

60. *To Senator Reid.*—The Advisory Committee desires to start with the railway on right lines from an architectural point of view. The heaviest traffic will

probably be along Ainslie-avenue, and a level crossing there would be wrong. There will be more than two trains a day, especially if the goods yard is close to the station, and I contend that it must not be far away. There will be 3,000 people on that side of the town for a start. If the station is not sunk it will dislocate our building proposals. If the station buildings are placed on the high level, I fail to see how the level can be lowered at a future date. There will be no hard material to remove at the central station site. It is all shale, and is comparatively easy to deal with. At Parliament House site we have removed material for 2s. 9d. a cubic yard, which included all surface-skimming and the filling of hollows. With buildings in the locality it will be very difficult to remove the station at a later stage from a high to a low level. The fact that a level crossing exists at Toowomba does not influence my opinion. Two wrongs do not make a right. The drainage problem can be dealt with satisfactorily. The water might be gathered into the stormwater drains. No sewer is laid near the railway. The station lavatories can be connected with the sewerage system. I am not satisfied that the proposed level of the central station is not lower than it need be. The level of the present embankment is too low. The flood water would come to about the top of it, even though there was no obstruction in the creek. A low-level causeway at the creek would not be sound practice or justifiable. The last flood continued for two or three days. The running of trains through Goulburn and Queanbeyan is a matter for the Railway Commissioner. There is one permanent disability in the running of trains to Sydney, in that they all arrive early in the morning. They pass through Goulburn at some ungodly hour of the night. I do not know how that can be overcome until the traffic warrants special trains. I do not see why the traffic could not be worked by dropping carriages off the main-line trains at Yass. If the Commissioners adopted such a practice they would probably make an extra charge for it. When Parliament comes here and the inconvenience is felt, the railway will be quickly built. The red clay will stand the water pressure of floods very well, but it might not withstand the lake pressure. Beaching may be needed on the two flanks of the abutments of the bridges. I understand that there is enough material between East Lake and Park View to fill wherever banks are required.

61. *To Mr. Cook.*—The difference between using silt and material from the cutting for the embankment would be from 1s. to 1s. 6d. a cubic yard. I have not had much experience of binding loose material with grasses. I should think paspalum grass would be as good as any. It is not merely a matter of binding the surface. I do not know how the material would behave below the surface if it were saturated. The Advisory Committee did not include any prospective settlers in its estimates of the future population. One hears a good deal of talk about people wanting to lease land, but I do not anticipate that there will be a great rush the first time land is offered. A few people will come along at first, and their number will increase. The Advisory Committee has never given an estimate for the construction of the railway. The estimate was made by the Railway Commissioner. I have not the slightest idea how it was carried out. I do not know what saving would result from the "compromise" suggested. In order to disclose the information it would be necessary to go through every section. I should take the first section from the Molonglo River to Prospect Park, and another section from Prospect Park to Interango. The Railway Commissioner must have suffered under some disability in regard to spoil. There will be excessive spoil in the cutting from near Ainslie to Interango, and it could be used in improving some of the general contours in the low-lying parts. The cost of the removal of that spoil must have been a difficulty to the Railway Commissioner. I am very emphatic about the need for a sunken railway at Ainslie-avenue. Compromises as a rule are beastly things, and are

wrong, but if the money is not forthcoming, and for financial reasons the proposal of the Advisory Committee cannot be carried out, the first part to waive would be the section from the Molonglo Bridge to Prospect-avenue, and the next the section between Ainslie-avenue and Interango. The spoil from the sunken railway would be used on the southern side for making the bank. We would thus do two jobs at the same time. The road through East Lake connects Queanbeyan and Canberra. It will not carry heavy traffic, but it is a thoroughfare. I do not know whether it would be necessary to have gatekeepers at the level crossings. The section between City Station and Interango shows two overhead bridges. If they were level crossings they would be too far from the station for a porter to attend to them. My first thought for the railway sleepers would be jarrah. I would not think of concrete or steel. There are ironbark and other suitable timbers in New South Wales. The railway engineer was instructed that a railway was wanted, and that it was necessary to avoid a level crossing at the intersection of Capital-terrace and the Parade. He was also told that it would be preferable to have an overhead bridge at Prospect Park, as that would be one of the vistas from Parliament House, and later from the National War Memorial. As there is a rise after Prospect Park we thought it would be wise to keep the track low, although we might have to place a turtle-back bridge overhead. Overhead bridges should be provided wherever possible, but there is a limit to them. There are many roads on the city plan that are not through roads. The third road that crosses the railway north of City Circuit is a through road. It crosses Northbourne-avenue, then the railway, and branches south-east across Ainslie-avenue and south-west to Capital-terrace. The next road for an over bridge is two roads north of the one I have just mentioned. It runs out into Canberra-avenue from Terrace-avenue. When the line is sunk the probabilities are that it will be sunk at each of the intersections as far as Interango-avenue. In a city like Canberra, which, if not a model city, will at least be expected to show as few imperfections as possible, I would avoid level crossings between Prospect-avenue and Interango. If the railway is sunk at Ainslie-avenue at the start it will be a simple matter to sink it elsewhere later. If the Public Works Committee consider it to do so, the Advisory Committee would consider Mr. Hobler's amended estimate. The building of the railway is largely a matter of point of view. It cannot be regarded purely as a railway proposition. It is part of the whole conception of the city. As a railway proposition solely no one would propose to sink it. Mr. Hobler's estimate of the cost of the line is higher than the Committee expected it to be. All the Committee could do would be to review his levels at crossings, and if he desired it, to sink further shafts to indicate more accurately the nature of the country the track will pass through. The Advisory Committee would not attempt to influence Mr. Hobler in his estimate of the cost. One of the shortcomings in Mr. Griffin's plan, having in view the object of Canberra, is the distance between the railway stations and the focal point of the lay-out. It is possible that something may be done in future to bring a tube, or a part open section and part tube, closer to Parliament House. It is difficult to say where it will cross the river. I believe the easiest crossing would be at Yarralumla. Another crossing is possible at a place near the dairy. Years ago, when I was on the Departmental Board, I put forward a scheme to take the railway close up to Parliament House, under the saddle of the hill. The Committee has no idea of preparing for that. It has been given a plan, and has to work to it. The Government was emphatic in saying that we must work to the plan. It would be an advantage to look into the question of providing for future railway development.

62. *To Senator Barnes.*—There will be bridging across the cutting at the Central Railway Station. The centre of the road may be open, but there will be two bridges for roadways. The cutting will be open except

where roads cross it. The city station at Ainslie-avenue could not possibly be placed above ground. If placed above ground it would have to be moved either to the north-west or the south-east, and in either case we would be starting with the nucleus of a station in the wrong place. The proper place for a station is at Ainslie-avenue. If the station was wrongly placed at the start, by the time a few thousand people were here the city would grow in some way not in accordance with the principles of the plan. In addition to the railway station there will be important architectural groups of buildings at the Civic Centre, and they will have to be architecturally linked up with one another. If the station is placed on the surface, out of its proper place, I fail to see how the linking up can be done. It would be expensive to cover the whole cutting. Parts of it would not be deep enough to cover. The life of the proposed railway bridge will be indefinite. As a structure it will last longer than it will be required. It should be good after 80 or 100 years. When there are 18,000 or 20,000 people here there will be considerable traffic on the railway. Mr. Hobler's proposal provides for only a single line. A single track will carry a large amount of traffic. I do not know how an alteration of the location of the station would influence the growth and development of Canberra, but a station on the surface would cause some inconvenience and exert on development a retarding influence that could not be capitalized. Over bridges will be more satisfactory than level crossings.

63. *To Mr. Blakeley.*—It would be practicable to go to East Lake at the 1,841-ft. level, and, instead of going into the bank at Federal-avenue and Capital-terrace, to avoid the cutting there and go below the surface at City Station, coming up again as soon as the grade would allow. That is how I would build the railway if money had to be saved. The next thing would be to get sufficient spoil for the causeway from the cutting, while allowing the existing line to remain. Mr. Hill contemplated at one time taking spoil from the island and higher land east of the causeway. To obtain spoil for the causeway from the railway cutting would assist future development. The first provision at East Lake station need be only a platform. Development should take place at Civic Centre. Private enterprise must be attracted there. With four feet added to the last flood the present line would be safe if the waterway in Jerrabomberra Creek was increased. It is not, however, a good proposition. The track would be almost submerged. If Parliament authorizes the line as proposed the spoil will have to be obtained either from East Lake circle or from a small eminence in the vicinity. To put an overhead bridge across the line at Federal-avenue would mean a certain amount of turtle-back bridging. A proposal to lengthen the existing railway bridge over Capital-terrace was investigated, and plans of the road were prepared. It may be done, but I do not think it is a good proposition. It is not necessary to take the line back into the hill merely for the purpose of making over bridges for Capital-terrace and Federal-avenue.

64. *To Mr. Jackson.*—A motor service between Canberra and Yass would meet requirements for five years, except for one thing, namely, that Parliament will probably insist upon the train service. For a motor service probably £100,000 would have to be spent on the roadway. Otherwise it would pay the Government to hire a fleet of Rolls-Royce cars and carry people free, as being cheaper than paying the interest on the capital cost of the railway, but another factor is the general development of Canberra. The railway will be a tool of development. There will be more traffic from the north than from the south. It has been suggested that members will have offices in Sydney. That will lessen the Melbourne traffic. The obstacle in the way of putting the Goulburn line in good order is the cost. A line to Jervis Bay has not been considered or discussed by the Advisory Committee. I have not been able to see the

objective of having a port at Jervis Bay. To provide a road motor service to Yass a considerable amount of money would have to be spent on bridges. Road traffic at present is liable to be held up by floods. I have no doubt that the road will be used by that section of the community which possesses motor cars. We expect to attract that class to the city. There are many motor cars at the Cotter River on Sunday mornings. They come from many places—Monaro, Yass, and Wagga. They travel along the Yass-Canberra road. Whatever happens that road must be improved. Murrumbateman Shire Council has done what it could do to improve the road. Although the Commonwealth Government's policy is averse to it, if I was asked for my opinion I should urge the Government to assist the Murrumbateman Shire immediately. The shire council has done its best, and that is more than many shires do.

65. *To Senator Reid.*—When the rivers between Canberra and Yass rise four or five feet the road is blocked. The floods last only a few hours.

66. *To the Chairman.*—In the excavations at Parliament House we did 9 or 10 inches of stripping and ran to spoil. The material removed has varied from light earth to compact clay, shale and gravel, necessitating the use of explosives. We have done this with scoops and steam shovels for 2s. 7d. a cubic yard, which includes plant charges and all costs. The average distance run to spoil is about 800 feet. Thirty-three thousand cubic yards of material have been removed. We have struck some hard ground, which the steam navy would not negotiate without shooting. If the bridge was made for a single track and a double track was required later, the bridge would have to be rebuilt. The embankment near the Molonglo River would be a different proposition if it had eleven or twelve feet on top of it. It has withstood the strain upon it, except at Jerrabomberra Creek. If the present line is allowed to remain, a new bridge over the creek will be needed. The level would have to be higher and more waterway would be necessary.

(Taken at Canberra.)

TUESDAY, 19TH FEBRUARY, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Barnes.	Mr. Blakeley
Senator Lynch	Mr. Cook
Senator Reid	Mr. Jackson.

John Thomas Hill Goodwin, Commonwealth Surveyor-General, Director of Lands, Officer in Charge of Administration, and member of the Canberra Advisory Committee, sworn and examined.

67. *To the Chairman.*—The plan of the City of Canberra has been accepted by the Government. The railway is shown on that plan, and the route cannot be departed from to any extent without seriously altering the general design. The design could, of course, be amended to conform to the railway. It is as important that the railway should be placed in its designed position as that any other work should be correctly placed to conform with the design. The level of the road to be placed across the Molonglo River at Yarralumla will be 1,825 feet. In my opinion the Eastern Lake will never be constructed. The 1,825-ft. level terminates approximately where the railway crosses. Mr. Griffin proposed that there should be another weir at the railway crossing, which would create an upper lake 20 feet higher than the lower lake. That scheme is not regarded as practicable, and has been abandoned. There would be a series of bilabongs and, probably, swamp lands unless something was done to obviate them. If water shallower than 3 or 4 feet exists anywhere reeds are certain to grow in the course

of time. It is desirable to do something to make the appearance of that part of the city conform to the rest of the city. The land on the Eastern Lake site is rich, and there will probably be dairy farms and market gardens on it. It has been completely flooded only once to my knowledge in eight years. Its appearance will be all right if it is covered with dairy farms and market gardens. There will be no residences on it. They will be on the higher ground sloping down from the Molonglo camp. No residences will be permitted within the boundary of the area liable to flood. It would be dangerous and unhealthy to have residences there. I regard the area to the north of the existing railway line from Queanbeyan and to the east of the causeway as the centre of what may be called the garden farms which will supply the needs of the city. The land on the slopes leading down into the lake is very good. It would not be absolutely necessary to have a footway or carriage way as well as a railway over the Molonglo River where the railway crosses, but at a later date a bridge will be necessary at the crossing of Federal-avenue. For the development of the city a bridge at Federal-avenue would be preferable. It would be possible to make a causeway to carry railway and vehicular traffic. It is not usual to have vehicles travel on a railway bridge. I do not think it would be wise, but with proper protection it could be done. The last flood covered the existing railway, and broke down the bridge. The temporary bridge put up by Mr. Griffin was damaged in the early stages of the flood. If the existing line is retained for the present instead of making the deviation at East Lake, it would not retard city development for many years. It would be necessary to erect a permanent railway bridge over the Molonglo at a sufficiently high level to be safe from flood. It will be many years before the city will extend to East Lake. The proposal would quite safely meet all needs for the next ten years. I would regard the line between Lake Park and the Causeway Junction as a temporary line of a semi-permanent character. The railway must ultimately go through East Lake and Lakebourne station. It must deviate from the temporary line somewhere about Lake Park station. I would recommend that the base of the piers of the Molonglo railway bridge, which must be of concrete, should be of adequate size to allow the line to be raised or the piers lengthened on the same principle as the bridge over the Molonglo River at Commonwealth-avenue. The level of the bridge opens up a very big question. I am dubious about the lake scheme. If we were certain that the lakes would be made it would be wise to have the bridge at the high level, but I do not anticipate that the lakes will be made for very many years. The retention of the present railway level at Civic Centre would mean a level crossing. That could not be tolerated for longer than the early constructional period of the city. If the city is developed on the lines of the plan, there will be considerable population at Civic Centre as well as at the Administrative Centre. The Advisory Committee thought that the second stage of construction would last until six years from the commencement. When the Advisory Committee recommended Parliament to allow the existing line to remain for five years the line had then withstood a small flood. Later one of the biggest floods in history washed it away in places. Obviously it would be unwise to build another bridge that might be washed away. Therefore it is proposed to build the line in its proper place. It is necessary for the development of Civic Centre to throw the railway further east, so as to leave sufficient room for shops and the railway station. A level crossing must be obviated somehow or other. We must either sink the line or build a bridge over it. The line at Civic Centre will have to be 20 or 25 feet below the existing surface. The railway station offices need not be below ground. It would be possible to place a small goods station at the back of the rectory, where the line will come to the surface. That point is between 204 miles, 35 chains and 204 miles 50 chains. A goods shed is not a thing of beauty, but it is essential. It could be obscured by a plantation, and if built of brick, creepers could be grown over it. It need not be as ugly as we are accustomed to think a goods shed must be. Mr. Hobler's suggestion for a goods shed a mile and a half further north applied to the main goods shed which, with marshalling yards, will have to be there. The people of Civic Centre would object to travelling to Northcote Station to get their goods. A goods shed will be also located on the south side of the river. The present line, with a siding into the power house, will be satisfactory for the building, construction and other works going on at Canberra. There is certain to be a large amount of material brought from Sydney for use on the south side as well as on the north, and it would be folly to carry it beyond the point at which it is used. The existing railway from the Molonglo River to Civic Centre could be left for a period of years without seriously affecting the formation of the city on the south side. The city will not extend south sufficiently to cause any inconvenience for ten years. I am inclined that there will not be extensive development beyond a mile north of Civic Centre, although there may be suburban development. The country between the Federal boundary and Yass is old settled sheep country. Within 2 or 3 miles of the line there are 50 or 60 holdings. The land is all freehold. Wheat and oats are not produced to any extent. Some of the farmers grow hay. The quantity of wheat produced is negligible. The railway from Yass to Queanbeyan will promote some closer settlement, but, ignoring the Federal Capital, I do not think any Government would construct the line for many years. The proposal to build the line is due to the construction of the city. The holdings are not big now. The largest is 12,000 acres. It belongs to Mr. McGuinness. The Gear station, owned by Mr. Hibberd, comprises 5,000 or 6,000 acres. It is close to the boundary. Mr. Armstrong, at Murrumbateman, owns about 4,000 acres. Other holdings are 1,000, 2,000, and 3,000 acres. Gear station might be cut up into two or three runs, but it could only carry two more people. It is not essentially agricultural country. It is essentially sheep country. It is worth, on the average, about £5 per acre. It is sheep-to-the-acre country, and better. We have one settler who has consistently made his living by agriculture, mostly the growing of wheat, but the rest are all sheep farmers. Some of the farmers put in about 100 acres of hay. If many people in this district grow hay it would not pay to grow it. In the early days various parts of the district were under cultivation. A certain amount of wheat was grown, but when better districts for wheat were developed, the farmers had to give it up. The distance from Yass to Canberra by road is, roughly, 40 miles. From a motoring point of view there are no bad grades, but it is not a well-constructed road. The cost of making a good motor road would vary from £2,000 to £4,000 a mile. The people would not be satisfied with a motor service between Yass and Canberra for very long. The facilities for getting to Canberra after the city is established will be better than they are now. The railway time-tables will be altered. People travelling from Melbourne have to get out of the train at Yass at 5 a.m., and travel for two to two and a half hours by motor-car. Eventually there will be through carriages from Albury to Canberra, but that will not be in the early stages. The kicking-out of certain carriages at Yass will be demanded by the southern States. The amount of population between Yass and Canberra is negligible. I estimate that Canberra will have 20,000 to 25,000 people in 20 to 25 years. That would be a town about the size of Goulburn. The existence of Goulburn does not materially affect the utility of the land in the surrounding district, except in the immediate vicinity.

68. To Senator Reid.—The large lake area has only been completely covered by flood water once to my knowledge. That was in July, 1922. We have had some minor floods that covered some of the flats lower down the river. In previous floods the West Basin was covered with water from the foothills to a height a little above the level of the tennis court. The last flood covered the whole of the tennis netting, representing a difference of 8 or 9 feet, as compared with previous floods. The water has often been on to the floor of the engine-house at Yarralumla, but the last flood covered the building. The water subsided in a few days. Inconvenience was caused for only two or three days. The Turrabombera Creek water did not count at all in that flood. If there had been openings all along the embankment, I do not think the water would have affected the railway. One cause of the line being washed away was the deviation of the creek. A very big building will not be necessary for a railway station at Civic Centre in the early stages, but eventually the railway station there will be an architectural feature. There was a very small building for many years at Flinders-street Station, Melbourne. It was eventually taken completely away. I picture the station as a miniature reproduction of Flinders-street, with booking facilities, &c., above ground. Shifting the station now will not interfere with building operations in the locality. The precautions that would have to be taken would depend on how far the buildings were from the cutting. The basements of station buildings could be used as shops. I would not put up a permanent railway station in the early stages. It would be impossible to go down at the railway station 25 feet, and leave the bare earth. Cutting down for the foundations of a large building would not necessarily interfere with the scheme. A line on the surface could not be entertained. It would be inconvenient and dangerous, unless considerable expenditure was incurred in making a 'U' across the line. The level crossing between Canberra and Queanbeyan is a source of danger, and is about to be abolished. There will be at least as many trains into Canberra as go over that crossing, and there will be more vehicular and foot traffic. There will certainly be one train out and one in, and there may be one goods train a day. As the city develops there will be several more trains a day. It would be extremely unwise to have a surface railway in that position. I would not favour the idea of making a surface railway now with the object of lowering it later.

69. To Mr. Cook.—In the commercial sense, I do not expect any manufactures in Canberra. There will be small factories, such as there are in Goulburn, and no doubt a motor repair shop. There may be a boot factory, but not for many years, if ever, will there be woolen mills or large factories such as exist in Melbourne and Sydney. Coal will have to be brought a long distance, and no raw materials except wool are produced in the district. I do not expect that there will be many applicants for land in the early stages, if the condition that they must utilize it is enforced. The regulations provide that holders of town land must utilize it throughout the term of the lease. The blocks are not laid out yet. They have to be ready by October. I have not given the subject much consideration. The minimum size for building blocks will be 5,000 or 6,000 square feet. They will range up to an acre or more. The grazing lands are all occupied at the present time. Some of the leases have 25 years to run. They are framed on the basis of a maximum capacity of 1,500 sheep. There are blocks of 400, 700, 1,000, 1,500, and 2,000 acres, according to the character of the land and the distance from the city. All the blocks in the vicinity of the city have a maximum lease of five years. The whole design will eventually be re-cast. I have re-cast the sub-division of nearly all the land lying to the west of the Yass-Canberra-road. This has been permanently surveyed and leased, and the tenures have been so regulated that the land nearest to the city will be held for

only five years. Further out the leases will be for ten years, and there they are not likely to be subdivided as a result of the transfer of the Seat of Government, they will be held for 25 years. The roads leading into the city have been designed and surveyed, but we have constructed only a few miles of the main road. Land will be made available from time to time as the city develops. The short leases are not subject to the right of the lessee to renew. The Government can subdivide the land if it chooses on the expiration of the lease. The rent varies from 6s. an acre to 3s. an acre; the average is about 5s. an acre. I have nothing to do with the preparation of estimates for bridges. The land round Duntroun is leased. Duntroun has an area of about 2,000 acres. The College cultivates a large area of land, which is not permanently dedicated.

70. To Mr. Blakeley.—The present railway from Lake Park to the junction with the Causeway of the proposed railway is not absolutely safe. With a worse flood than the last one the existing temporary line might be submerged. It is a risk, but the line is there. A flood might occur that would damage it and interfere with traffic for some time, but the damage would not be irreparable. If the proposed line is set made in its correct position at East Lake, the city blocks there cannot be developed. In order to put a road under the existing line at Capital Terrace it would be necessary to raise the line. There would be no great engineering difficulty in getting crossings over or under the present line. The Government has decided to make available the land from Northbourne to Ainslie-avenue and Canberra-avenue, and the plantation that already exists about three-quarters of a mile north of the City Circuit. Land will also be made available between Melbourne-avenue and Wellington-avenue on the south side, and probably some between East Lake-avenue and the power-house. This land will be for residential and business purposes. The site of the business area to serve the people who will be settled between Melbourne-avenue, Wellington-avenue, and Interlace-avenue, will be situated at a place shown on the plan as Manuka Circle. Later there will have to be a suburban business centre in the vicinity of East Lake Circle. The blocks will be classified in due course. There will be sites suitable for all pockets.

71. To Mr. Jackson.—It is quite possible that there will be a demand for a motor road from Yass to Canberra, irrespective of the railway. The method of transport in fifty years may be as different from the method in use to-day as the method in use to-day is different from that of fifty years ago. A concrete motor road might cost £10,000 a mile. It would be equivalent to a railway. It is difficult to say whether the people will tolerate a railway twenty years hence. The expenditure of nearly £1,000,000 between the existing line and Yass Junction is not justifiable. The absence of a railway would not keep any one away from the city if there were good motor traction to Yass Junction. The modern tendency is towards motor transport. Motor cars are now more certain and more safe than a horse and buggy. If the advance in motor traction is as great in the next twenty years as it has been in the past twenty years the conditions of transport will be very different from what they are to-day. In England—where there are good roads—motors are supplanting railways. With a complete re-arrangement of the traffic to meet requirements the present railway could be made to serve the necessities of Canberra for a considerable time. A person travelling from Melbourne leaves at 5 p.m., and arrives at Goulburn at 7 a.m. To take breakfast there, and then travel on to Canberra, would be a comfortable way to do the journey, provided the line to Canberra was put in good condition. Travelling *via* Goulburn would add about 50 miles to the distance from the South. The small number of people is receiving the consideration of the Railway authorities. There are two or three

classes of engines that can be used for that purpose. If it was left to me, to say whether I would build the Yass-Canberra railway I would say, "Not at present."

72. To Senator Lynch.—A sum of £725,000 was paid for the land in the Territory. I do not know how much has been spent on the development of the Territory. The income from it is about £40,000. It is not received entirely from land. Some is from house-rents. Between £30,000 and £35,000 is received from broad acres. The Territory is paying interest at 5 per cent. on the money spent in purchasing the land. If the Government sold the land to-morrow it would make about £2 or £3 per acre profit. Land adjoining the Territory boundary was sold recently for over £8 an acre, and for adjoining land the Government paid £4. Other land has been sold at £6 10s. The increased price of the land is due largely to the increased price of the wool. All broad acres have risen considerably in price. The money spent on improvements is still a debt to the Treasury. Eventually there will be an enormous revenue from the city lands and increased revenue from the country lands, because there will be more permanent settlement. We have no lands policy yet, but only a makeshift. We have no policy by which settlers can be assisted to build their houses. A twenty-five year lease is too short. If a man is expected to spend money on the land, his tenure should be as near a freehold as possible. The alternative is for the Government to spend money on improvements and increase the rent of the land. I look forward with confidence to the Capital Territory paying interest and back interest, and re-paying the capital cost, in the course of time, subject, of course, to the lease policy being adhered to. It will take many years before that result is achieved. The Territory instead of being a liability should some day become an asset. The material from Circular Basin is unsuitable for the purpose of bank construction. It would not matter much what was done provided the spoil was not wasted. If the line is not placed in its permanent position until some time hence, when the cut is made, there will be no use for the spoil. If there is an excess of spoil on the north of the river it will be sound policy to bring it across the river. If it is taken from East Lake there will be a hideous cut in the ground. It will not matter so much on the north side of the Molonglo River, because it will not be in the general run of traffic. It would best administer to the completion of the city scheme if the bridge and the line to the north were built in their permanent location. I cannot see that it will make any difference whether the spoil is taken from East Lake Circle or Federal-avenue. If the spoil from the north of the river could be advantageously used north of the river I would use it there, but otherwise I would run it to the south. The creation of lakes would cause swamplands in the East Lake area unless the waters were controlled by a levee. Before the Lake scheme can be carried out two controlling weirs must be built—one in the Queanbeyan River and the other in the Molonglo River. The Queanbeyan is the better river of the two. If the railway embankment is made of solid material it will not require a core. It will need to be a massive bank. The water in East Basin will be relatively shallow. There will be no considerable weight of water against the bank. If the level of the East Lake was higher than the East Basin the embankment would have to be made strong enough to withstand the water pressure. If the Causeway is to be used eventually to form the East Lake it will need to be constructed accordingly. As it is proposed to abandon the East Lake scheme the water against the Causeway embankment will have no weight. I favour laying the railway in its permanent position. If the railway is built at all it should be sunk when necessary to avoid level crossings. The railway should be made on its permanent location between Civic Centre and the Molonglo River, or it should not be made at all. At the present day railways are necessary to develop a country, but whether

that will be so in a hundred years' time I do not know. The extension of the railway to Civic Centre would greatly reduce the cost of developing that area.

73. To Senator Barnes—I do not know whether records have been taken of the rate of flow in the river at flood times. It is a relatively slow stream.

THURSDAY, 21ST FEBRUARY, 1924.

Present:

Senator Lynch, in the Chair,
Senator Barnes
Senator Reid
Mr. Cook
Mr. Jackson
Mr. Blakeley

Herbert Ernest Ross, Architect and Civil Engineer, sworn and examined.

74. To Senator Lynch.—I am a member of the Canberra Advisory Committee. I have not given any consideration to the main question of the route of the railway way outside the city area. I am familiar with the proposed route within the city area. There was no occasion for me, as a member of the Advisory Committee, to consider the railway except as a means of communication. Our scope does not extend outside the city area. I am not competent to discuss the broad merits or demerits of the question of railway communication to Canberra. In relation to the construction of the railway within the city, I would like to have something to say. The route of the railway has been laid down in a general way by Mr. Walter Burley Griffin, and has been subject to modification from time to time. It passes practically through the major axis of the city, and in so doing crosses a very large number of important streets of the future. The first point of importance that is reached, if we begin at the Yass end, is the city station at Ainslie, which must be regarded as a very important station of the future. It will be in the heart of the commercial enterprise of the city. The traffic in that neighbourhood will be very dense in years to come. The proposal is to sink the railway below the street level, and so to maintain open communication over the whole area by way of over-bridges. That, of all things which we have had to consider in relation to the railway, is the most important, and, like most important things, it is the most expensive. It will involve a very large outlay. The route was decided upon in the original layout of the city. How far the position is modified to-day by comparisons between motor and railway traffic is a very important subject, and it might involve, if it were considered at all, the placing of the railway outside the city boundary. That has not been contemplated, and I have nothing to say in favour of it. The cost should be faced of putting the railway in the city and beneath the surface, independently of the effect of the development of motor traffic. I am one of those who have foreseen the gradual displacement of some railways, at any rate, by motor traffic. Notwithstanding that, I still think the railway should go through the city. The position of the railway has been altered slightly from time to time as a result of the deliberations of the Advisory Committee. This has been done without disturbing the general design, but in order to overcome minor difficulties. One of such modifications was made near Canberra Gardens, where, in order to avoid the expense of over-bridges, the line had been moved to a new position. I point this out to show that the Committee has been dealing with the details of the line. The alteration consists in raising the line a little to the east. I recognize that matters of that kind are details which do not involve any very great cost one way or the other, but they do affect the design of the streets and the operation of traffic. There was a movement of a similar character at Federal-avenue. It was a purely local consideration, and the decision of the Committee effected a slight economy. The railway as laid down was a projected

route, and projected routes are always modified when the final plans are prepared. The grades, and the elevations over the proposed lakes, may call for modification in future years if the Federal Government in any way alters the decorative scheme proposed. The lakes in the present programme are not contemplated as finished works. They are something which it is anticipated will belong to the future. Whatever may have been the intention of the designer of the Federal City, economic considerations, or developments on aesthetic lines, may call for an alteration of the level at the Molonglo crossing. After passing through East Lake Greville another amendment was made on the original plan, also for economic reasons. It was an improvement both from the point of view of communication and cost. It was made as a result of a closer insight into the location of the railway. Beyond that point I have nothing to discuss that is in my mind. I want to emphasize that the Committee and I consider that the sinking of the railway is absolutely essential for the economic conduct of the traffic of the city. Anything in the nature of a level crossing in the centre of the city is out of the question in any circumstances. In what is known as the industrial area north of civic centre the sinking of the railway will involve in the future some little difficulty about sidings. It is not contemplated that Canberra will ever be an industrial city in the ordinary sense. We cannot imagine conditions which will lead to it being a large industrial centre, but such development as may take place in that area may involve considerable difficulty and extensive excavation in getting out of the cutting to the industrial area. If large railway yards are required it may need considerable excavation to sink them. The matter is so far in the future that it has no economic bearing on the railway at present. It is a problem which the future may bring to light. I draw the attention of the Committee to the fact that that is one of the disadvantages of sinking the line, apart from the cost of it. Modern railroad development in station yards has been such that it is now possible to haul on grades not contemplated a few years ago. The modern electric locomotive will haul any load up almost any grade. Thus the difficulty is almost compensated for by developments in another direction. I would not like to say that the present proposal represents the mature judgment and last word of the Committee. It is practically so, and any amendment that the Committee would recommend to the Government would only be in matters of detail. It would relate to construction details, rather than to the route. Proposed amendments will probably affect a street crossing or some detail of that character, or the swinging of the route to one side of an avenue or the other. The Committee is unanimous regarding the route. As there has been no dissentient voice on the Committee, I assume that we are unanimous. I regard the route as having been satisfactorily fixed. That statement applies also to the minor alterations of route I have described. We have not seen the cross sections. The longitudinal grades have been before the Committee, and have been amended from time to time. The cross sections do not materially matter, because they only affect quantities and materials. I am familiar with the nature of the work. The longitudinal sections were carefully considered by us in relation to the crossing of the streets, and we gave very careful thought to the question whether turtle-back or partly-elevated bridges should be used, so as to permit of lifting the grade and throwing some of the disadvantage on the road. We could find nothing to justify a recommendation of that kind. Modern conditions of traffic are such that a raised obstruction on the road should be avoided if possible. From the point of view of the visible effect, as well as of utility, it would be undesirable. It is possible that a removal of the railroad to outside the city street areas might save anything from £60,000 to £100,000, as against a sunken railway. I am not competent to express an opinion on the question whether a railway should go to Canberra from Queanbeyan or Yass. That is a question of railway communication I

have not studied. To what extent it would be profitable or unprofitable I am not competent to say. It must be borne in mind that if the railway was 2 miles from its present position, with a modern system of motor traction on good roads, the convenience of the public would not be very much disturbed. After all, no one lives at a railway station, and a road journey is therefore unavoidable. The railway should go through the city, but if it is a question of cost, and £100,000 could be saved, the city would not suffer materially if the railway was placed on the outskirts of it. Instead of intersecting the city, the railway could pass along the periphery of it. That suggestion has not been considered, and I do not recommend it, but rather than put the railway on the top of the streets for all time, I would say, most emphatically, put it outside the city. Through road traffic will be more and more important as time goes on. The development of the city on its proper and final lines would be hampered to a certain extent by retaining the existing railway from its junction with the proposed deviation. The finalization in position of a big work like a railway immediately provides a basis for the execution of other works in their proper position. If work has to be done it is cheaper to do it properly, once and for all, than to have to alter grades and start all over again. I favour the deviation rather than the existing line. I would favour, if the Commonwealth Government can entertain the proposal, the placing of the railway in its final position. In the crossing of the Molonglo River we are guided by certain fixed levels in regard to floods. The minimum levels that we can entertain for any work on the Molonglo River are related to the flood levels of which we have data. It is conceivable that, at some future date, the level of the bridge may be raised. It will never need to be lowered. In that connexion I would advise nothing. It is purely problematic. It may not happen for 100 years. The structure could be made strong enough to stand raising to a higher level. The creation of lakes is very problematic. The river should be crossed at a level sufficient to provide for flood waters. The proposal is to build the bridge at the 1,841-ft. level. From an aesthetic stand-point a low bridge is more attractive than a high one, provided it serves its purpose. I would prefer the execution forthwith of the route on the gradients set forth on the blue prints. Any temporizing with the levels of the railway will lead to fixed ideas and create difficulties in developing on proper lines afterwards. If the railway is built and is sufficient, it will remain, although it may be objectionable in many ways. I can only speak of the Federal Capital from the point of view of one who is instructed to carry out a definite plan as far as it can be interpreted in all its intentions. To say the existing line should remain would be to stupefy myself. Canberra is to be a city, and it is no uncommon thing for a city to spend £100,000 in putting one small road into shape. An expenditure of £60,000 to £100,000 in sinking the railway will bear good economic fruit in all subsequent development. If it is not done there will be a reverse. I look forward to a fair return from the work in its influence on future development. I cannot see that the railway as a profit-making concern is possible for many years. What its economic value will be to the community is very difficult to measure. The value to the community occurs in directions that cannot be measured. To keep the present line for 25 years, maintain the approaches and the bridges at the permanent level, and go underground at Civic Centre, rising again in the northern portion of the town, would get over the immediate difficulty of cross traffic at the Civic Centre. On the east side, south of the Molonglo Crossing, there are vacant areas. As the line turns again to the east it enters many streets which would call for the construction of crossings. I can conceive that from the Molonglo crossing south for some little distance, until the curve is reached, the railway might do on the surface, if the grades would permit a sunken road farther east. I would favour putting the railway at its permanent level at East Lake at the start,

I am more optimistic about the future progress of Canberra than to think that it will take the greater part of next century to make avenues, roads, gardens, parks, and lakes. I have regarded Canberra as a city with up-to-date services and a fine climate. The access of population to Melbourne and Sydney during the past few years has been extraordinary. Thousands of acres fronting streets have been built. I reasonably contemplate that Canberra will be a city in a much shorter period than a century. Some justification for that opinion is to be found in other countries. In America, where cities have been established inland on economic routes, their growth has been phenomenal, and for no reason that would not apply to Canberra. I agree that it will take at least the greater part of next century for the city to reach completion. It is true that the Committee proposes to bring the railway to completion at once, although other features of the city cannot be completed for many years. The establishment of the level of a railway, however, sets a precedent for many other things. A railway must be precedent to other road levels. All crossing grades and roads must be finally developed in relation to the level of the railroad. In relation to its possible growth, I would compare Canberra with Albury. It is on a main route, and is a good pastoral district. Albury is beginning to become a small industrial centre, and its population is steadily increasing, although it does not enjoy many of the benefits which will be conferred upon Canberra. It would be an economic mistake to place the railway on the surface at Civic Centre. It would be preferable to put it outside the city. Dealing with the storm water that will accumulate in the underground station will not be costly. A railroad with its grades drains itself to a point where discharge outlet is available. This railroad is graded practically the whole way. The Committee looks to the Railway Department to deal with problems of disposing of storm water and sewage. I would not say that the railway must necessarily be sunk right to the city boundary. The straight run almost due north will be through an area which will not be populated for a long time. I would not be so pressing about that section being underground. The major expense, however, will take place in the heart of the city. The only cutting contemplated in the direction of Interchange-avenue is sufficient to give over-bridges at two or three hills. The amount of intervening cutting is very little. This portion of the line will be largely on the surface. It is fortunate that the small hills are intersected by the railway. They afford means of communication without level crossings. The cost of cutting is involved in three hills of no great length. It would not be advantageous or economical to alter the levels. The railway will not in any sense be a suburban railway. I feel most emphatic that all distribution of population within the city will be by road. People living on the south side of the city and desiring to go to the north side will be able to travel more comfortably and cheaply by road than by rail. For a long time to come, one cannot contemplate anything in excess of two tracks. I suggest room enough to accommodate at least two tracks, which will not need to be exceeded within 50 years. Reservations of land for future widenings should be wide enough to give the land a leasing value. That would mean holding back a larger amount of land than would be required for a railway. Subject to the necessary batter of slope for the cutting of the railway, and a reasonable margin for a top surface before the fences are reached, I would contemplate vertical retaining walls in 100 years' time rather than the holding back of too much land in the meantime. The amount of the batter and the top drain would provide enough room for six tracks. Another objection, and a very strong one, is that Government land is always subject to every kind of eyesore, and gets out of municipal control for no other reason than that it is Government land. A strip of Government land may become an eyesore in an otherwise beautiful and properly controlled avenue of trees and handsome buildings. If the sunken road is contemplated I would hold enough land for two lines with the necessary batters on the excavations or on the fills, and I would let it go at that, because if four lines were wanted in future, vertical retaining walls and vertical fill walls could be erected. We regard the development of the upper and lower lakes as very problematical. Some future Government or future people may develop the low-lying basins on entirely different lines. It is possible that the scheme of lake levels will be altered. We do not regard it as essential for the development of the city that these levels should be fixed beyond certain limits of flood. The lakes are so problematical that they should not have weight in fixing railway levels, which, at the present stage, should be determined by economic and flood considerations. We consider, from the experience we have had of using silt from the river beds, that such a filling, when overgrown with vegetation and proper formation, is safe for flood purposes. The experience elsewhere on river crossings has been that there is not much trouble from washaways of that class of material.

75. *To Senator Reid.*—The use of the existing line south of the Molonglo would probably hamper development of the city there less than anywhere. The line, either in its temporary or permanent position, crosses very few streets. I hold to the statement that the amount of work involved is not great. The great expenditure will be involved north of the Molonglo River. I do not favour a temporary route unless a great saving can be effected. There is not much cutting on the curve. It is about an average amount for an average railway. A level crossing could be allowed to remain at Civic Centre for ten or fifteen years, but in that period the development of the streets would be hampered and disturbed. I would not like to see a level crossing there, and, in the circumstances, it would not be justified. A lot of money has been spent on Canberra. It is wise, after spending money on a fine building, to spend a little more to put a good front on it. The fact that a lot of money has been spent is justification for building this railway properly. A surface railway is objectionable in many ways. It would depreciate the renting and leasing value of all the land converging on the railway. It would depreciate residential portions next to the railway on the north of the city probably as much as 50 per cent. A surface railway is a very noisy, disturbing thing. A railway in a cutting is scarcely audible. In every city houses to let or lease are less valuable when in proximity to a noisy railway. I do not say that the railway would affect the value of land at Civic Centre in fifteen years' time. In that period of time it would not be a very harmful thing, but development would be saddled at the time with a line not in its permanent position. I do not think that the permanent station building will be erected in fifteen years or in 50 years. Regarded purely from the economic point of view, the railway probably ought never to be built. The railway is to be built for no other purpose than to reach a city and get through it, and I say that it ought to go through it in the right way. It will have a constant economic effect on the development of the city if it is put on the surface. Level crossings would not be unduly dangerous for ten or fifteen years. A cross cutting for drainage purposes would not have to go very far. If the railway had been designed first in relation to the topography of the country, and then the streets had been made to suit the railway, everything would have had a different aspect, but the city is designed, and the railway has to be put through it. That is dealing with the problem the other way round. A railway to suit the features of the country would probably have been swung more to the east, with more curves, and would have been a more economical proposition. It would involve, however, the alteration of the entire city plan. The line at the station will have to be drained. That is one of the things which an engineer always takes into account in any estimates he makes. I presume that in any estimates for the railway the drainage is provided

for. The Advisory Committee has not considered the Yass-Canberra-Goulburn railway in its broad aspect. It was not our function to do that. Our activities are restricted to the city, and on other matters the Minister seeks his advice elsewhere.

76. *To Mr. Blaxley.*—The existing line is not a safe line from the point of view of flood experience. Rather than spend a large amount of money on regrading the line I would prefer to place it in its permanent location. The bridge at Jerrabomberra Creek was affected by the last flood. The necessity for banks for flood purposes is established, and that fact justifies a certain amount of excavation in forming the line to a permanent grade. I should say that excavation on a permanent grade would be far more economical in the end, although they may cost more than taking filling from the immediate neighbourhood, where its removal serves no utilitarian purpose. The Committee considered the question of using the river sand and silt. Near the bridge, lower down the river there is silt of an exactly similar character. I am satisfied that that material, properly pitched and protected by vegetation, will stand any flood. The ends of the banks must be reveted. The Committee discussed the question of a turtle-back bridge at the intersection of Federal-avenue and Capital-terrace, and came to the conclusion that we would not recommend it. It is doubtful whether the rock obtained there is good enough for roadmaking purposes. A much harder type of metal is obtainable from Mugga. If the rock in the cutting is hard and durable, it would be economical to dig it out for street construction. We cannot open quarries in the city, and if a quarry happens to be in a railway cutting, it is an advantage rather than a disadvantage. There is no grave objection to turtle-back bridges over the present line, but they are not possible in many places. Under-bridges are usually found only where the grades are faulty. The road under the bridge generally has a grade on both sides. That is not good city planning. It is not necessary to treat Capital-terrace and Federal-avenue as they will be treated in fifty years' time. In the first stage of development it will be necessary to have a goods station of a temporary character much nearer to the Molonglo River than Prospect Park, but care should be taken that it is not allowed to become the central goods depot of the future city. Experience has shown that when any interest becomes vested in a city it is difficult to remove it afterwards. I have no fixed ideas about a goods station. To come out to the surface as quickly as possible north of Civic Centre is an alternative which we contemplated. We do not recommend it, but it might be done for economic reasons. That would get rid of half the difficulties, and retain half the disadvantages. Railways are constantly being lowered while traffic is running on them. It is comparatively easy to carry out such an operation in the country, but when the line is surrounded by city streets, it is more difficult. I have not heard that the level crossing between Queanbeyan and Canberra is being abolished. Recently there was a man guard there night and day. There is a great deal of traffic over it. I am quite emphatic that I do not want level crossings in the city. If the Government will not spend the money to sink the railway, level crossings may be unavoidable, but personally I am opposed to them.

77. *To Senator Barnes.*—The cost of putting the railway in a tunnel would be about twice as much as the cost of an open cut. Tunnel might be contemplated in the very distant future. With land at a nominal value at present, and not of very great contemplated value in the future, we thought a tunnel was outside the scope of practical economics. We are proposing a tunnel at East Lake Circle. The material from the cutting is required for filling. Only at one place will there be an excess of cutting, and for this we have a very good use. If spoil is not obtained from there it will have to be got elsewhere to fill up certain low lands on the flats of the Molonglo River south of Civic Centre. We will have to get filling for buildings roads over the low ground.

77A. *To Mr. Cook.*—The heaviest cost of construction will be at Civic Centre. Traffic there will be dense in the future. I cannot say what would be the approximate cost of an underground railway at Civic Centre. Taking that section alone I could only make a wild guess of about £40,000, to which I do not wish the Committee to attach much weight. I cannot say whether I would approve of Mr. Hobler's amended scheme without knowing the details of it. The Railway Department views the subject from a railway point of view. They want to build the railway economically to carry the traffic of the district. As a member of the Advisory Committee I have to look at the problem from a different point of view. I have to consider the relation of roads to the railway, and the development of the city generally. The Committee considered every detail relating to how the railway would grade out to surrounding lands. It would be very difficult to consider the railway without reference to the contours of surrounding lands. If the proposed railway cannot be built I would place it outside the city boundary so that it would cross no streets or projected streets. I would build it as cheaply as possible, and reserve a space through the city for a future railway. If the railway is put through the city at all, it should be built at a proper level. A railway outside the city would save, probably, £100,000. The Advisory Committee received a plan with instructions to carry it out. Part of that plan is for a railway route, from which we can deviate within reasonable limits. Putting the railway outside the city would leave us free to develop the city on any lines we liked. I would not put level crossings in a town of 10,000 inhabitants. In fourteen years the maximum population may be 12,000 or 14,000. I do not think the Committee is unanimously of opinion that the river silt will make a suitable embankment. I was not of that opinion until I investigated the matter. It is not as though the water will rise a great height on the bank. It will rise only a few feet; nor will there be a very great velocity. It can be observed how the river banks resist floods. They are mostly composed of alluvial soils, and they stand well. Vegetation runs its roots into the banks, and even a high velocity of water does not destroy them. Almost any material that could be excavated would serve for the banks. I am determined on the suken railway if a railway is built at all in the city. It is quite conceivable that if there was a crossing on the Molonglo available, the expense of taking the railway through the city could be avoided, and the city could be served for the next 25 years by a railway outside it as well as if the railway went through the middle of it. To alter the route of the railway at Capital-terrace and Prospect-avenue would involve rearranging the plan of the streets in that neighbourhood. That would be costly. The Advisory Committee is not allowed to re-plan the city. I hold the view that for all practical purposes the railway would be as well outside the city. At Sydney, for example, there is a railway at Darling Harbor, and the people are farther away from it than they will be at Canberra. I hope the Committee will not take my rough figures as a guide, but I should say that taking the railway outside the city would save at least £100,000.

78. *To Senator Lynch.*—It will not be necessary to have a core in the bank, but it may be necessary to pitch the toe of the bank for a certain distance with heavy stone pitchers. That may be necessary where the water velocity is great. There is little velocity of water some distance from the opening. Unless there is velocity of water the banks will not give way. It is not necessary to have a covering of harder material. If the angle of the banks is sufficiently flat, and they are pitched with rock wherever there is velocity of water, natural vegetation will do all that is necessary. The Committee expects that the design of the bridge will be submitted to it. The designs of other bridges have been submitted to us, and have received our closest criticism, and, if necessary, amendments have been suggested. We think it is our duty to consider the details

of the bridge. The duty of the people who will be responsible for the future development of the city will be to screen the railway so that one can neither see from the railway into it. A railway is never a beautiful thing, and there is no reason why people should not be carried into the city behind screens. I hope that by means of suitable avenues, hedges, and plantations, the railway will be properly screened. I would not say that residents near the railway should be compelled to turn the fronts of their houses to it. If the railway is an objectionable thing, I would allow them to back their houses to it. Electric traction at Canberra cannot be contemplated within the next 50 years. I look upon the railway as a through line between two places communicating with the city.

79. *To Mr. Jackson.*—The question of a railway or no railway is outside my ambit. I am satisfied that, generally, we are putting down too many railways and not enough roads. Except for passenger traffic the modern highway is properly graded road, if given a chance as the railway, will beat the railway every time. If roads were graded as railways are graded, the railways would not be able to earn extra money. Traffic is carried between Sydney and Orange by road every day in the week. These go over badly graded roads, and yet they earn dividends while the railways cannot make a profit. Whether there should or should not be a railway in the Capital Territory is a question of Federal policy, upon which I am not competent to express an opinion. If the railway is constructed on the route proposed, it should be built once and for all at its permanent level.

(Taken at Sydney.)

FRIDAY, 22ND FEBRUARY, 1924.

Present:

Senator LYNCH, in the Chair;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakeley	

John Sulman, F.R.I.B.A., M.T.P.I., Consulting Architect, Chairman of the Federal Capital Advisory Committee, sworn and examined.

80. *To the Chairman.*—The Advisory Committee was instructed to carry out Mr. Burley Griffin's plan, on which the route of the railway was already shown. Discussions took place for a slight divergence to avoid a tunnel at the Market Centre. That is practically all the Committee had to do with the route of the railway. The object of that divergence was to cheapen construction and avoid a hill. The Committee has suggested another slight divergence at the Civic Centre. That was done partly at the wish of Mr. Bell, in order to get a straight line where it passes through the railway station. We have flattened the curve there. We accepted the plan as an instruction to which we had to adhere. We have never considered the line as a whole, but accepted the route, and made slight alterations and improvements. Mr. Bell has consulted us. Mr. Hobler was at Canberra recently investigating the question of whether the line should be placed on the surface or in a cutting. The Committee had a general idea that the construction of the line would be costly, but until we heard the estimates of the Railway Commissioner we did not know what it would cost. If the route of the line is preserved, and we are generally agreed that it is laid out as well as it can be for the use of the city, I do not see that any reduction of cost can be made, except possibly from engineering points of view with which I am not familiar. The Committee is absolutely of opinion that the line should be in a cutting, and that it would be a suicidal policy to make it a surface line cutting across streets on the level. Level crossings if formed now will have to be altered as the city grows. America went in very largely

for surface lines crossing streets, and is now very busy removing them. The Railway Commissioners of New South Wales avoid level crossings wherever possible. The Committee has not made any recommendations except the minor alterations to which I have referred, and the sinking of the line. There is a very good reason for not using the existing line to the east of East Lake Circle via, it is covered with water in, flood time. I favour the proposed deviation rather than the utilization of the present line. It has been arranged that the bridge over the Molonglo River shall have a 3-foot clearance above the highest flood on record. If the bridge is placed clear of flood level the approaches must be graded. I do not see how any money can be saved on either side of the railway bridge unless the bridge is placed below flood level, in which event it will probably be washed away again. North and south of the bridge, and its approaches have been surveyed and arranged so as to avoid cutting across the railway on level grades. Over bridges will be employed. In some cases they will have to be slightly arched. Such bridges are not so good as level bridges, but they will cost less money. We have not asked for any undue expenditure. We are unanimous in wishing to preserve street communication. In some instances we agreed to make the streets dead ends at the railway line. People living in such streets will have to go round to the nearest bridge. We have not insisted upon bridges at every cross street. We have not asked for a line in a cutting at the Industrial Centre, because we believe it will be a great many years before that centre becomes congested. I am not prepared to modify my opinion about the railway up to the Molonglo River, across the Molonglo, and to the Civic Centre. I do not propose an elaborate station at the Civic Centre at first. The main sidings will be at the Industrial Centre. There must be a small goods shed at the Civic Centre. There should be at a low level. I think the plans provided for two sidings, but I do not know whether two have been included in the estimate. The Advisory Committee has not considered that matter in the light of the Railway Commissioner. When Mr. Bell was there he had a rough plan. The only point in regard to which I am prepared to depart from the plan is in the abandonment of the level line at the Industrial Centre. There will be a fair amount of cutting at East Lake station in order to get the streets over the line. On the approach to Federal-avenue the Committee made a slight deviation to save some cutting. On the original plan the curve went nearer to the Civic Centre. We are forming a square round the station. There will be two overhead bridges between the Civic Centre and Interchange-avenue. That is the minimum we can possibly do with. Other bridges can be provided later. A surface railway at Civic Centre would sever two important part of the city, and would be a grave mistake. The Committee has shown on its plan the amount of land that should be reserved for railway purposes. We propose to have sufficient width for a plantat-on to mask the line on both sides of it, and to deaden the noise. The line at first will be a single track, and later a double one. In addition to sufficient land for a double track and battering of the cuttings, we have sufficient room for plantations. The Committee has not discussed the development of motor traffic in relation to the proposal to build the line. The construction of the line as proposed is absolutely necessary to the carrying out of the plan of the city.

81. *To Mr. Cook.*—I maintain that I am instructed by the Government to assist in carrying out Mr. Griffin's plan. I have my own opinion about that plan, but as Chairman of the Committee I can only say that I am carrying out my instructions. The plan is a matter upon which I am not asked to give advice. I cannot see what alternative there is to building the railway as proposed. It would take me several weeks to consider what I would do if the matter was entirely in my own hands, and I was spending my own money. Our advice is accepted in the carrying out of the plan.

but the plan itself was an instruction to us, I have no idea how the cost could be materially reduced without destroying the plan. It would be very undesirable to continue the existing line on the surface level. I am aware of Mr Hobler's proposal to save £145,000 in the estimate. I do not regard it as desirable, because that amount of money, or twice that amount, would have to be spent in the next fifteen years in altering the work. As soon as Parliament sits here there will be a population of at least 6,000 people, and in fifteen years there will be 20,000 or 25,000. The only responsibility the Committee takes is in advising that the railway should be in a cutting through the city. We stand firmly to that. My personal opinion is that there is no other available route. I do not agree with the proposal to build the line outside the city. I am not in favour of using any portion of the existing line. I have had very little experience of railway embankments. I am satisfied that the proposal, notwithstanding the cost of it, is the best that can be done. I can not offer any hint for effecting a saving. I am quite satisfied that there must be an underground station at Civey Centre.

82 *To Mr. Jackson*.—The question of a motor service between Yass and Canberra has not been considered by the Committee. The progress of Canberra will be very materially retarded if the line is not constructed for several years. The railway will assist the economical building of the city. Supplies come mostly from Sydney. We have not made any estimate of the probable amount of traffic on the line. There will be a lot of traffic from the south as soon as a commencement is made in moving the Departments. A large number of officials, and the furniture and effects, will have to be brought here. It would take them four hours longer to do the journey *via* Goulburn than *via* Yass. The motor car will undoubtedly increase in popularity. A good motor road between Yass and Canberra is very desirable. There should be motor roads all over Australia. It will not be necessary to build a concrete road if the railway is built. If the railway is there people will travel by train. I prefer to travel by train rather than by car. The time-tables will be altered when Canberra is developed. I would not agree that it is unnatural whether a passenger alights from the train at Yass or at Canberra. A concrete road would be very

costly. Eventually a good motor road must be built. I adhere to the opinion that it would be preferable to build the railway first and the road afterwards. The growth of the city will be retarded if the railway is not

85. To Mr. Cook.—I do not think a line outside the boundary would be desirable even if it would save £100,000. I can hardly imagine that it would save £200,000.

83. *F. M. Blakely*—The objection to retaining the existing line to the east of East Lake Circle is that it is flooded. It cannot be used without incurring great danger of dislocating traffic. The spoil for the embankment should be obtained from East Lake station site and thereabouts. Engineers have calculated that the cutting will be equal to the filling. It is necessary to have an overhead bridge at East Lake Circle. The Committee has already agreed to a modification of the plan at Federal-avenue and Capital-terrace. We discussed it with Mr. Bell. I would have to be on the spot before I could answer a question about putting a turtle-back bridge over Federal-avenue. Turtle-back bridges are very ugly, and are bad for traffic. We have to adopt them to a certain extent, but I do not think any one would use them unless forced to do so by necessity. If the line is sunk at Civic Centre and brought up to the surface as quickly as possible, it would sever two very important portions of the city which will fill up as quickly as any other parts. The line will eventually have to be sunk. The Committee has agreed upon a line which comes out at Interchange-avenue. That avenue is on a hummock, and that is why there is an overhead bridge built. I am not a prophet, and cannot tell what inconvenience will be caused if the railway is not built for seven years. In a Federal Capital the best communications possible should be provided.

84. *F. M. Blakely*—The objection to retaining the line to the east of East Lake Circle is that it is flooded. It cannot be used without incurring great danger of dislocating traffic. The spoil for the embankment should be obtained from East Lake station site and thereabouts. Engineers have calculated that the cutting will be equal to the filling. It is necessary to have an overhead bridge at East Lake Circle. The Committee has already agreed to a modification of the plan at Federal-avenue and Capital-terrace. We discussed it with Mr. Bell. I would have to be on the spot before I could answer a question about putting a turtle-back bridge over Federal-avenue. Turtle-back bridges are very ugly, and are bad for traffic. We have to adopt them to a certain extent, but I do not think any one would use them unless forced to do so by necessity. If the line is sunk at Civic Centre and brought up to the surface as quickly as possible, it would sever two very important portions of the city which will fill up as quickly as any other parts. The line will eventually have to be sunk. The Committee has agreed upon a line which comes out at Interchange-avenue. That avenue is on a hummock, and that is why there is an overhead bridge

(Taken at Sydney.)

WEDNESDAY, 27TH FEBRUARY, 1924

Present:

Senator LYNCH, in the Chair.

Senator BARNES, in the Chair,

Charles Auston Hodgson, Chief Traffic Manager, New South Wales Railways, sworn and examined

87. *To Senator Lynch.*—I am aware of the reference to the Committee, and of the agreement between the New South Wales Government and the Commonwealth Government on the subject. That agreement is embodied in the schedule of an Act relating to the construction of the line. The wording of the section is—

In the event of the Commonwealth constructing a railway within the Territory to its northern boundary the State shall construct a railway from a point near Yass on the Great Southern railway to join with the said railway. . . .

I have received a communication to the effect that the Commonwealth is constructing the line. A survey has been made of the New South Wales section. The most convenient point of junction with the Great Southern line would be at Yass Junction. There will be 27 miles 54 chains of the line within New South Wales territory. The ruling grade will be 1 in 66. There are bridges or viaducts. The estimated cost is £10,725. The minimum curve will be 20 chains. When instructions are received to start the work it will take about two years to complete it. A bridge will have to be built over the Yass River, and the material for it will have to be imported. That will be the heaviest part of the work, and will cost about £33,000. There is a bridge at the present time, but it is not suitable. A train line runs over it. It is not usual to run vehicular and tramway traffic on the same bridge as a railway, but I know of no reason why it should not be done. It is immaterial who constructs the line. It would hardly be convenient for the Commonwealth to undertake the construction of the line in our territory, because part of it would be the conversion of the existing line from Yass Junction to Yass. That line will have to be converted into a first-class railway, and traffic will have to be maintained while it is being done. For that reason we would like to do the work instead of having an outside body interfering with one of our lines. It would probably be cheaper for one constructing authority to build the whole line. The one plant would then do for the whole job. I had nothing to do with the construction of the line from Queanbeyan to Canberra. I am not aware of the financial arrangement made between the Commonwealth and the State for the construction of that line. I am not aware that the Commonwealth was charged £2,014 for one year's use of plant which was valued at £3,645. From Sydney "down" the line is graded 1 in 40. On the "up" journey it is 1 in 75. It has been graded on the "up" journey. It used to be in 40. The theory is that empties are carried on the steeper grade, but it sometimes happens that our "down" traffic is heavier than the "up" traffic. I do not think there would be any advantage in having a flatter grade for the Canberra line. If you are going to be a trunk line to carry heavy through traffic it might be worth considering, but it is not likely to be the case. The New South Wales railroads have no storage-battery rail cars. I am aware of the introduction of storage-battery cars on some of the railway systems in the United States of America. Petrol rail motors are used in Victoria, and we have also petrol-driven cars. They were made in order to improve the services on outlying branch lines. They give a quicker journey than by mixed trains. The mixed service, however, is not so costly as the rail motors. The rail motors do not take the place of the mixed service, but are supplementary to it. They con-

at Albury at 10.21, and passengers do not get into their berths until about 11 p.m. I see no prospect of the starting times being altered until the gauge is unified. The time of arrival of passengers at Yass will not be altered while the break of gauge continues. I cannot hazard a guess what the starting times will be when the gauge is altered. The starting times from Sydney, namely 7.25 and 7.50 p.m., are suitable. I cannot speak of the suitability of the starting time from Melbourne. The Federal Capital would not have any influence upon the starting time. The New South Wales railways have not felt to any extent the effects of competition by road vehicles. Such competition is growing around Sydney. The competition in Sydney is mainly with the trams. It is not growing in the country, and I am inclined to think it is less than it was. Motor cars are run over the Blue Mountains. They are in competition with the railways, but their effect is very small. I do not apprehend any serious competition from road vehicles in the future. The railways can hold their own for all long-distance business, but they are likely to suffer in connexion with short-distance traffic. I would say that Yass to Canberra short-distance traffic, breaking the traffic has to come from somewhere else. It will be almost all through traffic. The trend of traffic in Australia is quite different from what it is in older countries. Almost the whole of the traffic in Australia is products of the land going to the seaboard, or traffic from the seaboard to country centres. There is not the same inter-urban traffic there is in older countries. In England there is an enormous amount of comparatively short-distance inter-town traffic. That is where the motor comes in. The bulk of our traffic is long-distance business. I have been over the line between Goulburn and Queanbeyan many times. It is not the best sample for comfortable travelling. It is an old branch line. The Government would not admit that the line is in bad order although it has several grades and curves. I did not make it, and had nothing to do with maintaining it. It is not a pioneer line, but is ballasted and foamed. The regrading of it would cost a considerable sum, and straightening the curves would also be expensive. Passengers travelling from the south would save roughly from four to four and a half hours by travelling via Yass as compared with travelling via Goulburn.

88. *To Senator Reid.* There would be no difficulty about detaching sleepers from the south at Goulburn. A connecting train would have to be run from Goulburn, and the through cars would be attached. It would be just as easy to conduct the traffic through Goulburn as through Yass. It would take about three and a half hours to run from Goulburn to the Territory. The limited train gets to Goulburn about 6.15 a.m., and passengers could be in the Territory about 9.30 or 9.45 a.m. There is no reason why sleeping-cars from Sydney should go on the express. There is a train to Queanbeyan at 8.25 and it gets to Goulburn a little after midnight. It would not matter what time it got to Goulburn, for it would have to wait until 6.30 in the morning for the arrival of the train from Albury. The probability is that the train would not be delayed at Goulburn, and would go on. It would drop the cars for Canberra, and they would be picked up by the Federal train later. The train goes on to Bombala. It serves Cooma, Nimmintabel, and Bombala. The train could leave Sydney very much later. The ordinary train to Queanbeyan arrives between 4.30 and 5 a.m. Sleepers could be dropped at Goulburn to wait for the Melbourne train, and passengers could arrive in the Territory for breakfast. There are refreshment rooms at Goulburn and Queanbeyan, but not at intermediate stations. Tarrago and Bungendore are the largest places in between. Very little business would be done on that train. The Melbourne express stops at Moss Vale at 8 o'clock for breakfast, but many people do not get out of their bunks.

89. *To Mr. Mackay.* I cannot state the probable term in which the New South Wales Government would undertake the construction of the Federal portion of the line. Passengers to Canberra from Sydney go via

Queanbeyan, where they arrive about 4.45. Passengers to Melbourne reach there about ten minutes to 1 o'clock. There would be a saving when travelling from the north to Canberra, as compared with travelling from Melbourne, of seven hours. I would anticipate a heavy loss on the Yass-Canberra railway. The Government made the agreement, and the Railway Department has to carry that baby. It could not be justified from any other point of view.

90. *To Mr. Jackson.* Through passengers from the capitals would not like to turn out at Yass and get into a motor. Sleeping cars could be side-tracked at Yass and left until 7 a.m. I have not considered the working of the traffic by road motors. I have not been over the road. Personally I do not consider the line should be built. At a cost of £750,000 I should say, "Certainly not." The time is not ripe for such an expenditure. Interest will have to be paid on the money, and the line will not pay working expenses.

91. *To Mr. Cook.* I do not know anything about the estimate of £400,000 odd. I do not know whether it is correct. I cannot say whether the New South Wales Government would have its portion of the line completed as soon as the Federal portion. If the Government finds the money, the Department can build the line in two years, but the Government must first find the money. The Railway Department cannot start until Parliament has voted and provided the money. There will come a time when the line will be required. Motor trains in New South Wales are giving only mixed satisfaction. They are perfect when they run, but they do not always run. They are a most admirable means of getting about the country. They are easy riding, quick, and everything that could be desired, when they run, but they have an unhappy knack at times of not running.

92. *To Senator Lynch.* If the Railway Department got instructions to go ahead with the work it could start at once. Even if the Yass-Canberra line is built I doubt whether passengers or goods from the north would go that way. The new line would carry only the through traffic. If the traffic did go that way it would be only diverted traffic, and no additional revenue would be derived. The revenue would be lost on one line and gained on the other. The line proposed is a first-class line with stone ballast and 80-lb. rails. It will be equal to the best line of that type in New South Wales. 100-lb. rails are used in the suburbs, 90-lb. rails on the trunk line to Albury, and 80-lb. rails on first-class branch lines and on some of the trunk lines. The weight of rail used depends largely on the volume of traffic. I cannot say whether the line would have to be referred to the New South Wales Public Works Committee.

(Taken at Melbourne)

MONDAY, 3RD MARCH, 1924.

Present:

Senator Lynch, in the Chair.
Senator Barnes
Senator Reid

Mr. Mackay
Mr. Mathews

John Henry Olsson, Chief Special Officer attached to the Passenger and Freight Agents' Branch of the Victorian Railways Department, sworn and examined.

93. *To Mr. Mathews.* I have not been to Canberra, and have no knowledge of its situation other than that gained by seeing its position on the map.

94. *To the Chairman.* I have supplied the Committee with copies of a number of statements, and it might, perhaps, be advisable to deal with them in the order in which they appear, and then refer to one or two instances in each so that a general idea might be gained of the volume of traffic and the peculiarities of

each particular town. The statements are as follows:—(1) Population in 1923, and remarks as to industries, &c., of 14 inland towns in Victoria, (2) particulars of outwards goods tonnage and revenue at 17 inland stations in Victoria—year ended June, 1923; (3) statement of outwards, and some inwards traffic, at 17 inland stations for years ended June, 1900, 1905, 1910, 1915, 1920 and 1923; (4) return of inwards goods and parcels revenue at 17 inland stations for year ended June, 1923; (5) railway map showing location of stations referred to. Statement No. 1 is headed "Population and important features of the undermentioned cities and towns in Victoria." Probably the most important of these is the city of Ballarat, including Ballarat East, with a population of 37,757 persons. It is an important railway junction for North-western, Maryborough, Daylesford, Newtown, Buninyong, and Geelong lines, and is next in importance to Melbourne. It has gas and electric light services, electric trams, railway workshops, hospital, orphanage, school of mines, high school, iron foundry, brewery, flour-mills, woollen-mills, tannery, fellmongery, soap, bacon curing, and tile works, bone-mills, quartz crushing works, butter, ice, confectionery, biscuit, and other factories, and freezing works. I thought that city would be the most suitable for comparison with the proposal now being investigated by this Committee. It is a city of fairly large proportions, and greatly patronized from a tourist point of view. It has very fine public gardens, streets, and statuary, and, generally speaking, it will for some years to come compare with Canberra. The town of Echuca has a population of 4,000. It is an important railway border town, and the main despatching and receiving point for river-borne traffic to Darling and Euston districts. It is the Victorian terminal of the Donaquin line recently taken over by the Victorian Railways Department from a private company. It is the centre of a wheat-growing district, and there is a large live-stock traffic. There are technical, grammar, and high schools, hospital, saw-mills, brick works, flour-mills, gas works, cordial factories, chilling works, and butter and bacon factories. With the exception of Swan Hill and Mildura, Echuca is almost unique for the fact that a large proportion of its traffic is brought to it from the River Murray and the rivers of the Riverina district in New South Wales. Another progressive town situated under rather different conditions is Horsham, with a population of 3,975 persons. It is a fairly important railway town, being the junction for Goro and the Balmoral-Hamilton-Portland line. It is stated in the *Municipal Directory* as being the metropolis of Wimmera, and is situated in a wheat-growing district. It has a hospital, high school, pumping station, cordial factories, electric light and gas works, butter factory, flour-mill and silo, staved flour-bins, and brick kilns. Horsham, to a very large extent, is dependent for its prosperity on the rich agricultural land surrounding it. Another typical city is Geelong, but it can hardly be compared with Canberra, because a very large proportion of its business is due to the city being a seaport. A great deal of the wheat grown in Victoria is exported from Geelong, and there is also a small import business. The population of Shepparton is 4,000. It is a railway depot, and the junction for the Dookie-Katamatitio line. It is situated in an irrigation district, growing fruit, lucerne and vines, and has a high school, gas and electric works, flour-mills, brick works, frozen meat works, tannery, creamy, brewery, and cordial, butter, and bacon factories. This town is situated in the centre of the irrigation area of Victoria, where soft fruits and lucerne are very largely grown, and on that account the local industries have received considerable assistance. I have taken out the revenue for those towns, but not the rates. If the Committee desire the rates I can obtain them without any difficulty. The statements cover the passenger and goods traffic. It will be noticed that in statement No. 3 I have taken out the traffic for the years 1900, 1905, 1910, 1915, 1920, and 1923. Those

are five year periods, with the exception of the last, which, of course, is the last available figure. In 1900 the number of passenger journeys by rail from Hamilton was 21,636, and the revenue from those passengers was £5,818. In 1923 the journeys were 46,438, and the revenue £18,662, so that in a period of twenty-three years the passenger journeys increased by more than 100 per cent., and the revenue by more than 300 per cent. I have not the figures showing the increase ofwards figures, I might explain that the method of keeping the records in our Department precludes full information respecting inwards traffic. It has been the practice in preparing the Commissioners' annual report to take the outwards traffic of every station, and, of course, by so doing we indirectly obtain the revenue of the inwards stations, because the outwards revenue applies only to outwards traffic, and to some extent reflect the inwards traffic of any particular place. "Outwards" is traffic from the station, and "inwards" is traffic to the station. I have been able to obtain some information respecting the inwards traffic for the year 1923. The outwards traffic from all stations in the system represents the total inwards traffic to all stations in the system. It is rather difficult to explain. For instance, taking ten stations and sending from each one to the others, at the end of the year when totalling up the receipts at that set of stations they will agree exactly with the outward figures for those stations. The method of compiling the Commissioners' report does not give very definite information regarding the inwards traffic of individual towns. I would hardly say that the inwards traffic would closely correspond with outwards traffic, because at some towns there is a large outwards traffic in primary products, but nothing inwards. It depends upon the nature and situation of the town. I cannot very readily assist the Committee to form any idea of the inwards traffic as the records have not been kept for back years. We can gain no complete record of the inwards passenger traffic to any town except by exhaustive inquiry that would probably take months, but regarding other classes of traffic we are able to give some information which, although perhaps not correct to the exact figure, will enable the Committee to form a conclusion as to the volume of traffic. The parcels traffic totals for Hamilton in 1900 was £1,765, and the inwards traffic £2,059. That is contrary to what I said just now, but as a matter of fact, we did keep some records at that time until 1915. In 1923 the outwards parcels traffic was £1,818, and the inwards parcels traffic, according to statement 4, was £322. In 1923 the outwards horses, carriages, and dogs traffic was £61, but that is only a small factor in the traffic. We have no comparative figures of the inward traffic. In 1900 the goods outwards traffic was 5,447 tons, and the revenue £4,011. In 1923 the goods outwards traffic increased to 15,720 tons, and the revenue to £15,119. The inwards goods traffic in 1923 was 19,495 tons, and, according to page 4, the inwards goods traffic for 1923 was £24,605. The item "horses, carriages, and dogs" relates to passenger trains. Live stock is a different class of traffic, and is carried on goods and live stock trains. The number of trucks loaded with live stock in 1900 was not recorded, but 856 trucks were loaded outwards in 1923, the revenue being £5,372. The inwards live-stock traffic for 1923 represented 433 trucks, but we have no information as to the revenue. The total outwards revenue for Hamilton in 1900 was £13,562, and in 1923 £41,432. In twenty-three years the increase was practically 300 per cent. I have no figures as to the total inwards revenue. The figures stated include all outwards traffic. I have no record of inwards passenger traffic, but for inwards goods and parcels traffic the figures are £24,605 and £23 respectively. I could not safely say that the outwards revenue of £41,432 would represent the inwards revenue. We certainly

Now that the inwards goods traffic was £24,605, as against the outwards goods revenue of £15,119. I should say that the passenger traffic, under the book-keeping system at present operating, would be about the same for inwards and outwards, because in most cases we issue single tickets each way, and of course the people who travel to Hamilton would have to return. The inwards and outwards passenger traffic would substantially balance, as every person who travels to Hamilton and returns would contribute equally each way to the revenue. Of course, one could not calculate the whole of the goods traffic being earned in the Hamilton station, as it is earned by traffic forwarded to other stations to Hamilton, and vice versa, so that, properly speaking, Hamilton could be credited with only half of the goods traffic revenue. That is the reason why we prepare our records on the outwards traffic only. The amount of £15,119 for outwards traffic to Hamilton last year could not legitimately be credited to Hamilton. As a matter of fact, it is very probable that the cash represented by that £15,119 was collected at other stations. It is revenue brought in for traffic forwarded from Hamilton and paid for delivery. Of course, the same thing would apply to other stations, and that is the reason why I think the inwards traffic figures I have given are an accurate reflex of the earning capacity of a particular town or district. I should say that the inwards passenger traffic to Hamilton would equal the outwards passenger traffic, viz., £18,000, because passenger fares are pre-paid, and we can always reasonably assume that the traffic outwards will very closely approximate the traffic inwards.

To Mr. Mathews.—The outwards passenger traffic to Daylesford in 1923 is shown as 24,630 journeys, the revenue as £7,048. As Daylesford is a tourists' centre, a number of people who patronize that district travel at holiday times when return tickets are on issue, and it is quite possible that the passenger revenue is paid to other stations than Daylesford would be substantially larger. For instance, a person visiting Daylesford for a holiday would purchase a return express ticket from Melbourne, and, owing to the way in which fares are computed, Daylesford would receive no credit for that revenue.

To the Chairman.—The population of Bendigo stations in 1920 the outwards passenger journeys recorded 116,672, and the revenue £26,630. In 1923 the outwards passenger journeys increased to 228,780, and the revenue to £69,042. The comparatively small increase is, no doubt, largely due to the retrogression of the gold mining industry. The outwards passenger traffic in 1920 was £7,840, and in 1923 £7,946, but these figures require some explanation. On page 3 of the document there is a note reading as follows:—“(1) The revenue shown for parcels, outwards and inwards, for years 1920 and 1925, also includes revenue from passengers, horses and dogs, mails, rentals, and miscellaneous collections for storage, demurrage, etc.” This arrangement of headings accounts for what would appear to be a very slight increase. The revenue from parcel traffic in 1920 was £9,035, and in 1923, as shown in statement 4, £2,013. The same explanation applies in that case. There is a small item for horses, horses and dogs outwards of £1,343, but no information regarding the inwards revenue. The goods outwards traffic in 1920 was 15,464 tons, the revenue being £11,573. In 1923 it increased to 54,279 tons, and £27,572 revenue, the latter being five times as much. The tonnage of goods is not quite four times as much, but that is accounted for by the fact that in recent years the revenue has been out of proportion with the tonnage on account of the increase in freights and the consequent on the higher cost of operating the railway system. The goods inwards traffic, as shown in the annual report for 1920, was 109,482 tons, and in 1923 it increased to 93,478 tons. The inwards goods revenue for 1923, as shown by statement No. 4, was £80,392. The live-stock revenue outwards in 1920 was

£921, and in 1923 it was £15,857, the increase, no doubt, being due to the additional markets at Bendigo consequent on the increase of population in that city and adjoining districts. Bendigo has become an important trading centre for live stock. The only information of inwards live-stock revenue is the number of trucks which, in 1923, was 5,739. There is no corresponding figure for 1920, but in that year the revenue is shown as £4,296. The total outwards revenue in 1920 was £24,970, and in 1923 £152,660, representing an increase of about 300 per cent., as in the case of Hamilton. Statement No. 2 gives information as to how revenue from goods was obtained. Taking Bendigo, the outwards traffic was—Miscellaneous, 6,369 tons, revenue £2,851; class A, 6,134 tons, revenue £5,670; class B, 2,074 tons, revenue £3,270; class C, 1,019 tons, revenue £1,703; class I, 876 tons, revenue £22,136; class 2, 833 tons, revenue £2,355. There is also revenue from other commodities which I shall not enumerate, flour being the chief item, £690 tons. This is accounted for by the fact that there is a very large flour-mill operating in the district. Thinking that, perhaps, the information shown on Statement No. 2 was rather incomplete, I have obtained additional information explaining briefly the principal classes as they are mentioned on the statement. For instance, the firewood rate applies to firewood, including Mallee roots, mining timbers, and certain low grade ores carried in full truck loads. I have also shown the rates for the different classes in zones of 50 miles, 100 miles, 150 miles, and 200 miles, so that a comparison may be made of one rate with another. In the case of firewood it is 5s, 4d., 8s, 4d., 10s, 8d., and 12s, 6d. per ton respectively, and the rate per ton per mile ranges from 1.28d. for 50 miles to 7.6d. for 200 miles. The manure rate is applicable to fertilizers and stable manure in full truck loads. Class “M” is applicable to low grade traffic such as clay, soil, bricks, &c., subject to specified truck minimums. Class “AP” (agricultural produce) is applicable to grain and other agricultural produce subject to specified truck minimums. Class “SAP” (special agricultural produce) is applicable to traffic in class “AP” when consigned in quantities of 3 tons but less than full truck loads. Class “A” applies to traffic specified under class “M” or class “AP” when forwarded in consignments of 2 tons, and this class also includes a number of commodities, the nature of which justifies their inclusion. Class “B” applies to traffic classified under Class “M” or Class “AP” when forwarded in consignments of 1 ton, and this class also includes a number of commodities the nature of which justifies their inclusion. Class “C” includes traffic in consignments of less than 1 ton, which in ton lots are charged class “B,” also a number of commodities the nature of which justifies their inclusion. Classes “1” and “2” are applicable to goods of high value of exceptional bulk by comparison with weight, or for other reasons regarded as being suitable for a high classification. The cost of carriage includes terminal charges, shunting, accountancy, &c. As the terminal charges are the same for long as for short distances, the rate per ton per mile tapers off according to distance. The taper in rates is also applied to assist settlers in remote districts, thereby promoting settlement. Especially low rates are fixed for manures, as their use promotes increased production. Low rates for road materials are granted in shire and borough councils, as it is considered that good roads greatly assist production in outlying districts. Special rate concessions are granted in respect of certain raw materials to be used in the manufactured products of country industries, also to products of country industries when carried on “up” journeys. Various concessions other than those mentioned are extended to country products carried on the “up” journeys to encourage decentralization. Ballarat is much in the same class as Bendigo, excepting that the former is the centre of a rich agricultural district, and is becoming more and more

manufacturing centre. I know that the residents of that city are very keen on concessions on railway freights. It will be noticed that the total outwards traffic of Ballarat East in 1923, as compared with 1920, does not show a very large increase. This is mainly due to the greater portion of the traffic being dealt with at the Ballarat station. The two stations are within half-a-mile of each other, and the tendency is to make use of the larger station where the business can be transacted more satisfactorily. Statement No. 5 is a map of Victoria that may be of some interest to the Committee. The towns I have dealt with are shown in red circles. I shall obtain for the Committee a statement showing the increase of population at Daylesford, Ballarat, Hamilton, and Bendigo from 1900 to 1923, or rather in 1901, 1911, and 1921, which were the census periods, and shall show a comparison with the items of traffic for those years. Concerning the effect of motor traffic on the railway system, both in the metropolitan areas and in the country, it would be a very difficult matter for an officer of the Railway Department to give such information owing to the fact that no returns of the motor traffic are available. Of course we do know that the Railway Commissioners have met with opposition in suburban passenger traffic, and also to some extent in passenger traffic between the city and country districts. We also know that there is a certain amount of competition in goods traffic between Melbourne and different inland towns such as Ballarat, Warragul, and Bendigo. On the other hand, we know of some instances where motor traffic has developed between the outlying districts and railway termini, and, as a matter of fact, has brought traffic to the Railway Department. Motor traffic is on the increase, and has made its presence felt on the railway system. We know that within the suburbs the motor competition is very keen, and although we are of the opinion that in some instances we supply a better service, yet there are certain advantages attached to motor bus carriage which appeal to the public, thereby diverting traffic from the railways. One very strong reason for this diversion of traffic is that the buses run through the city and draw passengers close to their places of business, whereas we can only carry them to the railway station. On the other hand we claim that our service is more comfortable and more expeditious, and we think that we shall be able to hold our own in comparatively long distances. Certain country traffic has been diverted from the railways owing to the use of private motor cars. People who formerly patronized the trains now club together and travel to important race meetings and other functions, but we do not know the extent of that traffic; we only know that it exists.

To Mr. Mathews.—It is quite possible for motor vehicles to compete with the railways between Melbourne and Geelong, particularly on account of the excellent roads and the fact that motor vehicles are able to run at times not suitable to us. In some cases they take the public door to door. The motor traffic to country towns depends a good deal on the state of the roads. The motor competition will continue, and probably increase up to a certain point, but I am inclined to think that motor competition as far as the Yass-Canberra railway proposal is concerned will not be a very important factor. Concerning the carriage of first and second class passengers on country railway lines, I might state that in the year 1923 we carried 1,553,049 first class passengers for a revenue of £82,784. Season tickets must also be added to that figure. Regarding second class carriage, in 1923 there were 6,385,484 journeys, the revenue being £1,652,617. The season tickets for first class comprised 1,289,170 journeys, the revenue being £185,784; and second class, 718,149 journeys, revenue £31,780; weekly workmen's tickets, 101,206 journeys, revenue £1,184. The total for the country was 10,047,058 journeys, and revenue £2,695,144. In order to make a comparison between first and second class we would need to calculate the whole of the traffic under those standards.

Taking the country, the total first class was 2,842,219 passengers, the revenue amounting to £1,009,568, while the second class represented 7,204,839 journeys, with a revenue of £1,685,676. The ratio of journeys of second class as compared with first class was, roughly, seven to two, the revenue being—second class £1,685,000, and first class £1,009,000.

To Mr. Mackay.—Those figures do not include the city. The suburban passenger journeys are, of course, very much greater. The total suburban traffic represented 146,910,182 journeys, the earnings amounting to £2,393,451. The proportion of first class to second class in revenue was very nearly equal.

To the Chairman.—I cannot give any authoritative statement concerning the starting time of the Melbourne to Sydney express or other train arrangements. It is apart altogether from my duties, and would possibly require some thought.

To Mr. Mackay.—It is quite true that in arriving at the populations of towns like Ballarat, Bendigo, and Hamilton, the surrounding districts are taken into account. Of course, those districts are more closely settled than others. Colac and Warracknabberl districts are closely settled on account of the high value of the land, quite apart from the township. It is quite different in the Mallee districts, where it is necessary for settlers to have a large area of land to enable them to carry on. Generally speaking, outside the city areas it would be safe to say that the productivity of the land would be a strong indication of the possibility of traffic. Having had considerable experience in connexion with reports and information for the Parliamentary Standing Committee of Victoria relating to the construction of proposed lines, I would say that the nature of the country is largely taken into consideration when framing estimates. The land values and other factors are obtained from the Government Departments concerned, and these are analyzed closely with a view to forming an opinion as to what traffic would emanate in the event of the proposed line being constructed. From a railway point of view we do not regard country districts as being particularly good producing country. On the other hand, land which may be of less value, such as Mallee country, is frequently more satisfactory from a railway point of view, as it brings in a greater amount of traffic. The nature of the traffic is a very large factor in determining what the railway finances are likely to be. I know nothing of the Canberra district.

To Senator Reed.—I think Hamilton would probably be the most suitable town to compare with Canberra. It is largely a wool-growing district, although of recent years agriculture has formed a substantial part of its industries, particularly between Hamilton and Ararat in a northerly direction. Of course, Hamilton, being a railway junction, is supplied with traffic from other stations, but that would apply to a greater or lesser extent to most of the towns I have mentioned. Hamilton, in addition to being a fairly rich pastoral district, is a good shopping centre, a certain amount of commercial business taking place there. The population is fairly large, and, of course, depends on the settlement of the surrounding districts. The pastoral industry has been carried on at Hamilton for quite a number of years. There are quite a number of sheep stations in the district, although several of them have recently been subdivided. It is also good agricultural country, and is fairly closely settled. A portion of the district is devoted to agriculture. I could not say what would be the size of the holdings devoted to agriculture, but I know from railway experience that adjoining towns, such as Strathalbyn, Mountsjup, Dunkeld, and Glen Thompson, have recently produced quantities of wheat. Other towns, such as Coleraine and Casterton, are more suitable for wool-growing, and from that point of view have practically been at a standstill.

102 *To Senator Reid.*—Pastoral country does not tend to increase the population or the traffic to the same extent as does closer settlement. Canberra would be practically in the same class as Casterton and Coleraine.

(Taken at Melbourne.)

TUESDAY, 4th MARCH, 1924.

Present:

SENATOR LYNCH, in the Chair;

SENATOR BARNES
SENATOR REID
Mr. Barnes
Mr. Mathews
Mr. Mackay
Mr. W. J. Thompson
Mr. J. C. L. (London), Chief Engineer, Australian
Concrete Company, Melbourne, sworn
and affidavit attached.

103 *To the Chairman.*—I think that in the early stages of the development of the Federal Capital at Canberra it would be possible to connect that centre with the New South Wales railway system by means of motor roads. The distance of roadway needed would be about 10 miles, and it is perfectly feasible to construct a suitable concrete road to carry the traffic necessary. I know of several roads which are used as feeders for the railways even in Victoria. There is a large motor traffic in either in connection with the main Gippsland line, the roads are very useful feeders for the railways, and when the County Roads Board constructs all its developmental roads I know that a number of other motor transport projects will be established. Even to-day there are feeders for the railways on many lines throughout the State. In any case, a country must have roads and railroads as railways. If a railway is constructed a road is necessary. To-day motor traction is coming into very keen competition with the railways.

The principal Victorian illustration is provided by the traffic between Melbourne and Geelong. A motor road has been constructed between the two places, and the railways are experiencing a severe loss of traffic of the amount of goods transported by road. Motor transport has also been developed between Portarlington and Melbourne and Bendigo and Melbourne, but it is not carried on to the same extent as between Geelong and Melbourne, because the roads cannot carry the traffic. I have heard that there are roads connecting and carrying motor traffic between particular points. The point is in thing like that in Victoria. The point is that there is not that the roads are not good enough to carry the traffic. Two big 10-ton motor lorries run daily between Warragul and Melbourne. This is a semi-private concern. The railways are feeling the effect of that competition. Goods are carried by road by the motor than by the trains, and the motor is a boon to the people in that part. Water transport is, of course, cheaper than motor or rail transport, but it should be.

Motor transport has been a competitor of the traffic to Geelong for the last three years, and to Gippsland for the last eighteen months. The traffic of vehicles, etc., for the trade is on the increase. Many busies firms here deliver their goods to Geelong and have their own motor transport running on the roads. They can take a load of their goods down to Geelong and bring back loading to Melbourne, doing both trips the same day. One of the reasons why motor transport is cheaper than rail transport is because with the railways there is a big operating cost which does not have to be met with motor traffic. The railways also have bigger overhead expenditure. The ton is about the maximum motor load under present conditions. I know that a train can take some hundreds of tons in one trip with only two or three men on the train, whereas at least one man has to go with every motor lorry, but it has to be remembered that there are railway employees all along the line. Motor traction is largely on the increase, and it will become a

serious competitor with the railway system even for tourist traffic. The establishment of motor traction between Yass and Canberra would necessitate the building of a roadway which would be satisfactory for modern conditions. If any road at all is put down, it should be a first-class road. I advocate putting down a concrete road. My estimate of the cost of such a road is £10,000 per mile. That would include grading, forming, bridges, and drainage for a 20-foot wide road which would carry a double line of traffic. The cost of constructing such a road would be influenced by the amount of material suitable for its construction that could be obtained in the country through which the road would pass. My estimate of £10,000 a mile is conservative.

104 *To Mr. Mathews.*—Such a road as I contemplate would be suitable for solid and pneumatic tyres, as well as steel tyres. If such a road were built the amount of traffic with steel tyres would ultimately diminish.

105 *To the Chairman.*—The solid tyre is more popular than the pneumatic tyre for heavy work. It is generally used for goods traffic. The pneumatic principle is likely to be applied to goods traffic more generally in the future, but it will probably by its application to the spokes of the wheels than to the tyres. A local invention transfers the cushion from the tyre to the spokes of the wheel. A company with £200,000 capital has been formed here to develop this patent wheel. The company has been offered a big sum for the patent rights for America. That looks as if there is something good in it. It will not materially affect the concrete roads whether solid or pneumatic tyres are used. I do not know from personal knowledge the nature of the country between Yass and Canberra, but my estimate of £10,000 a mile is conservative. I think it could be reduced considerably. If the existing road from Yass to Canberra has been formed and fairly well graded, I think my estimate of the price of a concrete road could be reduced by 25 per cent.

106 *To Mr. Mathews.*—The edges of the concrete road should be thicker than the centre, because the tendency of the concrete road is to curl at the edges. In the day-time the road is inclined to curl upwards and at night it curls downwards. The practice of making the edges thicker than the centre is the result of experiments made in America. The road would be reinforced. The life of such a road would be from 25 to 30 years without resurfacing. The maintenance cost would be a maximum of £50 per mile per annum. It is quite possible that a few holes will develop in a concrete road. These would be due to inequalities in the cement or variations in the natural surface. Impacts may cause slight depressions, but these can be refilled effectively.

107 *To the Chairman.*—The locally manufactured cement is now quite equal to, if not better than, the imported article. I think there is nothing to choose between the local and imported cement from the point of view of quality. Local cement is cheaper than the imported article. Ordinary basalt is the best class of stone to use. Failing that, coarse creek gravel may be used. I do not advocate water-worn gravel, I think the material should be angular. Diorite is quite as good as basalt, but basalt is more plentiful. Bluestone is basalt. I do not advocate the use of granite, because it is liable to disintegration.

108 *To Senator Reid.*—As soon as granite is exposed to the air it begins to disintegrate unless the surface is polished. I do not advocate using granite for concrete. A few classes of granite may be suitable, but as a general rule it is not advisable to use it.

109 *To the Chairman.*—Limestone is too soft. The road which I am advocating would carry the heaviest modern traffic. The cheapest method of construction would be to obtain an up-to-date plant, which would cost about £5,000, but such a road could be constructed with a plant costing not more than £1,000. With the cheaper plant the work would not be done so rapidly. To construct 40 miles of road, it would pay to buy up-to-date plant. The material to be used in the road would be dumped along the route by motor traffic at places where it could be handled easily. I could not say which would be the best method to make the excavations that may be necessary, because I do not know the exact route, but I presume that it would pay to use a steam shovel, seeing that 40 miles of roadway have to be constructed. The grade I advocate is 1 in 20. That is not a heavy grade. The Collins-street hill, from the Town Hall up, is 1 in 14. The maximum railway grade is 1 in 50. That is another reason why it would be less expensive to build a road than to build a railway. I cannot give you any information as to the type of motor vehicle that would be used. Numerous motor firms cater for this traffic, and they have a number of useful trucks on the market. Their representatives would be glad to give you any particulars about them. I do not think there is much to choose between them.

110 *To Senator Reid.*—I suppose the motor companies could make the road. It would be only a fair thing, if the motor companies are required to make the road, that they should be the only ones to use it. It would not be a fair thing to ask the companies to construct a road, and then allow anybody to use it. I think that ultimately there will be a tax on petrol and on tyres to meet the cost of road construction. The fees from the registration of motor vehicles should also be used to provide and maintain roads. A tax of some sort will have to be enforced. It was only early in the eighteenth century that railway traffic came into vogue to carry the heaviest goods, but now that mechanical transport on the roads has become practicable the roads will have to be made suitable for such transport. The wisdom of co-ordinating all the transport facilities of the country that there may be no overlapping, and so that each class of goods may be carried by the form of transport most fitted economically to deal with it, is not to be denied; and it should be a foremost aim in national organization to insure that roads, railways, canals, light railways, tramways, and airways do not needlessly trespass on each other's spheres, but each perform the service it is most suited for. There is room for all three services.

111 *To Mr. Mathews.*—Steel tyres have an abrasing effect on concrete roads, but, nevertheless, they used for steel traffic need not be done. The road could then be given a coating of bitumen. Concrete roads have been tested long enough to prove the truth of my statement. I repeat, however, that when a good road is laid down steel tyre will diminish. The concrete section of Bridge-road, Richmond, has been down for three years. It has a natural concrete surface, without any coating, and it is standing up well to the steel tyre traffic. It is reinforced. In cases where soft tyres may run on to the proposed concrete roads to Canberra, the concrete road can be so shaped as to prevent abrasions where the soft roads meet it.

112 *To Senator Barnes.*—The proportions of material in a concrete road should be one of cement, two of sand, and four of stone.

113 *To Mr. Mackay.*—I consider that 25 miles per hour is the safe maximum speed for motor passenger traffic. A macadam road, topped-dressed with tar, will stand to light motor traffic for five years with but little cost of maintenance. Such a road would be much

cheaper than a concrete road, but it would only carry light traffic. I recommend the concrete road. The next best road would be a reinforced bituminous macadam road. Such a road would cost about two-thirds of the cost of a concrete road. It would have a life of not more than fifteen years. Motor transport is beyond the experimental stage. I believe that we shall have heavier types of motor vehicles in the near future. I know Brisbane, but have not seen Queen-street since it was constructed with concrete. A main road should be of heavier construction than the road in a city street.

114 *To Senator Reid.*—Unless great care is taken with the joints, a concrete road is liable to crack at the junction of the day's work with another. A means of overcoming that difficulty is to put a layer of reinforcement on the top of the concrete at the end of the day's work, and leave 18 inches of the concrete projecting to connect with the next day's work. This ties the two together. Concrete will always crack on account of shrinking. It does not dry out for at least six months. It is very much better to leave a straight joint at the end of the day's work so that the crack will occur there. It will only be a faint hair crack, which will not affect the utility of the road in any way. At one time it was the custom to put a layer of bitumen 4 inches thick every 50 feet, thus providing for the expansion of the joints. But abrasions always take place. It has been found better to predetermine the crack at the junction of the day's work. If proper care is taken the cracks will not materially affect the life of the road. That has been demonstrated on Bridge-road, Richmond.

115 *To the Chairman.*—I believe that a comparison of the capitalized annual cost of maintaining the existing country road between Yass and Canberra, so that it could carry the traffic I have in mind, with the cost of constructing the concrete road which I have proposed at £10,000 a mile, would show that the concrete road would be much cheaper in the long run. The concrete road, in my opinion, would be a much better proposition. I believe it would be found that the cost of maintaining the existing road would come out about double the cost of laying down and maintaining the concrete road under conditions I have mentioned. If such a road were put down, and afterwards it was decided to build a railway way line along the same route, portions of the road could be used for the railway track. The two schemes would work together well. Road transport by motor is far quicker and cheaper, and causes less damage to goods than does rail transport. I think most people would prefer to travel by motor rather than by train from Yass to Canberra. I believe that would be the general opinion. The motor companies are developing the transport business very greatly. That is shown by the increasing number of motor trucks registered.

116 *To Mr. Mathews.*—I think people would prefer the motor to the train to go from Yass to Canberra, because I think they would be glad to get out of the train to get a little fresh air. If they had to get out of the train at 5 o'clock in the morning, and get into motors, their opinion might be different, but a more acceptable time than 5 o'clock could surely be fixed for changing.

117 *To Senator Reid.*—The increased registration of motor trucks is going on in spite of our bad roads.

118 *To the Chairman.*—If the price of fuel for motor traction were reduced, there would be an even greater development. In the United States of America petrol costs 1s. 3d. a gallon. The retail price of petrol in Melbourne is 2s. 6d. a gallon.

119 *To Senator Reid.*—If we struck oil in Australia it would make a wonderful difference to the possibilities of motor traction.

(Taken at Melbourne.)

TUESDAY, 11TH MARCH, 1924.

Present:

Senator Lynch, in the Chair;

Senator Barnes	Mr. Gregory
Senator Reid	Mr. Jackson
Mr. Blakely	Mr. Mackay
Mr. Cook	Mr. Mathews

Thomas Hill, Chief Engineer Commonwealth Works and Railways Department, sworn and examined.

120 *To Senator Lynch.*—Since 1910 I have been at least once and often twice and three times a month along the road from Yass to Canberra during the last thirteen years, so I claim to know the nature of the road itself and the class of construction required. For some period since the Commonwealth took over the Federal Territory, I have been in charge of, and have constructed and maintained, all the roads made in that Territory, and they total some 200 miles. As representing the Minister in connection with the expenditure under the Road Development Act under which the Commonwealth is providing £500,000 this year for road making, I have in the last few months visited each of the six States, and I have been in consultation with the various road bodies and engineers and have familiarized myself with the class of construction of the various roads now being made, from concrete down to the plainest formation. I saw certain evidence in the newspapers that a reinforced concrete road was suggested from Yass to Canberra at an estimated cost of £10,000 per mile, for the 40 miles I take it that for the purpose of reinforced concrete construction it could be classed as a new road through virgin country. In the work it has already done to this road the Shire of Goodradigbee has undoubtedly treated the Commonwealth very well, so far as its means would permit. It has improved the road very considerably as compared with what it was in 1910, but of course the road is not practicable in wet weather for the class of traffic that is nowadays developing such as motor cars, although in dry weather the surface is quite good. If an expenditure such as has been suggested is to be made, and on such a large expenditure is contemplated, steps should be taken at once to re-grade the road at intervals and to make deviations here and there for the purpose of securing better gradients. At one place for instance there is a grade of one in eleven and that would have to be eliminated. There are several creeks that require to be re-banked from a maximum expenditure of say £2,000 or £3,000 down to in other cases £200 or £300. I think therefore the estimate of £10,000 per mile for road improvement should be increased by some £500,000 to provide for deviations that should be made and for other additional works. Knowing the quality of the stone that has to be crushed and used and the distance the metal would have to be hauled from the railhead, I consider the estimate a little on the low side. I do not advocate the construction of a reinforced concrete road forthwith, for in my opinion a bituminous-surface metal road at a cost of from £5,500 to £4,000 per mile would more than amply meet present requirements. The traffic to be expected along that route at present is small, and the country is not such that supplies will be drawn from it for the Federal Capital, nor will it be a road over which goods will be transmitted from the railway at Yass to Canberra. It is very hard to see the nature of the goods that will come that way. The natural market for Canberra for almost all its goods is Sydney. The only commodity I can imagine negotiating the 40 miles by road would be chaff from the Riverina and some small fruits. Generally speaking for many miles around there are not any articles being produced that would be suitable for Canberra if it meant a haulage of 40 miles by road, in view of the proximity of Goulburn

and Sydney with their existing railways. My remark concerning the proposed road, I should say, would apply equally to the railway if it were built, and equally to some degree to passenger traffic. The main trains along that line are regulated by the needs of passengers between Melbourne and Sydney. The arrangements are such that any express or fast train passes through Yass Junction at 5, 5.30, and 6 o'clock in the morning, and on return they require to be boarded at 1, 1.30, and 2 a.m. For the number of passengers that would travel from Melbourne or the Western States to Canberra or leave Canberra for those States it is unlikely that the time-table would be altered. The other trains are too slow and every passenger would prefer to board the existing fast trains. Consequently, in the winter months and for some other months of the year the average passenger would not be prepared to leave the train at 5 a.m. in order to motor to Canberra, a distance of 40 miles, especially as the fare from Melbourne to Queanbeyan and Goulburn is the same as from Melbourne to Yass. The few passengers who prefer to leave the train in order to proceed to Canberra by motor car will need to get out of the carriage at 5.30 a.m., and will not reach Canberra until probably 8 a.m., whereas by going on to Goulburn and having a train to meet them they would be able to travel more comfortably and reach Canberra by 9.30 or 10 a.m., which is a reasonable hour in winter to arrive at the place. I cannot see that the probable traffic would justify any rearrangement of the existing time-table. Taking into account that probable passenger traffic and any possible goods traffic, the most suitable road to construct, I think, is the railway via Goulburn and Queanbeyan, which was kept in use for some years, would be a bituminous-surfaced metal road costing, say, £4,000 a mile, and probably a small expenditure would be sufficient to maintain such a highway for some years. It is only in the winter months that the present road is in any way difficult. The country is sound and hard except in a few places, and all the requirements would be met by gradually improving the road. For many years an initial expenditure of £4,000 per mile would be sufficient, and then as traffic developed consideration could be given to the construction of a £10,000 per mile road. I should say that an estimate of £150 per mile per annum for the upkeep of a bituminous-surfaced metal road would be a very liberal one. In the first year or two I do not think the maintenance would be as much as that. All the ingredients are obtainable for either a concrete or a bituminous road and there would be no difficulty in construction. Two days ago I had the pleasure of travelling along the road from Adelaide to Gawler, a distance of 25 miles. It is a bituminous road costing £4,000 per mile and its width is 22 feet. Some miles have already been constructed and portion of it was constructed last year. The road carries continuous and heavy traffic, a great deal of which consists of wagons carrying nine tons each, although there is a railway within a half a mile of the road and running parallel with it. Observation of this thoroughfare for a year shows that the surface is wearing splendidly, and it is a treat to go along it by motor car. The estimated cost was £4,500 and the actual cost has worked out at £4,000. The traffic over it includes heavy motor lorries carrying meat from the metropolitan abattoirs loaded to the extent of five tons. There are also horse-drawn vehicles using the road and the volume of traffic is far ahead of any that I can imagine being experienced for many years between Yass and Canberra. The Adelaide-Gawler road taps a very rich agricultural district whereas the road we have under consideration is in nothing like that class of country. On the Adelaide-Gawler road the old metal was taken out, the bed well rolled, and filled with five inches of good new metal, on the top of which was placed a surface of bitumen. Great care is being shown in the consolidation of the metal and in regard to the period that elapses before traffic is allowed on the road, which has a great deal to do with the success of the

construction. I have no fault to find with the wearing qualities of reinforced concrete because the main street in Brisbane which carries both horse and motor traffic has been in use for some eighteen months, and is still in very good condition. This street has five inches of reinforced concrete. The thickness on the bridge to South Brisbane is slightly less, but although there is terrific traffic it is wearing very well. It would be looking too far ahead to contemplate the construction of a road of that type between Yass and Canberra. Some of the deviations I suggest as necessary would be half a mile in length. There is one at the Jiminderra Creek. On the Canberra side of the creek I think the grade is one in eleven for some distance. I believe there have been one or two deviations in attempting to cross the creek at that point. There is another deviation desirable near Hall, and another required near Jair. There are some sharp turns at Murraybustaman, near Yass, and those should be improved. Our department is adopting one in twenty as the ruling grade, and curves, if possible, should have a radius of 300 feet. I should make the width of the road not less than 18 feet, and preferably I should have 20 feet of metalling with 30 feet of formation. Whatever is done I should suggest proceeding on such a basis that when it is desired to put down a better class of road it can be done without expensive alteration. This means so laying down the road in the initial stages that for all time it will practically follow the same road bed. I should certainly hesitate some years before putting on a surface of bitumen. My policy would be one of waiting to see how the traffic developed. I urge that the present road be widened, improved, and deviated, so that any subsequent expenditure will be made on the then existing road bed. I estimate that £50,000 on improvements such as bridges and deviations and another £50,000 on whatever work is decided upon to improve the road surface, a total of £100,000 would be sufficient expenditure for probable requirements for a number of years. It is advisable and preferable to allow a couple of years for putting the road in good order. This would give time for consolidation and settling of the soil before the surface dressing was applied. I have had the opportunity in the last four months of inspecting almost every class of road work in Australia, but reinforced concrete roads, except for odd patches, are confined to the cities. The Melbourne-Geelong road for instance is not a concrete road but a bituminous-surfaced metal road. The improvement that I propose for the road from Yass to Canberra would not make it so fast for motor traffic as a concrete road, and even a bituminous-surfaced metal road would be a little more comfortable; but the expenditure I have indicated would make it a good workable highway. I do not think the proposed expenditure on a railway between Yass and Canberra is justified at present, having regard to the financial returns in goods and passenger traffic that would be obtained.

121. *To Mr. Cook.*—It would be unwise to put down a temporary road but the existing road should be improved at a reasonable expenditure. Lessing motor traffic out of consideration the reinforced concrete road far ahead of any other; but the main street in Brisbane, 1 mile in length, is sharing both horse and motor traffic. I suppose 40 per cent. of the traffic is horse-drawn and 60 per cent. motor drawn. I maintain the great bulk of the traffic in both passengers and goods into Canberra would be from the direction of Sydney. It is owing to the poor agricultural character of the country between Yass and Canberra that I hesitate about recommending the construction of a railway. Yass is the nearest and best point for a road direct south. There is another route by way of Albury and Tumut. It means crossing the Murrumbidgee near the Cotter River, but it is a longer route and it would be suitable only for tourist traffic, being of a very hilly nature. You could come from Albury and leave the main road possibly at Gundagai whence you proceed to Tumut and thence across the

ranges separating the Goodradigbee River from the Goobarragandra River which rises to a height of some thousands of feet. This route would save some 40 miles, but it is not a practical proposition for other than very light traffic. I do not desire to run against the opinion of the Advisory Committee, but my personal opinion is that the cost of the proposed railway from the power-house to the Civic Centre seems too great, seeing that the longest distance to any part of the Civic Centre would be 3 miles, and much of the settlement would be between 1½ and 2 miles distant from the power-house. The short extra distance would be a very expensive piece of line to construct, because it involves a bridge across the Molonglo River at a cost of £30,000 or £70,000, and the estimated cost of undergrounding the railway along the spur is £247,000. On the other hand, it may be regarded as part of the essentials in connection with the establishment of the Federal Capital and perhaps I should therefore support the Committee in regard to that portion of the proposed expenditure.

122. *To Mr. Blakely.*—It appears to me that for some time the short length of railway within the Civic Centre could be on the surface. It seems worthy of consideration whether the heavy cutting involved could not be postponed for some years. The Molonglo is not an easy stream to bridge, it has a flood of 3,000,000 cubic feet per minute. Some years ago I estimated 3,000,000 cubic feet. There is a slope of 30 feet from the power station to Yassaluma House. The approximate estimate for the railway construction to be shared between the Federal and New South Wales authorities is £750,000. You ask me whether, if we can do with a road to the boundary, roads could not be made to serve the purpose for the balance of the distance to the civic centre. I agree that a road for the balance of the distance as far as the Civic Centre should suffice. The Federal Capital roads will pick up the stream from the boundary.

123. *To Mr. Mackay.*—There is no difference in the railway fare to Canberra and Goulburn as compared with Yass, although there is a difference of about two hours in the length of time occupied on the journey. The motor is becoming a serious competitor with the railway in country districts. Especially for branch lines and for short distances up to ten or twelve miles, the road is the better proposition. A good road is cheaper and there is less handling involved. Moreover, it is accessible at all hours of the day, and people are not limited to one particular train daily. Various Road Boards are working a good deal on the basis of the development of spurs from main railway lines for road transport in preference to rail. Several methods of transport have been mooted for Canberra itself and the railless motor is regarded at present as the one that will be most suitable, although when the time comes to adopt some method the decision may be in favour of a method not at present thought of. The existing road from Yass to Canberra is in need of improvement, although the shire has done very good work.

124. *To Mr. Gregory.*—The plan of the capital committee provides a railway connection between Queanbeyan and the Civic Centre, and there is danger of the plan not being actually followed unless a railway connexion with the northern side is effected. The railway connexion is not immediately essential in order to have the rest of the plan proceeded with. It is not possible to have railway communication without the construction of an expensive railway bridge. The facilities that could be given by allowing the railway to terminate at the southern end would suffice. I could not agree to the construction of a temporary bridge across the Molonglo River. It would be necessary for the piers to be put down in concrete, because of the heavy flood in this stream. Certain of the piers at any rate should be permanent and laid in concrete. The road bridge is at the 1,330-ft. level, and if the railway bridge is constructed at the same relative flood height as the road bridge it would suffice. The piers should be of the

most suitable type, whether of concrete or of cast iron, but even cast-iron piers would be filled with concrete. I should think it would be best to have a reinforced concrete pipe or pier filled with concrete. Where the railway bridge would cross the river there is a lot of suitable material that would be available for the construction of railway embankments.

125. *To Mr. Blakley.*—Even with the railway continued to the Civic Centre, members will have to travel $1\frac{1}{2}$ miles from the railway station to Parliament House and I do not think they would notice another mile or so. I see no reason why a motor approach from Yass to Canberra is not sufficient for present requirements. It is a question of traffic, although an hour or two could be saved by motoring from Yass to Canberra when coming from a southern direction. There is little to be gained because portion of the time that would be occupied on the road could be more comfortably spent in a railway carriage. Possibly on my basis of argument the East-West Railway, as you suggest, would never have been constructed. But there are some pioneering railways that have been good financial propositions from the outset.

126. *To Mr. Mathews.*—If there were a railway from Yass to Canberra there would still be need for a good road, and the existing road would have to be improved. The country from Gundagai to Tumut has a good road, but for 60 miles from Tumut to Canberra the track crosses some very high ranges. There are only tracks or partial roads at present but the expenditure in making a good road there would be too heavy owing to the long grades and the big heights to climb. That scheme is not in the running at present, but in time to come it may make an alternative route for motorists. Commercially it would be a worse proposition than the Yass-Queanbeyan route. There would probably be more tourists to Canberra from the South than from the North, especially with the development taking place in Gippsland and the encouragement of tourist traffic through Bombala and Cooma. The best approach on the west side is to keep to the main line and enter via Yass. More tourists by rail would probably come from the direction of Sydney and along the Goulburn-Queanbeyan road than from Melbourne, because Sydney is only 200 miles distant as against Melbourne being 400 miles away. I think Canberra will become a tourist resort of considerable importance. The mountainous country around it will attract visitors, especially those who can afford to travel several hundred miles for their holidays by motor car, as against the ordinary tourist who can only go 40 or 50 miles for the day. I certainly think this class of traffic will be conducive to the growth of the Federal Capital.

127. *To Mr. Jackson.*—I do not think the development of the Capital would be hampered by the non-construction of this railway to the extent of the cost of the line. Personally I look upon the proposed expenditure as hard to justify in view of the facilities to be given. The suggestion is made that the civic population would develop on the south side instead of on the north if the railway were not constructed, but even now the distance is $1\frac{1}{2}$ miles from Parliament House to the railway station, and it is hard to conceive that another mile or half a mile to the Civic Centre would have the effect suggested, especially if the area is reserved. The railway from Goulburn to Queanbeyan should be equipped with heavier rails and some of the grades improved because with a load up to 300 tons there is generally a block on some of the grades. I

take it that the Railways Commissioners of New South Wales would improve that line.

128. *To Senator Reid.*—From what I know of the conditions at Canberra I should recommend that the railway be extended from the power house to the Civic Centre as cheaply as possible, and I should not favor the deep cuttings at present. There should be a permanent bridge over the Molonglo River but I should not be very disappointed if the line were not extended over the river at present. In any case I should look very hard at the money before spending it. From the point of view of utility and general comfort, apart from the desire of the Advisory Committee to proceed with the construction of the Capital I find it very hard in my opinion to justify the extension from the power house at this stage. I should be strongly in favor, however, of marking that off as a future route to be adopted. Returning to the question of the railway from Yass to Canberra, the country traversed is all poor, and I cannot imagine any goods traffic there worth speaking of. There would be very little revenue from the line. Some wool would be carried at times. I have seen wheat grown there in some years, but in other years there has been nothing. The seasons and soil and everything else seem to be against the country. Melbourne is too far away for goods to be brought over that line. It would be cheaper if things were required from Melbourne to send them by water to Sydney. The journey from Goulburn to Canberra, 68 miles, should be done in two hours. Even now the train negotiates it in two-and-a-half hours, and with an improved line and heavier rails which will inevitably come, you would have a quicker service. I attribute the cracks in the road formation in Rome street, Brisbane, to the natural contraction of the concrete. It is not difficult to run in a little bitumen. Nobody has ever found means of preventing this cracking. It takes place even in the most heavily reinforced roads, and whether the layer of concrete is thick or thin. It is not a sign of inferior work.

129. *To Senator Lynch.*—It would be good engineering practice to use the material out of the lake for the formation of the railway bank, and the general run of the material in the Molonglo River is suitable for bank making. In the case of the Jerrabomberra Creek, however, the material is not suitable for bank making. The cost of £100,000 for the improvement of the road from Yass to Canberra should be borne exclusively by the Federal authorities, because the States would hardly be likely to agree to contributing towards the cost, and the local shire had already done good work in sympathy with the Federal Capital.

130. *To Mr. Mathews.*—Subject to the repair of the Jerrabomberra bridge and subject to the Commonwealth Railways Commissioner being satisfied, I should say that the present line from Queanbeyan should be retained. But assuming you build the bridge and go to the north side I should then advocate dispensing with the existing line and putting in the deviation around East Lake Circle.

131. *To Senator Reid.*—I should say keep the railway to the south, but if you go on the north side keep it on the surface, or alternately go the whole hog and sink it below. It is difficult for me, however, to see any need for sinking, even if you do go on the north side, for the sake of a few level crossings, and considering the number of people there will be.

The Committee adjourned.