1924.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

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18 JUN 1924

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE AND PLAN

RELATING TO THE PROPOSED PROVISION OF

TELEGRAPH CABLE BETWEEN SYDNEY AND NEWCASTLE, AND NEWCASTLE AND WEST MAITLAND.

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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.†	Arthur Blakeley, Esq., M.P.
Senator Hattil Spencer Foll.‡	Robert Cook, Esq., M.P.
Senator Patrick Joseph Lynch.†	David Sydney Jackson, Esq., M.P.
Senator John Newland.‡	George Hugh Mackay, Esq., M.P.
Senator William Plain.*	James Mathews, Esq., M.P.
Senator Matthew Reid.†	

* Ceased to be a member of the Senate, 30th June, 1923. † Appointed 5th July, 1923. ‡ Resigned 28th June, 1923.

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EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES, No. 54, DATED 7TH MAY, 1924.

12. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK—TELEGRAPH CABLE—SYDNEY-NEWCASTLE-WEST MAITLAND.—Sir Littleton Groom (Attorney-General), for Mr. Gibson (Postmaster-General), moved, pursuant to notice, That, in accordance with the provisions of the Commonwealth *Public Works Committee Act* 1913-1921, the following work be referred to the Parliamentary Standing Committee on Public Works for their report, viz.:—Provision of a telegraph cable between Sydney and Newcastle and Newcastle and West Maitland.

Sir Littleton Groom having laid on the Table plans, &c., in connexion with the proposed work—

Question—put and passed.

LIST OF WITNESSES.

PROVISION OF TELEPHONE CABLE BETWEEN SYDNEY AND NEWCASTLE AND NEWCASTLE AND WEST MAITLAND.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred for investigation and report, the question of the provision of a Telephone Cable between Sydney and Newcastle and Newcastle and West Maitland, has the honour to report as follows:—

INTRODUCTORY.

1. Between Sydney and Newcastle there are 36 existing telephone wires, some of which serve the north-eastern towns of New South Wales and also towns in Queensland. Five years hence it is estimated that 74 additional wires will be needed, making a total of 110; and at the end of twenty years it is expected that the development will have reached a total of 226 wires.

2. Between Newcastle and West Maitland there are at present 50 telephone wires. Within five years it is anticipated that 48 additional wires will be needed, making a total of 98; and at the end of twenty years it is forecasted that the requirements will have reached a total of 218.

3. There is no direct road between Sydney and Newcastle. The existing road running through Wiseman's Ferry is approximately 127 miles long. The main telephone lines are carried along the route of the railway, the distance being 98 miles.

The distance between Newcastle and West Maitland is about 20 miles.

4. For the greater part of the distance between Sydney and Newcastle there are four pole routes—two belonging to the New South Wales Railways and the other two being the property of the Postmaster-General. It is represented that these pole routes have practically reached the limit of their carrying capacity, and there is no room for the erection of another, so that if further pole routes are to be erected they would have to go the longer distance through Wiseman's Ferry.

PRESENT PROPOSAL.

5. It is now proposed to provide a cable containing 200 wires between Sydney and Newcastle, and in the troughing which will be laid to accommodate the cable sufficient space will be provided for an additional cable when necessity renders this provision essential.

6. Between Newcastle and West Maitland it is proposed to provide a cable containing 100 wires, and lay troughing which will accommodate additional cables when necessity demands it.

7. In both cases, the cable proposed to be used will be of a type weighing 40 lbs. of copper to the mile, and equipped with conductors. Its over-all dimensions for the 100 pairs of wires between Sydney and Newcastle will be 2.2 inches, and for the 50 pairs of wires between Newcastle and West Maitland, 1.64 inches.

DESCRIPTION OF WORK.

8. Between the General Post Office, Sydney, and Dawes' Point, it is proposed to lay the cable in existing conduits; then by submarine cable across the Harbour to Blue's Point; then in existing conduits to about half a mile north of Hornsby; thence along the railway line to a point near Adamstown, about 3 or 4 miles from Newcastle, and then in a conduit direct to Newcastle. That is to say, for approximately 79 miles of the distance between Sydney and Newcastle, the cable will be laid along the railway line, and for the remaining 19 miles in existing conduits or submarine cables.

9. Although considered as an underground cable, it will, along the railway line, be laid in troughing. The troughing will be composed of ironbark, jarrah, tallow-wood, or red gum, the inside measurement being 6 inches by 4 inches. It will be supported on concrete pegs probably 6 inches by 6 inches, about 4 feet in length, driven into the ground so that the cable will be carried at about 15 inches above the ground.

10. Arrangements have been made with the Railway Department to carry the troughing along the railway line at a certain distance from the rails to be agreed upon.

11. It is proposed to call for tenders for the supply of the material, and lay the cable by Departmental labour.

ESTIMATED COST.

12. The estimated cost of the proposal as submitted to the Committee was set down at £442,000, made up as follows :—

	Sydney–Newcastle.	*Newcastle–West Maitland.*
Material ..	£289,000	£64,000
Labour ..	43,000	9,600
Incidentals ..	11,000	1,000
Administration ..	21,000	3,400
	£364,000	£78,000

and the time for completion of the work twelve months from date of commencement.

COMMITTEE'S INVESTIGATIONS.

13. Representations were made to the Committee that owing to the insufficient number of lines at present in existence between Sydney and Newcastle, considerable delay is occasioned to telephone business; the time taken to put through a call averaging 30 minutes for the whole 24 hours, but being considerably more at busy periods.

14. The Committee ascertained in evidence that the undergrounding of telephone cable over long distances, although a new departure in Australia, is successfully practised in other parts of the world. The present proposition is on the same principle as an underground cable, but from motives of economy is carried in a wooden troughing similar to that which carries electric railway signalling wires.

15. Information was obtained that underground cable transmission has now reached a stage of development that communication can be established through cables containing comparatively light-gauge wires. Moreover, the wires can be disposed in such a fashion that not only are channels of communication secured over the metallic circuits, but a proportion of super-imposed phantom circuits can be made available.

16. The upkeep of underground plant is much less costly than that in respect of aerial lines, and the stability and uniformity of service is said to be greatly superior. It is represented that whereas the comprehensive and detailed examination of open line plant is of a laborious and costly character, inspection so far as underground cables are concerned is only a small item. On a route over which a large number of services are to be provided for, it is therefore more economical to use underground plant in preference to aerial lines.

Aerial Lines.

17. In view of the statement made that no further aerial lines can be erected along the present route, the Committee made inquiries as to the possibilities of erecting further pole routes by way of Wiseman's Ferry, but is satisfied from the figures furnished that any such proposition would involve considerably more expense.

Financial Aspect.

18. The estimated cost of the complete work if cables and troughing are used as suggested, is £442,000, to be spread over a number of years in the following manner :—

	Newcastle–Sydney.	*Newcastle–West Maitland.*
Now	£281,000	£39,000
In 5 years	12,000	3,800
In 10 years	38,000	28,000
In 15 years	12,000	3,800
	£343,000	£74,600
Administrative charges over whole period ..	21,000	3,400
	£364,000	£78,000

Total £442,000.

To cater for the requirements by aerial lines would cost £858,600, expended as follows :—

Sydney–Newcastle.		*Newcastle–West Maitland.*	
Now	£144,540	Now	£16,656
In 2 years	65,900	Within 5 years ..	9,210
In 7 years	191,295	Within 10 years ..	27,590
In 12 years	65,900	Within 15 years ..	20,660
In 17 years	191,295	Within 20 years ..	16,140
	£658,930		£90,256
Administration for whole period	96,414		13,000
	£755,344		£103,256

Total £858,600.

Estimated Revenue.

19. The revenue derived from the existing telephone lines between Sydney and Newcastle is £20,000 per annum, and the anticipated revenue in five years' time is set down at £47,000, and in twenty years' time at £120,000.

The revenue at present obtained from the lines between Newcastle and West Maitland is £5,000 per annum, and the anticipated revenue in five years is set down at £10,500, and in twenty years at £22,000.

Annual Charges.

20. A comparison of the annual charges is also distinctly in favour of the loaded cable proposal, as will be seen from the following :—

Sydney–Newcastle.		*Newcastle–West Maitland.*	
Cable.	Aerial.	Cable.	Aerial.
£40,180 ..	£78,160	£7,330 ..	£9,920

Total annual charges—Cable, £47,510; aerial, £88,080.

21. The Committee was informed that the aerial lines to Newcastle and West Maitland were first erected about 50 years ago, and the actual cost of erection is not now ascertainable. Their present value, however, is set down at £167,317.

22. The greater part of the existing aerial lines will be retained, but of those to be dismantled the value of the material which will be recovered if a cable be now laid is given as .. £19,248
and the cost of recovery as 6,077
leaving a net value of £13,171

COMMITTEE'S RECOMMENDATION.

23. After hearing the evidence, the Committee is satisfied that urgency exists for giving greater facilities for telephone business between Sydney and the important towns of Newcastle and West Maitland, and it is due to the public that these requirements be met in the most up-to-date method possible.

24. The nature of the work contemplated, however, restricted the field for obtaining evidence, and the Committee had to rely wholly on information obtained from departmental officials. On their evidence, however, as to the efficacy of the system in use in other parts of the world, and on the figures produced to show the saving in capital cost and annual charges if the cable be adopted, the Committee has no hesitation in recommending that the scheme as proposed be put in hand as soon as possible.

25. The Committee realizes with satisfaction that the establishment of this system of telephone communication will obviate the necessity for the great destruction of young trees which now takes place to provide the necessary clearing on each side of aerial lines and to supply the poles required to carry the wires.

26. Some members of the Committee have some doubt as to the durability of the system of troughing proposed, and it is therefore suggested that careful inquiries be made as to the design of the troughing and the best and most economical class of timber to be used for this purpose before work is commenced.

H. GREGORY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House,
27th May, 1924.

PLAN OF ROUTE.

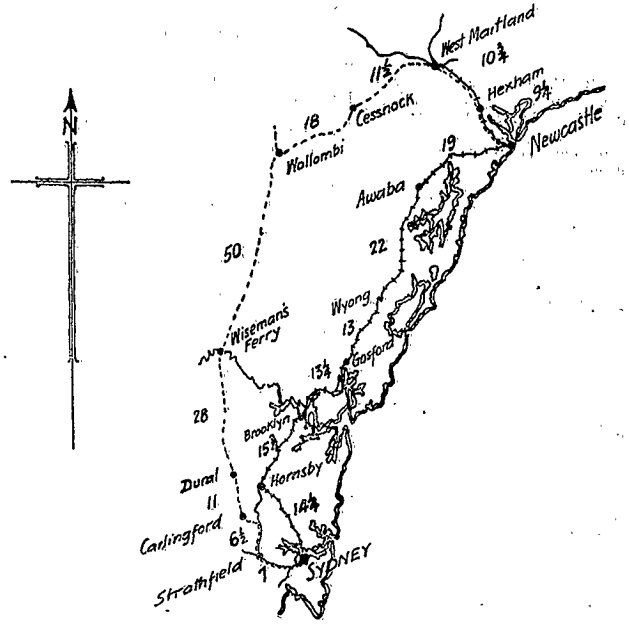
Proposed Telephone Trunk Cable.

Sydney to Newcastle and Newcastle to West Maitland.

Railways and Route of Proposed Cable shown thus: ——+——+——

Alternative Aerial Route via Wiseman's Ferry : ----------

Figures indicate intermediate mileages



MINUTES OF EVIDENCE.

(Taken at Melbourne).

WEDNESDAY, 14TH MAY, 1924.

Present:

Mr. GREGORY, Chairman;

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

John Murray Crawford, Chief Electrical Engineer, Postmaster-General's Department, sworn and examined.

1. *To the Chairman.*—The departmental proposal submitted to the Government is for the construction of a loaded telegraph cable between Sydney and Newcastle, and between Newcastle and West Maitland. I may explain that in legal parlance the word "telegraph" includes "telephone." The proposed cable will be used entirely for telephone purposes. Underground cable telephone transmission has now reached a stage of development that communication can be established through cables containing comparatively light gauge wires. In this case we propose to lay cables with conductors weighing 40 lbs. of copper to the mile, and containing 100 pairs between Sydney and Newcastle, and 50 pairs immediately between Newcastle and West Maitland. Later, a further 50 pairs will be laid between Newcastle and West Maitland. The wires can be laid in such a way that not only are channels of communication secured over the metallic circuits, but a proportion of super-imposed phantom circuits can be made available. The cable will not be laid for the whole distance along the railway line. Between the General Post Office, Sydney, and Dawes' Point it will be laid in existing conduits, then by submarine cable from Dawes' Point across the harbour to Blue's Point, then in existing conduits to about half a mile north of Hornsby, thence along the railway line to a point near Adamstown, about 3 or 4 miles out from Newcastle, and in a conduit direct to Newcastle, thus avoiding the circuitous route by which the railway enters Newcastle. For approximately 79 miles of the distance between Sydney and Newcastle the cable will be laid along the railway line, and for the remaining portion of the total of 98 miles in existing conduits or submarine cables. The total length of cable between Newcastle and West Maitland will be 18½ miles. Perhaps, in order that the Committee may understand what is meant by a loaded cable, I may explain that the primary electric constants of every telephone circuit are resistance, capacity, inductance, and leakance, or what is generally known as insulation resistance. The efficiency of speech depends on the magnitude, and on the mutual relations of these constants. Resistance produces attenuation of speech, viz., a gradual falling off in volume. It can be compared mechanically with frictional loss. Capacity produces absorption of the speech waves, a sort of retardation in speed, and, in addition, distortion of speech; that is to say, high pitched notes would be wiped out, but lower pitched notes would not be so badly affected. Inductance, on the other hand, produces a slowing down of wave speed; and can be compared with mechanical inertia, to use a mechanical analogy. Leakance, or insulation resistance, would simply produce attenuation of speech by loss of current. At about the year 1885, Oliver Heaviside, of Newcastle, mathematically showed that by adding inductance to telephone lines the effect of capacity would be neutralized. In 1900, Professor Pupin took out a patent for doing practically what Heaviside had mathematically shown could be done; that is to say, he produced what were then known as Pupin coils, now known as loading coils, and they were introduced at spaced distances along the line to balance the capacity of the copper wires forming the telephone circuit. He added inductance to neutralize the effect of capacity, and the purpose of spacing these coils at certain distances along the line was to give as near as possible an equalized distribution of inductance, since there is an absolutely equalized distribution of capacity. The first coils were wound on Swedish soft iron coils. The present coils are wound on specially constructed cores made out of iron dust under immense pressure. By that means we do away with eddy currents and consequent losses. A maximum inductance is obtained for a minimum of resistance. There is always plenty of resistance in a line, and inductance is needed. This particular type of coil, known as a loading coil, is to load the line, as far as possible, equi-distant with inductance, and to neutralize its inherent capacity effects. These coils are placed in iron pots, which in turn are put in manholes. The coils are then joined in series with the telephone wires which form the circuit. The spacing of the coils is mathematically calculated, and bears a certain definite relation to the wave length. The net effect is that we can use small gauge copper wires in a cable in lieu of open copper wires or iron wires. In fact, all modern telephone systems use copper wires in lieu of iron wires, because of the lower resistance and inductance. Whereas, previously on long open lines, it was necessary to have an aerial copper wire of a certain weight per mile, now it is possible to use very much smaller gauge copper wires, bunched together in a cable. The overall dimensions of the cable that we propose to lay between Sydney and Newcastle are 2.2 inches for 100 pairs, or 200 wires, and between Newcastle and West Maitland 1.64 inches for 50 pairs, or 100 wires. By super-imposition we obtain an additional 50 circuits out of 100 circuits. It is possible to have one superimposed circuit for every two physicals, so that, when the phantom circuits are put in, 150 circuits are obtained from 100 circuits, and 75 from 50 circuits. They are really superimposed telephone circuits on two other physical circuits. The maximum line capacity on an open route, where crossings and the higher timber required must be taken into account, is about 50 wires, but with a cable it is possible to put in 200 or more wires. By

this means we can lay many more wires in the troughing than we would be able to put on the poles. It would actually take four separate pole routes to carry what we now propose to carry by cable, viz., 100 pairs between Sydney and Newcastle. We propose to place this loaded cable in troughing supported at a height of about 15 or 18 inches above the ground along the railway. The troughing will be put on concrete pegs, this being the most economical method. I have not a diagram of this troughing, but that is a detail which will be worked out in conjunction with the railway authorities, who have had a good deal of experience with signalling wires. We propose to provide an ordinary trough the same as that which may be seen between Richmond and Brighton along the railway. The troughing will be, say, 6 in. by 4 in., and will be supported at a distance of 6 or 7 feet by concrete pegs placed in the side of the railway formation. The cable will be laid in the trough. Two purposes will be served by putting the troughing above the ground. In the first place it is cheaper than laying it in conduit, it is much easier to inspect it. We hope that it will not need repair, but there is that possibility. Secondly, this method of laying a cable does away with the possibility of electrolysis, which is an important point, as ultimately the railway between Sydney and Newcastle will be electrified. The danger of electrolysis will be obviated because the cable will not be connected with earth. It is the earth currents that causes electrolysis. Obviously, there will be an insulator between the earth and the cable. We have taken the usual precautions against attacks by white ants, that is, inspection and preserving, which have been found satisfactory by the Railways Department. In one case only, at North Adelaide, did I hear of lead cable being attacked by white ants. I have never heard of such a case in Sydney. I am quite satisfied that the troughing while above the ground will be immune from white ants. A comparatively large number of services can be provided for in a restricted space, and the initial cost per circuit is consequently low. The up-keep of underground plant is less costly than that of aerial lines, and the stability and uniformity of service is greatly superior. Inspection work is a small item as far as underground cables are concerned, whereas the comprehensive and detailed examination of open line plant is of a laborious and costly character. On a route, over which a large number of services are to be provided, it is, therefore, more economical to utilize underground plant in preference to aerial lines. Between Sydney and Newcastle there are 36 existing telephone wires, some of which serve the north-eastern towns of New South Wales and towns in Queensland. In five years hence it is estimated that 74 additional wires will be needed, making a total of 110; and, at the end of twenty years, it is expected that the development will have reached a total of 226 wires. We have orders now to erect 46 additional wires between Sydney and Newcastle. There are 10 circuits to Newcastle, 2 to West Maitland, 1 to Lismore, 2 to Tamworth, 5 to Gosford, and 3 to Woy Woy. This forecast relates only to the departmental services, but there is a demand for circuits for the exclusive use of business firms and the Railway Department. We have about seven already, but these I have not taken into account. The Railway Department want two lines. They will save money if they rent from us two wires out of the loaded cable, besides giving them a very much better service, thus obviating the erection of four wires for their own use. One of the newspapers requires a line, and there is no doubt that mining and other companies will also require lines. It is proposed to provide between Sydney and Newcastle a cable containing 200 wires, and in the troughing, which will be laid to accommodate the cable, sufficient space will be provided for an additional cable when necessary. We shall be able to lay an additional cable without any additional expense for troughing. Between Newcastle and West Maitland 50 telephone wires exist, and it is anticipated that within 5 years 48 additional wires will be needed, making a total of 98, and that at the end of twenty years the requirements will reach a total of 218. We have now orders for 15 lines, or 30 wires, between Newcastle and West Maitland.

2. *To Mr. Jackson.*—It would be possible to use one wire instead of two, but in that case there would be an earth circuit, resulting in all sorts of disadvantages, such as overhearing, &c. Every subscriber has two lines for his own use.

2A. *To the Chairman.*—It is anticipated that beyond these figures there will be a demand for circuits between Newcastle and the coal-fields for the exclusive use of business firms. West Maitland is really the centre of the coal trade, and there is a large number of towns growing up about there which all require additional service. Between these towns it is proposed to provide a cable containing 100 wires, and to lay troughing to accommodate additional cables when necessary. The estimated cost of the complete work is £442,000, made up as follows:—

	Sydney-Newcastle.	Newcastle-West Maitland.
	£	£
Material	289,000	64,000
Labour	43,000	9,600
Incidentals	11,000	1,000
Administration	21,000	3,400
	£364,000	£78,000

The expenditure will be spread over a number of years in the following manner:—

	Sydney-Newcastle.	Newcastle-West Maitland.
	£	£
Now	231,000	39,000
In 5 years	12,000	3,600
In 10 years	33,000	23,000
In 15 years	12,000	3,600
	£343,000	£74,600
Administration over the whole period	21,000	3,400
	£364,000	£78,000

The administration cost is made up of various items, including 40 per cent. for labour, and from 1 to 7½ per cent. for different classes of material, according to the amount of handling that it requires. The estimated cost of catering for requirements by aerial lines is £358,600, vide Schedules B and D.

The estimated annual charges, shown in detail on Schedules A, B, C and D, are as follow:—

SYDNEY-NEWCASTLE.		NEWCASTLE-WEST MAITLAND.	
Cable.	Aerial.	Cable.	Aerial.
£40,180	£78,160	£7,330	£9,920

TOTAL ANNUAL CHARGES.

Cable.	Aerial.
£47,510	£88,080

The present revenue between Sydney and Newcastle is £20,000 per annum, and the anticipated revenue in five years is £47,000, and in twenty years £120,000. The present revenue between Newcastle and West Maitland is £5,000 per annum, the anticipated revenue in five years being £10,500, and in twenty years £22,000. The uprights for the troughing will consist of, say, 6 inches by 6 inches, or 6 inches by 4 inches reinforced concrete posts, spaced 6 to 7 feet

apart, to protect it from white ants. I shall submit a drawing of the troughing to the Committee. I submit the following schedules, number marks A, B, C and D, for the information of the Committee.—

SYDNEY-NEWCASTLE TELEPHONE CABLE. 100 PAIRS LOADED AND ACCOMMODATED IN 6" x 4" TROUGHING.

Annual Charges.

Work.	To be carried out.	Estimated Cost.	Interest.	Depreciation.	Maintenance.	Total.	Extended.
		£	£	£	£	£	£
Conduits	Now	3,215	100	64	3	267	..
Troughing	"	73,270	4,396	3,664	250	8,310	..
Cable (100 prs. loaded, 2/50 pr. submarines laid and 1 in reserve)	"	191,840	11,490	4,333	640	16,463	..
Repeater elements	"	1,200	72	1,200	100	1,372	..
" apparatus	"	10,800	648	1,080	400	2,128	..
Buildings	"	1,000	60	20	10	90	28,020
Repeater elements	In an average time of 5 years	1,200	72	1,200	100	1,372	..
" apparatus		10,800	648	1,080	400	2,128	3,500
		12,000					
Loading coils for phantom circuits ..	In 10 years	38,000	2,280	1,900	380	4,560	4,560
Repeater elements	In 15 years	1,200	72	1,200	100	1,372	..
" apparatus	"	10,800	648	1,080	400	2,128	3,500
		12,000					
Total	..	£343,334	..	..	..	..	£40,180
Administration	..	21,000					
		£364,334					

SYDNEY-NEWCASTLE.—AERIAL TELEPHONE LINES.

Annual Charges.

Work.	To be carried out.	Estimated Cost.	Annual Charges.			
			Interest.	Depreciation.	Maintenance.	Total.
		£	£	£	£	£
Value of existing material which can be recovered if cable laid	Now	19,248	1,143	385	576	2,104
Subtract cost of recovery	"	6,077	..	..	..	..
Net Cost	..	13,171				
Re-poling, rearrangement of route and provision of new circuits	Now	131,369	7,888	3,753	3,929	15,546
Poling along Wiseman's Ferry Route	2 years	65,900	3,944	3,295	1,977	9,216
Additional circuits along Wiseman's Ferry route ..	7 years	191,295	11,477	3,826	5,736	21,039
Additional route via Wiseman's Ferry	12 "	65,900	3,944	3,295	1,977	9,216
Additional circuits	17 "	191,295	11,477	3,826	5,736	21,039
Total	..	£658,230	..	..	..	78,160
Administration	..	96,414				
		£755,344				

NEWCASTLE-WEST MAITLAND TELEPHONE CABLE.—TWO 50 PAIR LOADED AND ACCOMMODATED IN 5" x 3" TROUGHING.

Annual Charges.

Work.	To be carried out.	Estimated Cost.	Annual Charges.			
			Interest.	Depreciation.	Maintenance.	Total.
		£	£	£	£	£
Conduits	Now	5,000	300	100	5	405
Troughing	"	11,000	660	550	40	1,250
Cable, Loaded	"	23,000	1,380	710	70	2,160
Phantom Loading	5 years	3,800	228	190	38	456
Loaded Cable	10 "	28,000	1,680	840	83	2,603
Phantom Loading	15 "	3,800	228	190	38	456
Total	..	£74,600	..	..	..	7,330
Administration	..	3,400				
		78,000				

NEWCASTLE-WEST MAITLAND AERIAL TELEPHONE LINES.

Annual Charges.

Work.	To be carried out.	Estimated Cost.	Annual Cost.			
			Interest.	Depreciation.	Maintenance.	Total.
		£	£	£	£	£
Value of existing material, including recovery charge which will be available if cable laid	Now	4,356	232	87	130	499
Re-poling and rearrangement of existing route ..	"	5,620	330	110	165	605
Additional circuits	"	6,780	407	134	203	744
Additional circuits	Within 5 years	9,210	553	184	278	1,015
Additional route	Within 10 years	11,450	675	228	344	1,247
Additional circuits	"	16,140	968	322	484	1,774
Additional route	Within 15 years	11,450	675	228	344	1,247
Additional circuits	"	9,210	553	184	278	1,015
Additional circuits	Within 20 years	16,140	968	322	484	1,774
Total	..	90,256	..	..	..	9,920
Administration	..	13,000				
		103,256				

The first schedule shows the annual charges on the Sydney-Newcastle telephone cable of 100 pairs loaded, to be accommodated in 6 inches by 4 inches troughing. The work includes conduit, troughing, cable, repeater elements, repeater apparatus and buildings. That is the immediate expenditure. We show also the expenditure in an average time of five years for repeater elements and apparatus, and in ten years for loading coils for phantom circuits, and in fifteen years for repeater elements and apparatus. The details of cost are shown, as for instance the cost of the troughing and conduits and so on. Then is shown the interest, which is calculated at 6 per cent, depreciation, maintenance, and the total annual charge The second schedule shows the actual value of the existing material, which can be recovered if the Sydney-Newcastle cable is laid, also the cost of recovery and the net cost. We can only work out this information on the unit basis. All the intermediate towns will, as now, be served by the existing aerial wires. Obviously it would be unwise to pull down something which at a later date might have to be re-erected. Within the life of the poles we estimate that there will be demand for a certain number of aerial wires along the route. The telegraph circuits will, of course, be very much improved.

3. *To Mr. Mackay.*—By the laying of this cable we shall be able to abandon one route entirely, and within this generation should not be required to put in more aerial construction

4. *To the Chairman.*—The interest allowed on capital cost is 6 per cent. For depreciation the amount varies. On conduits the allowance for depreciation is 2 per cent, on troughing, 5 per cent.; on cable, 2½ per cent For repeater elements we are estimating a life of one year, so a repeater element would not last more than about 1,000 hours. On repeater apparatus the allowance is 10 per cent., and on buildings, 2 per cent. Referring to the aerial telephone lines, I may state that we can only re-pole along the existing route. After that we shall be able to do no more, because that route will be full, and there is no direct road between Sydney and Newcastle. The route must be *via* Wiseman's Ferry, a distance of about 137 miles, as compared with the existing route of 98 miles Between Newcastle and West Maitland we propose to put up 5 inches by 3 inches troughing. This will be large enough, because the cable diameter is only 1.64. The allowance for interest, depreciation, and maintenance on that route has been worked out on the same basis. The work is most urgent, especially as regards the Sydney-Newcastle traffic. This additional line is wanted immediately. There are only 46 wires between Sydney and Newcastle at present. We do not want to put another heavy route over the railway, because it would give an inferior service, and ultimately be much more costly. If Parliamentary authority is obtained we estimate that within six months of the receipt of the cable we could have it laid, and as we expect to get the cable within six months, the line would probably be ready for traffic within twelve months. The balancing of this particular type of cable will take much longer than the jointing, because only a certain number of men can be entrusted with that class of work. We have to balance with special apparatus. If we receive Parliamentary authority we shall push on with the work of erecting the troughs, so that when the cable is to hand we may be able to run it along on railway trolleys, and lay it in the troughing. We have a definite agreement with the New South Wales railway authorities to run the troughing along the railway line, but there are one or two outstanding points, such as the distance of the trough from the rail, which have yet to be settled. I anticipate no difficulty in that direction. If subsequently the railway authorities decided to lay a second set of rails we should have to move the troughing bodily away from the existing line, because we propose to lay it as close to the rails as possible, in order to minimize the fire risk. We want to be in the same position, with respect to the rails, as the existing railway signalling wires. If we can erect the troughing along the formation there will be less risk of damage by grass fires.

5. *To Mr. Mackay.*—The troughing will be constructed of hardwood, probably 6 inches x 3 inches x 1 inch about 15 inches from the surface.

6. *To the Chairman.*—There will be ample room for a second cable in the trough. I should say it would be at least 45 years before there would be any necessity for larger troughing. The upright pegs will be of concrete, probably 6 inches x 6 inches. This is a detail which has not yet been determined. We might have 6 inches x 4 inches, or 6-inch x 5-inch pegs. They will be about 4 feet in length, and pointed so that they may be driven into the ground. They will cost approximately 2s. 4d. each. The New South Railway authorities have the plant for the manufacture of these pegs, and we propose to purchase them at cost price. This will obviate the necessity for any duplication of plant. We shall require about 880 pegs per mile.

7. *To Mr. Jackson.*—Obviously if the price charged for the pegs is higher than what we estimate, we could get them from outside, and we shall invite alternative offers.

8. *To the Chairman.*—The cable will be affixed to the uprights by bands. At first the New South Wales railway people used nails, then screws. Now they are using galvanized iron bands, which are more satisfactory. The troughing will be attached to the concrete pegs by prepared wooden plugs. There will be no danger of electrolysis. The only leakage would be due to earthing of the wires, and as the troughing will be attached to the top of the concrete peg, and the peg will be properly insulated, there is no possibility of any earth current affecting the cables. All the existing services will be utilized. The telegraph circuit will be transferred from iron wires to good copper wires on the other side, and only the unnecessary telephone wires between Sydney and Newcastle will be taken away. The proposal will involve no loss of capital. The telegraph service will be very much improved, and, in addition, intermediate subscribers' business will be carried on existing poles. I have not calculated the cost of the wire in the cable as distinct from the lead sheathing. It is all special work. It will be manufactured as a loaded cable. Most of our wire cables are 10 lbs., and occasionally 20 lbs. This cable will be 40 lbs. Under our present system we receive tenders at so much per yard. It is rather a complicated business. We estimate the value of the copper, lead, and tin or antimony at the date when the order is placed. As the price varies so must our estimate rise or fall. When the estimates for the Sydney-Brisbane line were prepared, £169 per mile was the price which we calculated on having to pay, but as the price of copper wire had dropped when the order was placed, we were able to get it at much less than the estimate. We did not pay above market price at the time. It is intended to call tenders for the materials, but we propose to lay the cable ourselves, and probably will do the work by day labour. Generally speaking this system is more satisfactory in New South Wales. I do not think there would be any objection, on the part of the New South Wales railway authorities to the day-labour system on this work, so long as the men were under proper control.

9. *To Mr. Mackay.*—This is a new system adopted as applied to long-distance lines. Obviously the laying of the cable will mean an improvement in the telephonic communication between Sydney and Brisbane. At present there is interruption due to climatic conditions. This risk will then be eliminated, and there should be an absolutely silent and perfect service. We shall only dismantle those telephone wires that we estimate will not be required within the life of the existing poles, which is fixed at twelve years. It will not be difficult to lay an additional cable in the troughing. It would only be necessary to lay it alongside the existing cable. The New South Wales railways authorities will not charge a rental for the use of their property for the reason that, probably, we shall allow them to utilize the same troughing for their signal wires. This arrangement will ensure due care for the troughing by the railway employees and minimize the risk of interference by outsiders. We should like to be able to erect a troughing on the formation, and as close as possible to the end of the wooden sleepers. As a rule there is a margin of about 4 or 5 feet on the formation, so there should be ample room. This will reduce the risk of damage by fire, especially as the section is very well patrolled by railway men who burn off the grass once a year. I have every confidence that the system will be successful. The troughing of cables and wires is largely adopted by the railways authorities in Queensland, New South Wales, Victoria, and, I think, South Australia. The railway troughs for signalling wires extend for a good many miles out from the different stations, and with the introduction of automatic signalling in New South Wales, troughing will be necessary throughout the State.

10. *To Mr. Cook.*—It would be possible to use galvanized iron troughing instead of wood, but it would not be desirable because of certain chemical action in galvanized iron and lead, two dissimilar metals. Probably the lead sheathing would eventually be eaten away, and I should say that the loss would be greater than by fire with the use of wooden troughs. We propose to treat the troughing in order to preserve the wood work. To some extent also that will minimize the fire risk. Experience in New South Wales has shown that day labour for the handling of poles and stringing of telephone wires is more satisfactory than the contract system. We always have an experienced body of men available to do the work, whereas a contractor would have to pick up his men, and he would have no guarantee that they would know anything about the kind of work required of them. Possibly the prevalance of strikes and the fluctuation in the price of raw materials make it necessary for contractors to safeguard themselves in the matter of tenders. All I know is that frequently contractors have been unable to carry on, and have stated in explanation that they have been either hampered by strikes or the difficulty of getting suitable labour. Unquestionably the underground system for the laying of cables is the most efficient. With aerial wires there is always the risk of interruption through falling trees. Delay in the construction of the cable will mean loss to the Department. The work is urgently needed. I do not think that there is much prospect of prices for raw materials varying appreciably, but there might be a slight tendency downwards. I do not think that the estimate of cost will be exceeded. We know the price of loaded cable and loading coils, which is nine-tenths of the total cost, so that the estimate is approximately accurate. By the time the cable is delivered we shall have the men available for the work. Until the cable arrives we can do nothing except to erect the troughing. I have recently been transferred from New South Wales, where I was State Engineer, to Victoria, as Chief Electrical Engineer for the Commonwealth, so that I am really dealing with this question in a dual capacity. This particular work will not delay any other work of the Postal Department. Its character calls for skilled jointers, and by the time the cable arrives we shall have plenty of these men available. If, instead of the cable, a large amount of aerial construction were to be undertaken, our great difficulty would be to obtain skilled labour. The present proposal simply plays into our hands in that respect.

11. *To Senator Reid.*—This proposal has nothing to do with the construction of the new railway along the coast of New South Wales. It is to deal merely with present traffic. The life of a telegraph pole varies according to the timber. Ironbark poles from New South Wales have a life of from twenty to twenty-five years. Stringy bark or messmate poles have a life of as low as seven or eight years; in fact, we have had poles lasting only five years. The use of wooden poles and iron poles is purely a matter of economics. In South Australia the difficulty is to get timber, so we have placed for that State a large order for cast-iron girder poles. The difference in cost depends entirely on the freight, but generally the cost of an iron pole, compared with that of a wooden pole like ironbark, is as five is to three, possibly twice the cost. We propose to import this cable. We do not import all our cables Last year we placed a large order with Port Kembla Works, and they delivered to us almost up to the full capacity of their factory. I could not say what would be the difference in cost between the Australian-made and the imported cable. A question was recently asked in the House of Representatives concerning the cost of copper wire, and the answer to that would apply in about the same ratio to cable. The cost can easily be obtained. I shall supply the information to the Committee as soon as possible.

12. *To Mr. Jackson.*—Port Kembla recently erected a factory to make paper-covered cable, up to 400 pairs. I do not think they could make the proposed cable.

13. *To Senator Reid.*—It is probable that we would not paint the troughing for the cable, but would treat it in the same way as we treat the timber for the

poles, viz., with crude oil and arsenic. When I spoke of painting the troughing I really meant that it would be necessary to apply a preservative surface.

14. *To the Chairman.*—I shall supply to the Committee a drawing of the troughing and particulars of the cost of the timber, the method of fastening and preserving it, and the fullest information concerning the cost of cables. This is the first loaded cable of this type which will be erected in Australia. The British Post Office authorities have constructed thousands of miles of loaded cable, and in America, of course, it is quite an established factor.

15. *To Senator Reid.*—Concerning contract labour versus day labour, in New South Wales we invariably called for tenders. If the contract price is lower than the Departmental estimate the contractor carries out the work, but if not the Department carries it out under day labour.

(Taken at Melbourne.)

THURSDAY, 15TH MAY, 1924.

Present:

Mr. GREGORY, Chairman;

Senator Reid,	Mr. Jackson,
Mr. Blakeley,	Mr. Mackay,
Mr. Cook,	Mr. Mathews.

John Murray Crawford, Chief Electrical Engineer, Postmaster-General's Department, recalled and further examined.

16. *To the Chairman.*—I produce, at the request of the Committee, a complete plan of the route between Sydney and Newcastle, and between Newcastle and West Maitland, together with the alternative aerial route. I have prepared also a section of the troughing we propose to use, showing the manner of fastening it. The top of the troughing has a fall of one quarter of an inch in six inches, just sufficient to throw off the rain. A wooden stub is set in the reinforced concrete, and the floor of the troughing is spiked on to the stub. In order to avoid using nails in fastening the lid, we are employing a galvanized hoop-iron clip. That is comparatively easily removed when one wishes to examine the cable from time to time, and we obviate the danger of the oxidization of the screws or nails creating a difficulty in getting the lid off. At the same time, the spring clip is a cheap fastening. We are experimenting with this troughing in Sydney now, and it may be that we shall decide to put a bigger camber on the lid. I submit a schedule showing the prices of cable per mile —

SCHEDULE V.325.

PRICES OF CABLE PER MILE.

Size of Cable	Made in Australia	Lowest Overseas Tender		With Duty Added, Difference in Favour of	
		Exclusive of Duty	With 25 per cent Duty Added.	Australian.	Overseas.
	£	£	£	£	£
400–10	1,295	1,055	1,371·50	76·50	..
300–10	985	810	1,053	68	..
250–10 ..	873	681	885·30	12·30	..
200–10	657	551	716·30	59·30	..
150–10	522	421	547·30	25·30	..
100–10	382	302	392·60	10·60	..
75–10 ..	285	234	304·20	19·20	..
50–10 ..	211	101	209·30	..	1·70
35–10 ..	157	121·25	157·63	0·63	..
25–10 ..	115	90	121·80	0·80	..
15–10 ..	88·25	67·50	87·75	..	0·50

A schedule of works done by contract during the six months ended the 31st December, 1923, is also submitted. It shows that 197 tenders were invited for country lines, as follows:—New South Wales, 61, of which 45 were accepted; Victoria, 57, of which 54 were accepted; Queensland, 6, of which three were accepted; South Australia, 29, of which 25 were accepted; and Western Australia, 9, all of which were done by day labour, five of the works having failed to produce any tenders at all. Our practice is to call for tenders, and if the lowest received is in excess of the Departmental estimate, we carry out the work by day labour. I have complete schedules of actual man hours for every piece of work done by my Department, and I can tell to a fraction of a man-hour the cost of erecting a pole up to 30 feet in height. I have also a schedule of costs which includes all administrative and overhead charges. Often we have to send men considerable distances to carry out work, and in such instances the administrative costs are high. But, generally speaking, our administrative and overhead charges are not greater than those of any well-conducted private firm. The timber to be used in the troughing has not yet been decided upon, but we are proposing to call for tenders for the supply of ironbark, jarrah, tallowwood, and red-gum. Those we find, by experience, to be the best, but other timbers will not necessarily be excluded. I find that the Victorian Railways Department uses Oregon for troughing, and preserves it with a preparation obtained from the Albion Quarrying Company. Of course, there are few white ants near Melbourne, where the troughing is laid. I do not apprehend any danger from white ants along the Sydney-Newcastle route. We have the patrol system, so that any damage will be quickly discovered, and, in addition, the troughing will be along the railway metal, and will be entirely above ground. Undoubtedly we shall use some preservative on the timber, probably the same as we are using now for the poles. This troughing should have a life of 30 or 40 years. I think the framing shown in the cross-section is sufficiently stable. The building, for which an estimate of £1,000 is provided, is to house the repeaters which will be required midway between Newcastle and Sydney, approximately at Gosford. The repeaters in the telephone service between Melbourne and Sydney and Sydney and Brisbane have been quite effective. They make possible a large saving through the use of lighter copper wire. For instance, in the No. 1 trunk line between Melbourne and Sydney we have 60C lb. copper wire, but in the No. 2 line, which is worked with repeaters, and also in the line between Sydney and Brisbane, only 200 lb. wire is used. If those lines had been installed without repeaters, probably we would have required to use 600 lb. or 800 lb. wire. We use as many repeaters as are necessary to give good commercial speech, the system being equated for a definite transmission value. The only submarine portion of the cable will be that between Dawes' Point and Blue's Point, a distance, including leads in and out, of about 900 yards. We have already a number of submarine sections, both 50 and 100 wire pairs, between Dawes' Point and Blue's Point. They are carried in lead sheathing, served with a special jute protective covering, and over that is the steel wire armouring. The estimates of revenue which I submitted to the Committee were obtained from the telephone manager and accountant. The Department has not yet been able to meet the demand for trunk services; in every part of the Commonwealth it is still in arrears. We are trying to overtake the arrears as quickly as possible; last year we erected a large number of additional trunk lines, and we are building an even larger number during the current financial year. After overtaking arrears the ordinary development has to be met. To carry the troughing along the railway line will enable the work to be done at a much cheaper rate. When this service between Sydney and Newcastle and Newcastle and West Maitland is established, there is not any likelihood during this generation of difficulties arising, as it will be on a "no delay" basis between Sydney and Newcastle.

For the first time it will be up to date, and thoroughly efficient. It will not be subject to interruption, and will not vary in transmission efficiency. It will be unnecessary for a person desiring to communicate over that route to have to wait twenty minutes, or half an hour, because if there is any increase in traffic sufficient additional wires will be available. We will have ample spares. As compared with an aerial service, the cost will be approximately one-half.

17. *To Senator Reid.*—I understand the trunk line between Sydney and Brisbane is paying. The trunk lines between Sydney and Melbourne and Melbourne and Adelaide are paying handsomely. I cannot speak definitely regarding the Sydney to Brisbane trunk line, because it was only completed about the middle of last December, and has not yet been working for a full financial year. The proposed line, when completed, will relieve the business along that section, and the risks of interruption on long-distance trunks will be reduced by one-half. There will be no interruptions between West Maitland and Sydney unless some unforeseen accident happens.

18. *To Mr. Mackay.*—We have not yet definitely decided the manner in which the troughing is to be roofed. I do not think we are likely to adopt a gable roof for the troughing unless we can obtain a favourable price. Our proposal is considered to be cheaper, but if the other method is cheaper we will adopt it. Even if water entered the troughing, it would not injure the cable, as it is encased in lead. If the timber covering the troughing split and allowed water to enter, the cable would not be damaged in any way.

(Taken at Melbourne.)

THURSDAY, 22ND MAY, 1924.

Present:

Mr. GREGORY, Chairman;

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

Lawrence Bede Fanning, Superintendent of Telephones, Central Administration, Postmaster-General's Department, sworn and examined.

19. *To the Chairman.*—I am aware that a reference has been submitted to the Committee respecting the laying of a telephone cable from Sydney to Newcastle. I did not prepare the figures that were recently supplied to the Committee by the Chief Electrical Engineer. Owing to the extensive development that is taking place in the telephone trunk line business between Sydney-Newcastle-West Maitland, and places north of West Maitland, it is necessary, in order to meet existing and future requirements, to replace the present aerial routes by underground cables between Sydney and West Maitland. Owing to the lack of sufficient telephone lines between Sydney and Newcastle, and important centres in the northern part of New South Wales, considerable delay is occasioned to telephone business. It is essential that relief be provided at an early date. As an indication of the congestion that exists, it is pointed out that at least fourteen additional lines are required almost immediately between Sydney and Newcastle to satisfactorily handle the business passing between those two cities. The annual revenue at present earned from trunk line traffic passing between Sydney and Newcastle is £13,563. It is estimated that by 1928 the revenue will increase to £30,000, and by 1943 to £46,000. The annual revenue derived from the business passing between Newcastle and West Maitland is £2,086, and it is estimated that this will increase to £4,000 in 1928, and to £8,000 in 1943. The figures furnished indicate the revenue that is earned from the direct traffic between Sydney and Newcastle and between Newcastle and West Maitland, and do not include any proportion of the revenue derived from calls between Sydney and places north of Newcastle and West Maitland. An analysis of the business for the last year indicates that the revenue earned from trunk line business passing over circuits between Sydney-Newcastle-West Maitland is £27,000. It is estimated that this business will increase to £66,000 in 1920, and £120,000 in 1943. These figures have been arrived at by crediting to the Sydney-Newcastle-West Maitland routes that proportion of the revenue earned from calls to the northern parts of New South Wales and Queensland which should properly be credited to the cable proposal. The proportion of the revenue credited to the cable has been arrived at in this way: Between Sydney and Newcastle at present there are 23 circuits, and of these 11 serve Sydney and Newcastle. The balance go beyond Newcastle to places such as Maitland, Tamworth, Armidale, Wallangarra, and Brisbane. The whole of the circuits on the main northern route in New South Wales pass through Newcastle and West Maitland, and in the proposed cable they will form the main arterial lines between Sydney and the northern part of New South Wales. The Brisbane trunk line, and the trunk line proposed to be erected to Brisbane next year, will also be put into the cable. The distance between Sydney and West Maitland is 116 miles. We have taken the total revenue and the length of the Sydney-Brisbane trunk line, and credited the cable proposal with its proper proportion of the revenue. The distance between Sydney and Brisbane roughly is 675 miles. On the mileage basis, we have credited the cable proposal with $\frac{116}{675}$ of the total revenue earned on the Sydney-Brisbane trunk line. Every call to Brisbane will pass through the cable. In considering this proposal, it is quite fair to estimate the revenue received on a proportional mileage basis. The proposed cable will carry not only the Brisbane trunk line, but also lines to Newcastle, West Maitland, Lismore, and other places. It is therefore fair to credit the cable proposal with its proportion of revenue arrived at on a mileage basis. It is the fairest basis I can think of in estimating the probable revenue that may be credited to the cable proposal. The necessity for the proposal cannot be determined entirely on its revenue-earning possibilities, for the reason that it is imperative to increase at once the number of lines between Sydney and Newcastle. This can be done only by laying down cable or erecting new aerial routes. As the cable is the better proposition it is recommended. If the cable were extended all the way to Brisbane, the business in the intervening distance between Newcastle and Brisbane would be less per mile than between Newcastle and Sydney. The estimated business per mile of cable between Sydney and Newcastle is greater than between Newcastle and West Maitland. It is estimated that, in 1928, the revenue from Newcastle-Sydney business will increase to £30,000. The Committee have already been furnished with figures showing the cost of the proposed cable as compared with the new aerial routes, including the annual charges. I think that the existing plant was taken into consideration. At present there is an aerial service from Sydney to Newcastle. The present value of that aerial route may be taken at—

Poles—	
98 miles (Sydney-Newcastle), at £583 per mile	£57,134
18½ miles (Newcastle-West Maitland), at £515 per mile	9,527
Wire—	
116½ miles (Sydney-West Maitland), 36 wires at £24 per wire-mile ..	100,656
	£167,317

I might mention that the actual cost of construction of this route was very much less than the above, but these figures are not now available as the route was built over 50 years ago, and has been reconstructed since then more than once. The above figures represent its present value. The route is a very rocky, tortuous, and difficult one. It includes the long Hawkesbury bridge, the Woy Woy Mountain, many deep gullies, and the difficult terrain between Brooklyn and Gosford. The aerial routes are partly railway property and partly departmental property. A good deal of the material used in constructing the aerial route will remain even if the cable route is constructed, because it will be needed for business between intermediate stations on the route. The poles will be only required to carry subscribers' lines and telegraph lines. The net value of the material to be recovered will be about £13,000. To meet the trunk line telephone business offering, we must either develop the aerial route or construct a cable route. The amount of capital cost charged against the telephone and telegraph works respectively can be ascertained, but there is a joint telephone and telegraph account, because wires are used for joint purposes. The revenue earned from telephone trunk line sources in New South Wales, including the New South Wales proportion of the Sydney-Melbourne trunk line, for the financial year ended 30th June, 1923, was £222,690. The working expenses, excluding interest, were £194,410. On these figures, the percentage of working expenses to earnings is 87.3. Every proposal to instal a new trunk line service is carefully examined by the Department. I am required to investigate the proposal and report to the secretary whether it is a necessary one. If we have an existing circuit between two towns which is not giving satisfactory service because it is overloaded, we have to provide additional wires. My business in examining such a proposal is to show whether, taking into account the revenue, the proposition can be justified. There is serious congestion between Sydney and Newcastle at present. We have eleven trunk lines serving the two cities. At present the average number of calls daily between Sydney and Newcastle is about 700. The average delay, taken over the 24 hours, is 30 minutes per call, which means that during the busy hours delays of over an hour must occur. Repeated complaints about the delay have been made by representative bodies in Newcastle and Sydney. We have received at least seven applications from commercial firms in the two cities to rent direct lines between Sydney and Newcastle. We cannot supply the lines because facilities are not available. Even if space were available for wires to be put on the poles, we could not grant these applications, for public requirements must be considered before the requirements of particular firms. If a cable is laid, we shall be able to consider these applications. The firms would probably pay a substantial rental for the use of direct lines. To cope properly with the existing business between Sydney and Newcastle we require at least 25 trunk lines, which is fourteen more than we have at present. That number cannot possibly be put on the existing poles, as they are overloaded with wires. Twenty-five lines would give a reasonably satisfactory service between the two centres, with an average delay of five minutes. I think the people in two important centres like Sydney and Newcastle should not be required to wait longer than five minutes. Other applications for trunk lines have been received from towns in various parts of Australia, but, in my opinion, the proposition now before the Committee should have precedence. It is a most urgent matter, and vitally affects the development of the trunk line system to the northern part of New South Wales and Queensland. One reason why I consider that to be the most important trunk line project is that between Sydney and Newcastle we have a bottle-neck through which every trunk line going north must pass. The Sydney-Brisbane line passes through Newcastle. The country between the two cities is mountainous, and the only possible route is along the railway line unless we go out around Wiseman's Ferry. There are four pole routes along the railway now, and we could not put another route in even if we wished to do so. There is a limit to the number of wires which poles can carry. We expect that within five years we will have at least 52 trunk lines between Sydney and Newcastle, and that means 104 wires. To show the development which has occurred in trunk line telephone business, I may say that when the Sydney-Brisbane line was opened last October, it was estimated that the revenue would be £2,500 per annum. The revenue, based on the last 24 weeks, will be £8,203. That clearly shows that that line is already heavily overloaded. The revenue will exceed the estimate by about £5,000. About 80 calls per day are made on the line. A second line between Sydney and Brisbane is badly needed, but it cannot be provided unless we increase the facilities between Sydney and Newcastle by either cable or aerial route. My estimates of the growth of trunk line telephone business are on a conservative basis. When we put in the new Sydney-Melbourne trunk line, we estimated an increase of 15 per cent. in the previous business, whereas the actual increase has reached 30 per cent. Improvement in trunk line facilities invariably leads to an increase in business. The development in telephone trunk line business in the last five years has been enormous. The number of calls has increased from 9,000,000 to 15,000,000, or an increase of 62 per cent. Last year alone the increase was 15 per cent. I think we are perfectly justified in estimating that that rate of increase will continue.

20. *To Mr. Jackson.*—It is very hard to say what the effect of wireless telephony will be upon the present system, but I do not think there will be any noticeable effect in the next five years. Wireless telephony has very little commercial value at present. There has been practically no commercial use of it so far. I do not think it will take the place of land line telephony for many years to come. It is still a problem how wireless telephone communication between Sydney and Melbourne can be so arranged as to connect individual subscribers in the respective cities.

21. *To Senator Reid.*—The rate of development to which I have called attention is not normal for the simple reason that we have not been able to satisfy the demands of the public. When we are able to do this and provide a reasonably satisfactory service, the percentage rate of development will increase substantially. The congestion has been so great on many of our trunk lines that we have reached saturation point in the carrying capacity of the circuit. The experience with the Sydney-Brisbane line proves that. There is sufficient business on that line at present to warrant the construction of a second line.

22. *To Mr. Mackay.*—The building of a second line from Sydney to Brisbane has not yet been decided upon, but it has been decided that a second line is necessary. Before it can be provided it may be necessary to refer the matter to this Commitee. The aerial routes from Sydney to Newcastle are seriously overloaded, and it is impossible to attach additional lines to the existing poles. No lines which will be needed for telegraph business, or for intermediate telephone business, will be removed from the existing poles if the cable route is decided upon. We shall place the additional trunk lines required into the cable. The lines between Sydney and Newcastle are subjected to much interruption. Because the volume of business carried on that route was not anticipated the telegraph and telephone circuits are not arranged to the best advantage. It is too much for a single

line to carry up to eighty calls a day, as the Brisbane line is doing. Very shortly it will be possible to arrange for direct telephone communication between Melbourne and Brisbane, and Adelaide and Brisbane; and Adelaide and Sydney, and when that time comes greatly increased business will result on those routes. At present it is possible to speak to Brisbane from Melbourne, but the conversation is not entirely satisfactory. We hope shortly to make satisfactory telephone conversation possible between all the capital cities on the mainland, except Perth

The Committee adjourned.

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