1927.

LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDED 30TH JUNE, 1927,

Together with Photographs.

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THE DEPARTMENT OF PUBLIC WORKS.

(ANNUAL REPORT FOR THE YEAR 1926-27.)

The Under-Secretary for Public Works to The Honorable Secretary for Public Works and Minister for Railways.

Department of Public Works, N.S.W.,
Sydney, 30 September, 1927.

Dear Sir,

Report upon the operations of the Public Works Department for the financial year ended 30th June, 1927, is submitted hereunder :—

Financial.

The expenditure for the year amounted to £4,178,429 1s. 6d., the total receipts were £390,367 6s. 11d., making a turnover for the year of £4,568,796 8s. 5d. Supervision costs totalled £304,753 7s. 3d. Details of these figures are shown in the accompanying report by the Accountant. Statement showing total transactions and costs of supervision, with District Offices in detail, and embodying a comparison with the similar information for last year, may also be seen on reference to the Accountant's report.

Water Supply and Sewerage Branch.

Public water supplies constructed at a capital cost of £2,637,758 are now in operation in seventy towns. Thirteen towns are sewered, and stormwater channels have been constructed in thirteen towns. The total capital cost of sewers and stormwater channels amounts to £645,191. The cities of Sydney and Newcastle are not included in these figures.

The rainfall in the western half of New South Wales for most of the year, and in the eastern half from July, 1926, to March, 1927, was below the average. In April heavy and general rains fell in the eastern districts, but May and June were deficient in rainfall throughout most of the State.

The Broken Hill water supply has proved adequate owing to heavy rain which fell in March, 1926, but only 330 points fell during the year with the result that the volume of water in the storage reservoir has diminished; a full supply is available until March or April next.

Country towns water supplies generally met the demand made upon them, but in the Riverina, where reticulated supplies had not been installed, it was found necessary to convey large quantities of water by train.

The Cordeaux Reservoir was completed at a total cost of £969,627, and handed over to the Metropolitan Water, Sewerage and Drainage Board.

Construction work at Avon Reservoir was practically completed, the cost to 30th June being £1,106,497.

The expenditure to 30th June on the Nepean Reservoir construction and main wall excavation amounted to £284,469.

Several country water supply works were brought to conclusion, the principal being complete schemes for Blackheath, Yass, Orange Mental Hospital, and Queanbeyan.

New concrete service reservoirs were constructed at Goulburn, Lithgow, and Muswellbrook; and electrical pumping machinery was installed at Blayney, Corowa and Nyngan.

New schemes of water supply are in course of construction for Canowindra and Molong, and a combined scheme for Taree and Wingham.

Works are also in hand at Armidale, Culcairn, Moree, Leura, Balranald, Condobolin, Cowra, Casino, Dubbo, Albury and Lismore.

The Northern Suburbs ocean outfall sewer works showed satisfactory progress, No. 3 section being completed, and sections 1, 2 and 3 handed over to the Metropolitan Water, Sewerage and Drainage Board. Sections 4 and 5 are in course of construction. The aqueduct between east and west Middle Harbour submain was completed. The cost of these works amounted to £1,373,374.

The Canterbury-Campsie-Belmore-Bankstown sewerage work is almost complete, the expenditure being £255,933. Sewerage works are nearing completion at Tamworth, Dubbo and Lismore.

River Murray Waters Agreement.

Good progress is reported in connection with the Hume Reservoir, the quantity of excavation taken out being 141,900 cubic yards, making the total to date 791,900 cubic yards.

The concrete placed during the year amounted to 42,200 cubic yards, the total to date being 114,500 cubic yards.

Contour surveys were proceeded with in connection with Locks 12 to 15, and alternative sites selected for Lock 17.

At No. 10 Lock, 4,200 cubic yards of excavation were taken out during the year, making a total of 59,500 cubic yards to date.

Expenditure from the River Murray Commission funds amounted to £399,952, making a tota expenditure to 30th June, 1927, of £1,391,360.

Harbours, Roads and Bridges Branch.

The total expenditure amounted to £870,242, as compared with £1,144,268 for last year; the expenditure on harbour works, including dredging, being £426,489, and on roads, bridges, ferries, and public watering-places, £443,753.

Harbours.

Major improvement works were in progress during the year at Byron Bay, Woolgoolga, Coff's Harbour, Nambucca River, Manning River, Cape Hawke, Newcastle, Port Kembla and Moruya River.

As regards dredging—the quantity of material lifted during the year totalled 3,974,665 tons, costing 12·4d. per ton, as compared with 11·5d. per ton for the previous year's output.

The depths at the various river entrances were maintained by the bar dredges, the only delays to traffic occurring at the smaller entrances where the larger portion of the designed work is still incomplete.

Resurveys of Newcastle Harbour and of Cook's River between Tempe Dam and Burwood-road were completed during the year.

The snagging of the River Darling from Wentworth to Burtundi, about 70 miles, and also at Higgins' Cutting was undertaken, and repairs were carried out to the Bourke Lock, Weir and Wharf.

No additional Drainage Trusts or Unions were gazetted during the year, the number still being 28 Trusts and 20 Unions.

Roads.

The expenditure on roads in the Western Division amounted to £25,904 and a sum of £6,143 was expended on general maintenance and improvements to the Kosciusko and Jenolan Caves roads. A commencement was made with the construction of the road to Abercrombie Caves, expenditure for the year amounting to £1,060.

On the road Woodenbong to the Queensland Border the expenditure for the year amounted to £18,196, making the total expenditure on this road £35,220.

Reconstruction work was carried out on sections of the Great Northern, the Great Southern Road, and the Main South Coast Road, and upon completion the maintenance of these roads was taken over by the Main Roads Board.

The year's expenditure on road works—construction, maintenance, etc., totalled £122,167.

Bridges.

Bridge construction works were in hand at Mildura, Abbotsford, Euston, Gonn Crossing, George's River, Yarrawa, Dingo Creek, Tallywalka Creek near Wilcannia, Kynnumboon, Tallywalka Creek at Menindie, Cook's River at General Holmes Drive, Byangum, Willandra on road Booligal to Ivanhoe, Goobang Creek at Condobolin, Wyaldra Creek at Beryl, Mulwala, Merrowie Creek on road Booligal to Ivanhoe, Narran River at Bangate, Box Creek (road, Whealbah to Trida), Emmigrant Creek near Ballina, Willandra Creek (road, Clare to Ivanhoe), Polygonum Swamp at Bourke, Lachlan River at Collett's Crossing, Allan's Creek near Wollongong, Gladesville, Cockfighter Creek at Warkworth, and Williams River at Clarencetown.

The following new works were undertaken—Tarrion Creek Bridge near Brewarrina; Merrimajeel Creek (road, Booligal to Oxley); Bridge over Willandra Creek (road, Whealbah to Trida); Bridge over Bellinger River at Urunga; Bridge over Castlereagh River at Gilgandra; Bridge over Barwon River at Boonangar; Bridge over Yass River at Hardwick Road; and Bombala Bridge footway.

The total expenditure on the construction, renewal, repairs and maintenance of bridges for the year amounted to £215,038.

Punts, Ferries and Launches.

The expenditure on national ferries—construction, upkeep and working—totalled £76,694.

The new punt for the Grafton ferry service commenced working in December, 1926. A new punt is also in course of construction to replace the existing one at Louth, on the Darling River. A new punt is under construction at the Government Dockyard, Newcastle, as an addition to the Dover Point ferry service.

Public Watering-places.

The expenditure on construction, repair, and maintenance of public watering places in the Western Division amounted to £29,855.

Electrical Engineering Branch.

The two principal works controlled by this Branch are the Port Kembla electricity undertaking and the hydro-electric development at Barren Jack.

Considerable improvements have been made as regards the operation of the Port Kembla system, both at the power station and in connection with the transmission systems. A new schedule of rates brought into force in February, 1927, has resulted in considerable increase in the number of consumers, which has necessitated many additional substations, and, in some cases, short service lines to give supply. The result of these additions to the system, however, will not be fully appreciated until next year. The extension of the 33 kV transmission line from Kiama to Nowra has been put into service, but so far only the town of Berry has been connected.

A comparison, by Branches, of the foregoing figures with those of the previous year is afforded by the following :—

Branch.	1926-27.		1925-26.	
	Turnover.	Per cent.	Turnover.	Per cent.
	£ s. d.		£ s. d.	
Architectural	385,711 14 5	7·91	385,319 7 7	8·86
Electrical	314,792 9 7	6·46	195,979 18 8	4·51
Harbours, Roads and Bridges	928,244 14 3	19·05	1,203,924 16 10	27·70
Water Supply and Sewerage	1,480,940 10 4	30·39	1,327,932 6 4	30·55
Sydney Harbour Bridge	927,968 1 7	19·04	479,260 13 7	11·02
Miscellaneous	531,138 18 3	10·90	492,017 3 1	11·32
Turnover	4,568,796 8 5	93·75	4,084,434 6 1	93·96
Supervision	304,753 7 3	6·25	262,508 3 2	6·04
Totals	4,873,549 15 8	100·00	4,346,942 9 3	100·00

The increased turnover in the Electrical Branch is due to the vigorous construction policy followed in regard to the Barren Jack Hydro-Electric Scheme. The falling off in the transactions of the Harbours, Roads, and Bridges Branch is attributable mainly to a reduced expenditure on road works—the work done on behalf of the Main Roads Board amounted to only £64,686 as compared with £223,992 in 1925–26—and to decreased disbursements on bridge and harbour works. The increased turnover of the Water Supply and Sewerage Branch is due to a greater activity in respect of works being carried out under the River Murray Agreement, particularly in regard to Hume Reservoir.

In terms of total turnover, the supervision cost during 1926–27 was equivalent to 6·67 per cent. as compared with 6·42 per cent. in 1925–26. The total supervision cost of each of the Branches and the percentage cost to the turnover of each Branch were as follows :—

Branch.	Turnover.	Cost of Supervision.	Percentage of Supervision to Turnover.	1925-26 Percentage.
	£ s. d.	£ s. d.		
Architectural	385,711 14 5	39,728 19 8	10·30	10·17
Electrical	314,792 9 7	20,490 10 8	6·51	6·71
Harbours, Roads, and Bridges	928,244 14 3	73,013 14 1	7·87	6·99
Water Supply and Sewerage	1,480,940 10 4	128,803 4 10	8·70	7·19
Sydney Harbour Bridge	927,968 1 7	23,859 0 8	2·57	2·66
Miscellaneous	531,138 18 3	18,857 17 4	3·55	3·60
Totals	£4,568,796 8 5	£304,753 7 3	6·67	6·42

It should be noted that the supervision costs discussed herein include the salaries, allowances, and expenses of all architects, engineers, engineering assistants, engineers' chainmen, inspectors, foremen, clerks, timekeepers, storekeepers, storemen, clerical labourers, motor-car drivers and cleaners; the salaries and expenses of the whole of the Head Office administrative officers, whether professional, clerical, or general; and motor car running costs, stamps, telephones, cleaning, lighting, heating, rent of offices, purchase of instruments, &c., &c.

A further interesting dissection of the supervision cost in terms of the total turnover is the following :—

	1926-27.		1925-26.	
	Amount.	Per cent.	Amount.	Per cent.
	£ s. d.		£ s. d.	
Local Supervision—				
Direct Local Supervision	111,999 1 7	2·45	77,135 19 8	1·89
General District Supervision	58,780 14 2	1·29	55,566 8 9	1·36
	£170,779 15 9	3·74	£132,702 8 5	3·25
Head Office Administration—				
Construction Branches	77,350 3 6	1·69	72,561 8 9	1·77
General Administration	56,623 8 0	1·24	57,244 6 0	1·40
	£133,973 11 6	2·93	£129,805 14 9	3·17
Totals	£304,753 7 3	6·67	£262,508 3 2	6·42

As bearing on the lower total cost and the lower percentage cost of Head Office general administration it is satisfactory to record that the work of the Accounts Branch was performed at a total cost of £17,075 16s. 7d., equivalent to ·391 per cent. of the turnover. The corresponding figures for 1925–26 were £17,140 13s. 6d, and ·432 per cent. Thus, despite a 12 per cent. increase in the Departmental transactions, this branch, insofar as its Head Office organisation is concerned, was able to function at a slightly reduced cost. But the true comparison will be better realised when it is stated that the cost of the Accounts Branch in 1926–27 was only 94 pence in respect of each £100 of Departmental turnover, whereas, in the previous year the cost was 104 pence per £100.

The following statement shows the total transactions and costs of supervision for all District, Construction, and other local offices, and the similar information for the previous year :—

District Work, or Office.	Expenditure.	Receipts.	Turnover.	Cost of Supervision.	Percentage of Supervision to Turnover.	1925–26 Turnover.	1925–26 Supervision.	1925–26 Percentage.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	per cent.	£ s. d.	£ s. d.	per cent
Armidale	32,249 13 6	471 17 2	32,721 10 8	2,135 6 6	6·53	14,951 1 7	1,870 7 11	12·51
Bathurst	181,634 14 1	543 4 1	182,177 18 2	4,891 10 1	2·69	117,951 5 5	4,007 0 11	3·4
Bourke	32,970 13 11	407 6 3	33,378 0 2	2,495 8 6	7·48	15,324 11 7	1,799 11 5	11·74
Broken Hill	33,638 4 11	445 16 4	34,084 1 3	2,843 15 5	8·34	27,527 8 8	2,337 2 8	8·49
Coff's Harbour	18,098 13 1	24 17 9	18,123 10 10	1,142 7 7	6·3	.....	.....	.....
Cootamundra	89,875 7 3	3,897 19 7	93,773 6 10	4,325 13 3	4·61	99,089 16 1	4,635 19 1	4·68
Dubbo	25,759 11 6	846 6 11	26,605 18 5	2,244 18 0	8·44	24,672 8 1	2,652 13 2	10·75
Goulburn	95,828 14 5	3,131 16 4	98,960 10 9	5,797 4 8	5·86	91,892 11 10	5,250 8 11	5·71
Hay	28,767 12 6	441 16 3	29,209 8 9	3,302 2 4	11·3	19,766 9 2	1,921 13 8	9·72
Kempsey	107,331 19 5	607 17 0	107,939 16 5	4,166 3 11	3·86	47,497 16 5	3,351 3 3	7·06
Lismore	160,348 6 8	1,170 5 11	161,518 12 7	7,750 3 7	4·8	118,453 2 7	7,235 13 2	6·11
Moree	21,137 16 9	776 19 2	21,914 15 11	2,534 9 9	11·56	12,927 12 11	2,446 9 2	18·92
Newcastle	290,673 13 3	6,382 10 11	297,056 4 2	12,684 19 5	4·27	367,414 1 0	11,487 7 0	3·13
Port Kembla	222,355 14 0	108,729 9 1	331,085 3 1	9,982 8 7	3·02	290,736 8 10	10,095 0 8	3·47
Tamworth	55,249 17 4	284 18 6	55,534 15 10	5,119 16 4	9·22	52,333 19 0	4,838 15 1	9·25
Metropolitan	68,830 11 4	2,289 10 2	71,120 1 6	4,316 19 6	6·07	92,314 16 5	4,021 10 4	4·23
Total—District £	1,464,751 3 11	130,452 11 5	1,595,203 15 4	75,733 7 5	4·75	1,392,853 9 7	67,950 16 5	4·88
Avon and Nepean	199,053 2 6	5,837 6 2	204,890 8 8	17,178 8 11	8·38	257,356 1 7	12,833 11 4	4·99
Cordeaux	20,541 5 0	2,115 19 1	22,657 4 1	2,471 0 4	10·91	43,970 9 9	6,695 2 6	15·23
N.S.O.O. Sewer	248,318 18 7	3,898 5 0	252,217 3 7	13,396 14 11	5·31	255,566 15 0	10,839 9 4	4·24
Canterbury-Bankstown	30,760 11 5	.....	30,760 11 5	3,585 16 4	11·66	66,539 9 9	4,234 12 0	6·36
Sydney Harb. Bridge...	913,734 17 10	14,233 3 9	927,968 1 7	11,829 19 1	1·28	478,658 17 4	5,823 17 7	1·22
Coff's Harbour Improvements.	28,103 3 6	92 3 7	28,195 7 1	2,374 17 7	8·42	36,133 19 2	2,253 14 4	6·24
Woodenbong Road	17,021 17 11	76 6 9	17,098 4 8	1,250 7 7	7·31	9,880 2 8	943 9 7	9·55
Bondi Sand-hills	16,275 19 9	.....	16,275 19 9	1,030 16 2	6·33	8,842 13 10	456 5 4	5·16
Dubbo Sewerage	29,434 18 0	14 3 6	29,449 1 6	1,904 10 8	6·47	10,567 15 1	339 14 2	3·21
Hume Reservoir	320,116 19 11	9,112 1 6	329,229 1 5	12,267 4 0	3·73	.....	.....	.....
No. 10 Lock, Wentworth.	73,608 13 0	4,252 16 3	77,861 9 3	8,379 2 3	10·76	.....	.....	.....
Ten Minor Works	77,523 18 11	3,708 0 8	81,231 19 7	5,852 6 3	7·2	277,177 1 5	13,339 9 11	4·81
Total—Construction Offices ... £	1,974,494 6 4	43,340 6 3	2,017,834 12 7	81,521 4 1	4·04	1,444,693 5 7	57,759 6 1	3·998
*Electrical Branch	206,503 10 7	780 15 11	207,284 6 6	12,708 4 8	.....	104,703 19 2	6,706 6 4	.....
*Architects' Branch	175,264 9 7	1,622 7 4	176,886 16 11	28,718 19 8	.....	195,231 8 2	2,948 12 10	.....
*Dredge Service	65,978 10 2	4,823 0 6	70,801 10 8	2,540 13 11	.....	59,640 0 2	3,227 6 4	.....
Head Office Local Office	75,108 19 11	39,123 5 0	114,232 4 11	92,287 12 4	.....	260,715 0 2	115,012 18 1	.....
*State Telephones	22,432 0 11	125 6 11	22,557 7 10	.....	.....	.....	.....	.....
Leichhardt Depot	86,190 18 3	76,529 0 9	162,719 19 0	5,169 15 7	3·18	204,285 9 8	4,679 9 5	2·29
Broken Hill Water Supply.	70,226 2 3	58,575 2 1	128,801 4 4	4,927 17 9	3·83	128,744 18 7	3,898 5 5	3·03
Junee Water Supply	10,972 1 11	11,008 9 5	21,980 11 4	331 3 9	1·51	18,493 17 11	260 8 0	1·41
*River Murray Commission (Loans).	18,888 12 1	.....	18,888 12 1	31 5 10	.....	236,387 15 10	.....	.....
*Working Account	2,666 11 2	21,059 11 7	23,726 2 9	783 2 3	.....	29,270 1 1	Cr. 246 5 0	.....
Three Other Offices	4,951 14 5	2,927 9 9	7,879 4 2	.....	.....	9,415 0 2	310 19 3	.....
Total—Other Offices £	739,183 11 3	216,574 9 3	955,758 0 6	147,498 15 9	.....	1,246,887 10 11	136,798 0 8	.....
Grand Total ... £	4,178,429 1 6	390,367 6 11	4,568,796 8 5	304,753 7 3	6·67	4,084,434 6 1	262,508 3 2	6·42

NOTE.—* The figures for these offices exclude expenditures recorded in District Offices.

The total expenditure for the year—£4,483,182 8s. 9d, inclusive of supervision costs—was made from the following votes, accounts, &c.

£	s.	d.	
778,137	19	9	from 39 Consolidated Revenue votes.
240,004	1	5	from 17 Public Works Fund votes.
2,207,885	19	10	from 70 General Loan votes.
516,977	0	5	from 35 Special Deposit Accounts.
424,230	4	9	from funds of the River Murray Commission.
200,658	16	2	paid direct by the Education Department.
90,593	1	2	paid direct by the Department of Public Health.
19,136	6	4	paid direct by 36 other Departments.
5,558	18	11	paid on behalf of the Government Insurance Office.
£4,483,182	8	9	

Progress as regards the Barren Jack system has not been as favourable as was expected, the construction of the power-house building having introduced many difficulties, which are explained in the Chief Engineer's report. It was hoped to give supply in May, 1927, to the majority of the towns to be connected, but as the erection of electrical machinery cannot be proceeded with until the power-house building is properly covered, the supply of power will be further postponed from six to seven months. It is hoped that power will be available early in January, 1928.

The survey of the line for supplying the Federal Capital has been completed, but negotiations in this regard have not reached finality.

The Hydro-Electric Committee have favoured the proposal for the development of the power available from the Shoalhaven River, and progress is also being made regarding the investigation of the water power resources of other portions of the State.

Reports have been made in respect of loan proposals in connection with the supply of electricity to several country towns, and in regard to agreements to grant trading franchise in a number of others.

A complete survey of the Tia River development was carried out. This river has a very good storage, a reasonably short hydraulic line, and a gross head of 1,073 feet. The probable power on a 50 per cent. load factor is 7,000 h.p.

A preliminary investigation of the whole of the Barrington Tops area showed that the Barrington River afforded the most favourable possibilities. On a 50 per cent. load factor at 1,500 feet elevation 8,000 h.p. could be developed, and this could be increased to 20,000 h.p. by the addition of three other interconnected power stations at suitable points on the river down to an elevation of 535 feet above sea-level.

A comprehensive survey was made of the Tooma River. Under this scheme the gross head would be 1,390 feet, and the probable power on a 50 per cent. load factor would be 20,000 h.p.

Sydney Harbour Bridge.

Satisfactory progress is reported in connection with the construction of the northern approach, although some difficulty was experienced in obtaining vacant possession of resumed property as required.

The construction of the southern approach was commenced on 6th October, 1926, the main portion of the work consisting of excavation between Grosvenor and Margaret streets, but progress has been somewhat hampered by the delay in deviating underground services, and the time taken to demolish Scots Church and the St. Phillip's Church schoolroom. As in the case of the northern approach, difficulty was met with in obtaining possession of the properties when required, but vacation is now proceeding satisfactorily.

The total quantity of concrete placed in position on the northern approach during the year amounted to 11,076 cubic yards, but on the southern approach only minor concreting work has been carried out, the total quantity being but 100 cubic yards. The quantity of open cut excavation on the northern approach amounted to 20,080 cubic yards, and on the southern approach 13,113 cubic yards were excavated from the commencement of operations in October, 1926, to the 30th June, 1927.

As regards the contract of Messrs. Dorman, Long & Co., the approach span piers have been completed with the exception of piers Nos. 17 and 18 of the northern approach; and good progress has been made with the southern abutment tower.

One of the most critical phases of the construction work was carried out during the year, viz., the erection and concreting in position of the two main bearings at Dawes Point. Each of these bearings weighs 296 tons. All sections had been most accurately machined and came together with a perfect fit.

The following quantities show the amount of civil engineering carried out in connection with the contract :—

	Cubic yards.
Earth excavation	29
Rock excavation	3,189
No. 1 concrete	34,115
No. 2 concrete	4,324
Granite masonry	3,783

The quantity of carbon steel delivered to the workshops at Milson's Point during the year totalled 6,193 tons, of which 2,550 tons were obtained locally. Contracts were placed for 1,000 tons of rivets, and 2,315 gallons of paint were delivered.

The total weight of material fabricated in the shops during the year was 4,914 tons.

Spans Nos. 1 and 2 were erected during the year, and span No. 3 was nearing completion. The erection of span No. 6 on the northern side was commenced on the 16th June.

The total cost to date of the bridge and approaches has amounted to £1,852,240 18s. 2d.

Government Architect's Branch.

The expenditure of the Branch for the year amounted to £377,390 6s. 2d., as compared with £380,522 8s. 11d. for the previous year.

The following are the most important works for which contract drawings, estimates and specifications were prepared :—Erection of new building for the Public Trustee and Staff in Phillip-street, Sydney, estimated cost £98,000; Sydney Hospital—New Wards, Casualty and Operating Blocks, £67,000; Royal North Shore Hospital—New Home for Nurses, £67,300; Newcastle Hospital—Additions to Nurses' Quarters, £31,000; Orange Mental Hospital—Additional Buildings, £100,000; Canterbury Memorial Hospital—New Building, £30,000; Manly Peace Memorial Hospital—Additional Buildings, £28,000; Lithgow District Hospital—New Ward Block, £26,200; Maitland District Hospital—New Home for Nurses, £17,500; Liverpool State Hospital—Nurses' Quarters, £17,000; Broughton Hall—Administrative Block and Nurses' Quarters, £15,700; Central Police Barracks—Additions and Alterations, £14,700; Kiama District Hospital—New Buildings, &c., £12,000; Wagga Wagga Police Buildings, £9,400; Dubbo District Hospital—Additions and Alterations, £9,000; and Royal South Sydney Hospital—Out-patients and X-Ray Departments, £8,000.

Amongst the works completed or in course of completion during the year were the following:—Campsie Court House, estimated to cost £7,350; Katoomba Court House, £5,166; Lidcombe Police Station, £4,193; Waterfall Sanatorium—New Boiler-house and Laundry, £6,764; Parramatta Mental Hospital—Residential quarters for Medical Officer and Manager, £5,582; Gladesville Mental Hospital—Residence for Senior Medical Officer, £2,880; Marrickville District Hospital—Re-modelling and expansion, £20,000; Blue Mountains District Anzac Memorial Hospital, Katoomba, £17,000; John Storey Memorial Dispensary, £6,570; Jenolan Caves House—Additions to the Dining-room and further Bedroom accommodation, £7,340; Hotel Kosciusko—Provision for housing staff, and for laundry and boiler requirements, £22,000; and National Library—Additions, £60,000.

Testing Branch.

The operations of this Branch almost equalled that of the previous two years combined.

During last year 1,486,150 bags of cement were tested. This year the total was 2,436,340 bags, being the highest number of bags handled in one year.

A marked increase was also shown in steel-work inspection and miscellaneous investigations.

Receipts for last year amounted to £3,806 9s. 4d., whereas the fees collected this year totalled £5,328 13s. 6d.

The total expenditure was £7,627 5s. 10d., of which £6,870 11s. 8d. represented salaries. The expenditure exceeded receipts by about £2,300, but the bulk of the work carried out was for departmental purposes, for which there is not any charge.

Survey Drafting Branch.

It will be noted from the report submitted by the Chief Survey Draftsman that there has been an increase in the work of the Branch as compared with last year.

Helios printed amounted to 42,016, the total for the previous year being 41,292; and 3,100 maps were mounted, as against 3,003 last year. New plans to the number of 1,900 were registered, last year's total being 1,340.

State Automatic Telephone Exchange.

The scheme originally formulated in 1919 to link up State Government Departments through an Automatic Exchange, has now become an accomplished fact.

When the scheme was put forward in the first instance, between 700 and 800 extension lines were in use in the various Departments. Since then the activities of the Departments have grown to such an extent that, when the new service was brought into operation, it was necessary to provide for 1,100 extension lines. Subsequently these were increased to nearly 1,200, and from time to time the service will be extended further.

Following upon the introduction of the new Exchange, it is hoped that business between the Departments will be conducted more rapidly and efficiently than hitherto, with a saving in annual expenditure.

Government Dockyard, Newcastle.

The anticipated output for the year foreshadowed in the last report was not realised owing to labour disturbances in Great Britain delaying the delivery of material.

The supply of material is now coming to hand, and it is expected the year 1927–28 will be one of the busiest in the history of the Dockyard, the Railway Department having placed large orders for all-steel carriages, and a commencement being made with the construction of the Floating Dock. In connection with the latter, Mr. Waters, the General Manager, proceeded to England in September last to confer with the Admiralty and leading consulting engineers. At the same time he familiarised himself with engineering works organisation, both in Europe and America, which should produce advantageous results to the establishment.

During the absence of Mr. Waters the management was in the hands of a committee consisting of the Under Secretary for Public Works (Chairman), Mr. W. I. Kidd (Works Manager), and Mr. T. H. Tennant (Secretary).

Included in the works completed were two oil barges for the Imperial Oil Company, thirty-two all-steel railway carriages, a bridge over Cook's River, and 50 per cent. of the castings required by the Sydney Municipal Council for the Bunnerong Power Station. The output of cast-iron pipes was 8,000 tons.

The new pilot steamer required for the Navigation Department was well forward at the 30th June. Other works in hand were the construction of large steel pipes for the Hume Reservoir, pumping plant for Taree-Wingham water supply, bridges for the Kyogle-Richmond Gap Railway, bridge over the Paterson River at Gostwyck; a new ferry for George's River, and a small sand pump for Cook's River.

The total turnover for the year amounted to £538,000.

State Industrial Undertakings.

These undertakings are dealt with in a separate report by the Auditor-General.

The operations for the year were again satisfactory, the profits being as follows:—

	£
Building Construction	17,908
State Metal Quarries	22,167
State Brickworks	34,841
State Monier Pipe and Reinforced Concrete Works	30,242

General.

It is with regret that I have to refer to the loss sustained by the Department owing to the retirement on account of ill-health of Mr. E. M. de Burgh, M.Inst.C.E., Chief Engineer for Water Supply and Sewerage. Mr. de Burgh had completed forty-two years of service to the State, and had been Chief Engineer for the past eighteen years. His capacity as an engineer, and ability as an administrative officer, are reflected in the many large works of water supply and sewerage which were completed during his regime.

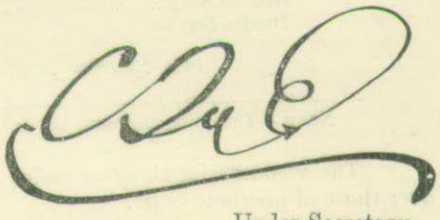
Mr. C. Simons, Wh.Sch., Inspecting Engineer, acted as Chief Engineer for a short period, but he also entered upon extended leave prior to retirement, having reached the age limit. I am glad to be in a position to place on record my appreciation of the valuable services rendered by this officer during his lengthy service.

On the retirement of the two officers abovementioned, it became necessary to reorganise the Water Supply and Sewerage Branch, having regard also to the filling of the position of Deputy Chief Engineer vice Mr. Peake, whose retirement was referred to in last year's report. As a result of the rearrangement, Mr. T. E. Burrows, L.S., M.Inst.C.E., M.I.E.A., Chief Engineer, Harbours, Roads and Bridges Branch, was transferred to the Water Supply and Sewerage Branch as Chief Engineer; Mr. Gerald Haskins, A.C.S.E., was appointed Deputy Chief Engineer in succession to Mr. Peake; and Mr. J. K. Ross, M.A. and B.Sc. (Edin.), A.M.Inst.C.E., was brought in from the Hume Reservoir Construction work to take up the duties of Inspecting Engineer vice Mr. Simons. Mr. Herbert Fleming, M.I.E.A., has been placed in charge of the Country Towns Water Supply and Sewerage Works.

The position of Chief Engineer, Harbours, Roads and Bridges Branch—rendered vacant by the transfer of Mr. Burrows above referred to—was filled by the appointment of Mr. Richard Vowell, M.Inst.C.E., M.I.E.A., formerly Engineer-in-charge, Newcastle District, and President of the Hunter District Water Supply and Sewerage Board.

I desire to express thanks and appreciation of the generally good service rendered to the Department by all officers under my jurisdiction.

The reports of the heads of the several branches are incorporated in full with this report.



Under-Secretary.

Accountant's Report

For the Year ended 30th June, 1927.

The Staff of the Department as at the 30th June, 1927, the annual salary charge for 1926–27, and the comparison of those with the similar particulars of the two previous years will be found in the following :—

Year.	Permanent Officers.		Temporary Officers.		Total.	
	No.	Salary.	No.	Salary.	No.	Salary.
1926–27—		£		£		£
General Staff	418	170,109	344	107,874	762	277,983
Dredge Service	90	29,025	213	56,862	303	85,887
1926–27 totals	508	199,134	557	164,736	1,065	363,870
1925–26—		£		£		£
General Staff	433	175,994	293	86,761	726	262,755
Dredge Service	106	33,319	179	47,054	285	80,373
1925–26 totals	539	209,313	472	133,815	1,011	343,128
1924–25—		£		£		£
General Staff	423	164,796	263	75,677	686	240,473
Dredge Service	110	33,463	164	41,249	274	74,712
1924–25 totals	533	198,259	427	116,926	960	315,185

NOTE.—The foregoing does not include Industrial Undertakings and Government Dockyard staffs.

The accounts for the year ended 30th June, 1926, reveal an increase in the Departmental activities over those of previous years.

The total transactions were represented by :—

	£ s. d.	per cent.
Expenditure	4,178,429 1 6	85·74
Receipts	390,367 6 11	8·01
Turnover	4,568,796 8 5	93·75
Supervision	304,753 7 3	6·25
Total	£4,873,549 15 8	100·00

As compared with the 1925–26 total of £4,346,942 9s. 3d., there was an increase of £526,607 6s. 5d., equivalent to 12·11 per cent.

The following summary indicates the nature of the year's operations :—

Nature of Work.	Expenditure.	Receipts.	Total.
	£ s. d.	£ s. d.	£ s. d.
Architectural	377,390 6 2	8,321 8 3	385,711 14 5
Electrical	275,190 9 8	39,601 19 11	314,792 9 7
Roads	116,909 4 1	3,230 15 3	120,139 19 4
Bridges	209,401 13 3	7,576 4 3	216,977 17 6
Punts and Ferries	76,645 14 10	1,431 10 3	78,077 5 1
Public Watering Places	29,854 12 7	882 5 6	30,736 18 1
Dredge Service	217,311 7 6	6,182 7 5	223,493 14 11
Harbours and Rivers	203,181 19 2	55,637 0 2	258,818 19 4
Water Supply	538,572 18 0	90,266 0 3	628,838 18 3
Sewerage and Stormwater Channels	400,384 3 9	5,232 8 9	405,616 12 6
River Murray Agreement	421,071 4 3	25,413 15 4	446,484 19 7
Sydney Harbour Bridge	913,734 17 10	14,233 3 9	927,968 1 7
Leichhardt Depot	87,026 9 9	77,288 6 0	164,314 15 9
Education Department—Country	200,658 16 2	.....	200,658 16 2
Miscellaneous	111,095 4 6	55,070 1 10	166,165 6 4
	£4,178,429 1 6	390,367 6 11	4,568,796 8 5
Supervision	.....	.....	304,753 7 3
		Total	£4,873,549 15 8

A close dissection has been made of the foregoing expenditures, revealing that the transactions represent:—

	Amount. £ s. d.	per cent.
(a) *Capital Expenditure*—		
On revenue-producing utilities	2,678,241 18 6 ...	59·74
On non-revenue-producing utilities	682,148 3 6 ...	15·21
(b) *Working and Maintenance Expenditure*—		
Running expenses, &c., of revenue-producing utilities	102,309 10 6 ...	2·28
Maintenance of non-revenue-producing services and utilities	569,253 16 7 ...	12·70
(c) *Sundry Disbursements*—other than (a) or (b) ...	451,228 19 8 ...	10·07
Total Expenditure for the year	£4,483,182 8 9 ...	100·00

The work devolving on this Branch in connection with the financial side of country towns water supply, sewerage and stormwater drainage services is steadily increasing. There were reviewed during 1926-27 the 1925 accounts of all municipalities and shires indebted to the Government in respect of existing services. This phase of the work necessitated the close review of the accounts covering 64 water supply, 11 sewerage, and 9 stormwater drainage systems. Excellent results—to the Crown and to certain of the Local Authorities concerned—have attended our efforts in this connection, and the material advantage to be gained by a continuance of a thorough and methodical oversight of these accounts will far outweigh the comparatively trifling expense entailed in such oversight; this has been amply demonstrated by the results to date. No better argument can be furnished of the necessity for continuing and developing this good work than the recital of the figures of total indebtedness involved in those water supply and sewerage services which have been constructed by the Government and transferred to municipal and shire councils under terms of repayment. At the 30th June, 1927:—

In respect of Sixty-six Water Supply Services:—

The councils concerned were indebted to the Crown to a total of £1,989,881 4s. 7d. The liquidation of the 201 capital debts covering this liability requires the payment to the Treasury of instalments totalling £95,922 10s. 8d. per annum.

In respect of Eleven Sewerage and Nine Stormwater Drainage Systems:—

The councils concerned were indebted to the Crown to a total of £632,228 1s. 2d. The liquidation of the 36 capital debts covering this liability requires the payment to the Treasury of instalments totalling £29,691 12s. 2d. per annum.

Another phase of the accountancy work in connection with country towns water supply and sewerage schemes is that under which a detailed investigation and report have to be made concerning the financial aspect of every proposed new service and of major additions to existing services. This work has involved a visit to each of a number of towns for which proposals were investigated during the year, and has entailed the preparation of a comprehensive and authoritative report in each case. Because of the accurate and comprehensive data now held in this Branch the reports on extensions of existing schemes can generally be compiled without special visits to the towns concerned.

The payments made for the year from the Departmental Drawing Account totalled £3,620,829 15s. 5d. and involved the issue of 10,033 cheques, as compared with £3,259,845 18s. 2d. paid in 1925-26 by 9,282 cheques. The vouchers handled totalled 62,271, as against 56,873 in the previous year.

The returns necessary in connection with the Workers' Compensation Insurance Act involved the keeping of an accurate record of wages and salaries paid. The total of insurable wages and salaries for the year was £1,215,313 10s., viz.:—

	£ s. d.
Managerial and clerical	163,126 8 3
Travelling	67,654 4 2
General	973,245 5 11
Cleaners and caretakers	9,167 3 6
Timber contracts	2,120 8 2
	£1,215,313 10 0

This does not cover quite the whole of the disbursements on salaries and wages; for instance, salaries at the rate of over £750 are not included. The amount of premium paid to the Government Insurance Office for the year was £27,485 10s. 7d.

The accomplishment of the accounts work of a period which constitues a departmental record for volume of expenditure was only made possible by the commendable co-operation and zeal of the entire staff—Head Office and Country—of the Branch.

It is with regret that one has to record the deaths of Mr. T. Davis, a highly-esteemed senior officer of the Head Office staff who had spent thirty-six years in the service of the State; Mr. A. Ohlsen—a valuable young officer who, at the time of his death, was Senior Clerk at No. 10 Lock Construction Work, Wentworth; and Mr. C. R. Alexander, Senior Clerk at Bathurst District Office.

JAMES ROBERTSON,
Accountant.

The Under-Secretary.

* 49051—B

Water Supply and Sewerage Branch.

Report for year ended 30th June, 1927.

A.—GENERAL REPORT.

(1.) Water Supply and Sewerage Generally.
(2.) Water Supplies Administered by the Department.
(3.) Expenditure for Year.
(4.) Legislation.
(5.) River Murray Waters.
(6.) Hydro-electric Development.
(7.) Staff and Administration.

I have the honor to submit my report of the operations of the Water Supply and Sewerage Branch generally, including works under the River Murray Agreement, for the year ended 30th June, 1927.

(1) WATER SUPPLY AND SEWERAGE GENERALLY.

At the end of the year public water supplies constructed at a capital cost of £2,637,758 were in operation in seventy towns. Thirteen towns are now sewered, while stormwater channels have been constructed in thirteen towns. The total capital cost of sewers and stormwater channels amounts to £645,191. The cities of Sydney and Newcastle are not included in these figures.

The rainfall in the western half of New South Wales was below the average for most of the year and in the eastern half of the State from July 1926 to March 1927 similar conditions obtained. In April heavy and general rains, much above the average, fell in the eastern districts, but May and June were deficient in rainfall throughout most of the State.

The Broken Hill Water Supply, due to the heavy rain in March, 1926, has proved adequate to the demands upon it, but the rainfall during the year was only 330 points and the volume of water in the storage reservoirs has diminished. As a result of these conditions about ten months' supply remains in the storage reservoirs if no rain falls during that time. In the course of the inquiry by the Public Works Committee into the question of augmenting this supply (referred to in last year's report) the representative of the Mining Companies notified a change of attitude with reference to the use of Stephens Creek water at the mines and requested the Department to use that water to its utmost both for the mines and the town. The Department accordingly has been supplying Stephens Creek water to the mines to a much larger extent than previously to the drought of 1925. The report of the Public Works Committee is not yet available owing to the Parliamentary recess, but the Department has been informed that the Committee has passed a resolution in the following terms :—" That in the opinion of the Committee it is not expedient the proposed scheme for the construction of certain works to augment the water supply at Broken Hill, as referred to them by the Legislative Assembly, be carried out."

The Country Towns Water Supplies generally were adequate to meet the demand made upon them, but in the Riverina, where reticulated supplies had not been installed, it was found necessary to convey large quantities of water by train.

During the year Cordeaux Reservoir was completed and handed over to the Metropolitan Water, Sewerage and Drainage Board, the total cost of this work being £969,627. At Avon Reservoir the construction work has been completed and the plant is being transferred for use at the Nepean Reservoir. The total cost to 30th June was £1,106,497. Preliminary work was completed on the Nepean Reservoir construction and main wall excavation was commenced, the cost to 30th June being £284,469. The progress of these three dams is described in detail in Part B of this report.

During the year several water supply works for country towns were brought to conclusion, the principal of which consisted of complete schemes at Blackheath, Yass, and Queanbeyan. The supply to Orange Mental Hospital was also completed. New concrete service reservoirs were constructed at Goulburn, Lithgow, and Muswellbrook, and electrical pumping machinery was installed at Blayney, Corowa and Nyngan. Complete new schemes of water supply are in course of construction for Canowindra and Molong, and a combined scheme for Taree and Wingham; a curved concrete dam is being erected at Armidale to augment the existing supply to the town. New pump wells are being put down at Culcairn and Moree, and a reinforced concrete reservoir is being erected at Leura to provide for increased consumption from the Katoomba supply. Electrically-driven pumps are in course of installation at Balranald, Condobolin, Cowra, Casino and Dubbo. Extensions to the existing reticulation are being carried out at Albury and Lismore. Investigations were carried out during the year for complete new schemes in eighteen towns and for the augmentation of existing supplies to five Government institutions.

Good progress was maintained on the construction of the Northern Suburbs Ocean Outfall Sewer. No. 3 Section was completed and Sections Nos. 1, 2 and 3 handed over to the Metropolitan Water, Sewerage and Drainage Board. Sections Nos. 4 and 5 are in course of construction, and work has been commenced on Sections Nos. 5a, 6 and 7. On Middle Harbour Submain construction the work is well advanced, and a portion of the West Middle Harbour Submain is already in use. The aqueduct between East and West Middle Harbour Submain is completed. The total cost of these works is £1,373,374. The work on the Canterbury-Campsie-Belmore-Bankstown Sewerage is now almost completed, the expenditure being £255,933.

On the Country Towns Sewerage good progress has been made. At Tamworth the reticulation is complete and the pumping station, treatment works, &c., are nearing completion. The schemes at Dubbo and Lismore Low Level Extension are also well on the way towards completion. Investigations were carried out for complete new schemes of sewerage in seven towns and for additions to existing schemes in nine towns. Schemes were also prepared for four public institutions.

(2) WATER SUPPLIES ADMINISTERED BY THE DEPARTMENT.

For the two supplies administered by the Department the accounting period is the twelve months ending 31st December in each year.

(1) Broken Hill Water Supply.

The total quantities of water pumped from the two storage reservoirs were :—

	Gallons.
Umberumberka	446,497,000
Stephens Creek	126,312,000
Total	572,809,000

The average cost of pumping was approximately: Umberumberka, 4·9d. per 1,000 gallons, and Stephens Creek 1s. per 1,000 gallons. The average for the two was about 6·5d. per 1,000 gallons.

(2) Junee Water Supply.

Pumped at Tenandra. Gallons.	Railway Commissioners. Cost per 1,000 gallons.	Junee Council. Cost per 1,000 gallons.	Supplied from Bethungra to Railway Commissioners. Gallons.	Cost per 1,000 gallons.
122,042,000	2s. 10·453d.	1s. 0·035d.	8,881,300	8d.

(3) EXPENDITURE FOR YEAR.

	£
Water Supply Works	569,110
Sewerage Works	423,143
River Murray Works (including plant purchased and expendlture on hydro-electric work.)	443,150
Total	£1,435,403

(4) LEGISLATION.

During the year the following laws were passed referring to the work of this Department :—(1) Broken Hill Water Supply Validation Act, 1927, which validated the expenditure of sums of £84,927 upon the existing works of water supply for the City and District of Broken Hill, and the proposed expenditure of £68,008 in excess of the amount authorised by the Broken Hill (Umberumberka) Creek Water Supply Act, 1910. (2) Junee Water Supply Administration (Amendment) Act, 1927, which is to come into operation on 1st January, 1928. This Act provides for the construction of the following additional works, viz.: New pumping station with electrically-driven pumps, new rising main, additional gravitation main, additional service reservoir and water treatment plant. The Act also stipulated that the actual price of delivery of the water per 1,000 gallons should be fixed from time to time, and the Municipal Council and the Railway Commissioners should pay accordingly. (3) The Local Government Act, 1919, and the Acts amending the same were further amended by the Local Government (Amendment) Act, 1927, under which Part XIV, dealing with water, sewerage, drainage and electricity works, is to be administered by the Minister for Public Works instead of by the Minister for Local Government.

(5) RIVER MURRAY WATERS AGREEMENT.

During the twelve months good progress has been made on the Hume Reservoir. Approval was given by the Contracting Governments to the construction of the reservoir forthwith to impound 2,000,000 acre-feet, and amended designs for earth embankment and retaining wall, South Bank, were approved by the Commission. The quantity of excavation taken out for the year was 141,900 cubic yards, making the total to date 791,900 cubic yards. The concrete placed during the year amounted to 42,200 cubic yards, the total to date being 114,500 cubic yards. Contour surveys have been proceeded with in connection with Locks 12 to 15 and alternative sites have been selected for Lock No. 17. Designs have been prepared and preparatory work for commencing on the construction is proceeding for Lock No. 15. At No. 10 Lock 4,200 cubic yards of excavation were taken out during the year, making a total of 59,500 cubic yards to date. The expenditure by the Department from River Murray Commission funds for the year amounted to £399,952, making a total expenditure to 30th June, 1927, of £1,391,360.

A detailed report of operations of New South Wales Constructed Authority for year ended 30th June, 1927, is given in the annual report of the River Murray Commission and it is attached as Appendix A.

(6) HYDRO-ELECTRIC COMMITTEE.

The Special Expert Committee on Hydro-electric Development consisting of Mr. E. M. de Burgh, M.Inst.C.E., Chief Engineer, Water Supply and Sewerage Branch, Mr. H. H. Dare, M.Inst.C.E., Commissioner, Water Conservation and Irrigation, and Mr. H. G. Carter, Assoc.M.Inst.C.E., Chief Electrical Engineer, held three meetings, when matters dealing with the use of power available on the Tumut River and tributaries, and the general reports on the Shoalhaven River Development were discussed. In respect of this latter development the Committee recommended that the scheme should be referred to the Parliamentary Standing Committee for inquiry and report.

(7) STAFF AND ADMINISTRATION.

Through the early retirement of Mr. E. M. de Burgh, M.Inst.C.E., Chief Engineer of this Branch, owing to ill-health, several changes in the staff have been made. Mr. C. Simons took up Mr. de Burgh's duties as Acting Chief Engineer but, owing to reaching the age limit for Departmental Officers, he entered upon leave prior to retirement on 15th June, 1927. Mr. Gerald Haskins, A.C.S.E., was appointed to the position of Deputy Chief Engineer on 1st November, 1926. Mr. J. K. Ross, M.A., B.Sc., who was in charge of the construction of the Hume Dam, being transferred on 20th June to the position of Inspecting Engineer

of construction works on the Murray River, including the Hume Dam, and of the Nepean Dam being constructed for the Sydney Water Supply and of the Northern Suburbs Outfall Sewer. Mr. S. W. Jones, B.E., has succeeded Mr. Ross as Resident Engineer at Hume Dam. Attention is called to the success attending the placing of Mr. Herbert Fleming, M.Inst.E. (Aust.) in charge of the Country Towns Water Supply and Sewerage Works.

Although the writer has only recently taken control of this Branch he was previously connected with it as Principal Assistant Engineer under Mr. de Burgh for some years, and takes this opportunity of placing on record the very valuable services Mr. de Burgh has given to the State and to Australia. Mr. de Burgh has left many monuments to his ability both in bridge construction and water supply and sewerage works. In the latter he has been very largely responsible for the design and carrying out of the storage dams at Barren Jack, Cataract, Cordeaux, and Avon, as well as the design and construction of the huge works for water conservation on the Murray River, comprising the Hume Dam and the lock and weir at Wentworth.

The satisfactory methods adopted for the carrying out of works of such magnitude as are embodied in this report were largely due to the co-operation of the whole of the staff, who have given of their best in every way to assist in making these works successful.

T. E. BURROWS, M.Inst.C.E., M.I.E.A.,
Chief Engineer for Water Supply and Sewerage,
Chief Engineer, N.S.W. Constructing Authority, River Murray Waters Act.

25th August, 1927.

B.—DETAIL REPORT.

(I) WATER SUPPLY.

(*a*) Sydney Water Supply—
- (1) Cordeaux Reservoir.
- (2) Avon Reservoir.
- (3) Nepean Reservoir.
- (4) Investigations.

(*b*) Country Towns Water Supply—
- (1) Works completed.
- (2) Works under construction.
- (3) Works proposed and investigations.

(II) SEWERAGE.

(*a*) Metropolitan Sewerage and Stormwater Channels :
- (1) Northern Suburbs Ocean Outfall Sewer.
- (2) Canterbury-Campsie-Belmore-Bankstown Sewer.

(*b*) Newcastle Sewerage and Stormwater Channels.

(*c*) Country Towns Sewerage and Stormwater Channels :
- (1) Works completed.
- (2) Works under construction.
- (3) Works proposed and investigations.

(III) WATER SUPPLY AND SEWERAGE.—Treatment and filtration.

(I) WATER SUPPLY.

(a) Sydney Water Supply.

(1) CORDEAUX RESERVOIR.

Cordeaux Reservoir has now been completed, and was handed over to the Metropolitan Water, Sewerage and Drainage Board on 2nd February. During the year 540 million gallons of water were liberated for supply to Sydney. Work has principally consisted of dismantling the plant, demolishing the buildings on the township and construction area, and completing the approach roads to the dam. The expenditure for the year has been £5,500, and the total expenditure to 30th June, £969,627.

(2) AVON RESERVOIR.

Good progress has been maintained during the twelve months, and the construction work has now been completed, and most of the plant dismantled and transferred for use at the Nepean Dam. The road of access, Bargo to Avon Dam, has been surfaced throughout with asphaltum, and has withstood the heavy traffic satisfactorily.

Quarrying operations in the bywash were completed during November, 1926. The total output for the year and the complete output are as follows :—

	Year ended 30th June, 1927. Cubic yards.	Total to 30th June, 1927. Cubic yards.
Displacers	.....	84,300
Spawls	853	101,596
Spoil	5,452	238,903
	6,305	424,799

The concreting of the bywash, weir and floor was completed during January, 1927; 1,240 cubic yards of concrete were placed during the period, making a total of 2,070 cubic yards therein. The main wall was completed to its full height during August, 1926. The valve houses, pylons and stilling pools have been completed. Access footpaths and steps and roads of approach to the west end of the wall have also been completed. The quantities of concrete placed during the twelve months and the total quantities placed to date are as follows :—

	Year ended 30th June, 1927, Cubic Yards.	Total to 30th June, 1927, Cubic yards.
Main wall	312	214,269
Valve house and pylons	462	2,708
Stilling pools	395	8,171
Paths, entrance roads	1,047	1,952
Bywash	1,240	2,070
	3,456	229,170

Clearing operations on the storage basin were completed during January, 1927. The total area cleared to date is 2,601 acres. A boom is at present being constructed across the Avon River, about 3½ miles from the main wall, to intercept floating timber. The Reduced Level of stored water on 15th June, 1927, was 1,034·9, representing a volume of 37,252 million gallons, the total storage to Full Supply Level being 47,160 million gallons. The expenditure for the year was £37,805, making a total expenditure to 30th June, of £1,106,497.

(3) Nepean Reservoir.

Good progress has been made with the Nepean Dam Preliminary Works Construction, the township having been completed. The main work during the year consisted of the construction of plant and platforms and plant installation. In the works platforms the excavation amounted to approximately 25,000 cubic yards, and 1,500 cubic yards of concrete were placed in retaining walls, foundations, &c. Main wall excavation was commenced in January, 1927, and bywash stripping in May, 1927. The railway has been completed with the exception of small spurs to the cement shed and sand bins. A 60-h.p. Australian made locomotive has been procured, and the line is now in service for the transport of stores and materials. The road of access is in a satisfactory condition. A road of access to the river bed has been constructed and has given satisfactory service. The length is about 3,000 feet, and the necessary excavation amounted to 4,900 cubic yards. Further barrack accommodation has been provided, and accommodation is now available for 336 men in six units. The township streets have been completed and kerbed and guttered throughout. A further ten cottages for married workmen have been erected by the Department, making a total of 85. In addition twelve private cottages have been built and six are in course of construction. Further accommodation has been provided for the staff, comprising the following buildings :—Resident Engineer's residence, senior staff quarters, junior staff quarters (4), foremen's cottages (3), schoolmaster's quarters and staff recreation building. The steam-driven pump in connection with the water supply system has been replaced by an electrically-driven unit. A second four-inch rising main and a service tank have been installed giving a total storage of 40,000 gallons. Work is at present proceeding with the reticulation for the South Bank Works Area. A further 4,000 feet of kerbing and guttering has been constructed. Extensions have been made to the township sewerage system, and each house connected direct thereto. The transmission line from Avon has been free from breakdown, and has given satisfactory service during the year. The sub-station is complete. Transformers have been installed and power and light supplied to the works and township. The township electric light and power distribution reticulation have been completed and work is proceeding in the works area. Temporary telephone magneto installation has been replaced by an automatic system. The cableway head tower platform has been excavated and retaining and underpinning walls built. No. 1 tower is now in course of erection. The tail tower excavation is complete and concrete footings are being put in. The anchorage shaft is excavated and work is proceeding with the anchorages. The stores and shops level excavation is complete and access is provided to each shop by railway and road, ten buildings being in use. A storage level, commanded by the cableways and with access from the shops level has been constructed. The excavation of the mixer level is complete, and the mixer house is being built. Blue metal bins with a capacity of about 700 cubic yards have been built. A cement shed with direct service from the railway is in course of erection. For the South Bank layout a compressor house has been built, and four electrically-driven compressors installed for use on the main wall and bywash excavation. Blacksmith's shop and jackhammers shop are in course of erection. Excavation for crushers and sand washing plant is in hand. Main wall excavation was commenced during January, 1927. The northern abutment has been stripped and work is proceeding in the river bed. About 23,000 cubic yards have been excavated to 30th June, 1927. The downstream diversion weir has been completed, and the upstream weir is in course of construction. Work was commenced on stripping the bywash at the end of May, and 1,220 cubic yards were excavated to 15th June, 1927. A suspension foot bridge for providing access to the workings on the South Bank, including the bywash quarry, has been erected. Clearing operations were commenced in January, 1927, and on 18th June, the position was as follows :—Area cleared, 120·5 acres; stacked, 20·5 acres; felled and shattered, 25 acres; felled only, 249·5 acres. The number of men employed on 15th June, 1927, was 413. The expenditure for the twelve months ended 30th June, 1927, was £172,588, making a total expenditure to 30th June, of £284,469.

(4) Investigations.

The Committee of Experts comprising :—Messrs. T. B. Cooper, President, Metropolitan Water, Sewerage and Drainage Board (Chairman), E. M. de Burgh, M.Inst.C.E., Chief Engineer, Water Supply and Sewerage, H. H. Dare, M.Inst.C.E., Commissioner, Water Conservation and Irrigation, late T. W. Keele, M.Inst.C.E., Member of the Board, and J. G. S. Purvis, M.Inst.C.E., Chief Engineer of the Board, appointed by the Metropolitan Board of Water, Sewerage and Drainage to investigate the question of the construction of dams on the Warragamba Area, submitted their report to the Board in January, 1927. This report is now under consideration by the Board, and it is expected that a decision will be come to in the near future.

(b) Country Towns Water Supply.

(1) Works Completed.

Blackheath.—This work consists of electrically-driven pumping machinery with a total capacity of 24,000 gallons per hour, pumping station, 9-inch rising main, reinforced concrete service reservoir with a capacity of 500,000 gallons, service main and reticulation. To ensure a permanent supply to Medlow during periods when the water level in the storage dam is too low for the Medlow pumps to operate, a small concrete supply tank with a main thereto from the Blackheath pumping station was also installed. The capital cost of the scheme was £41,954.

Blayney.—An electrically-driven pump with a capacity of 10,500 gallons per hour was installed in the existing well at a cost of £734, to 30th June, 1927, and takes the place of the old steam plant.

Corowa.—Pumping machinery consisting of duplicate centrifugal pumps electrically driven was installed in the new well. Each pump has a capacity of 36,000 gallons per hour, and the necessary power is obtained from the Victorian State Electric Supply. The total cost of installation was £1,671.

Goulburn.—To provide for the increased consumption an additional concrete service reservoir with a capacity of 2,000,000 gallons was constructed, the cost to 30th June, 1927, being £19,293.

Lithgow.—A service reservoir to supply the high levels was erected and a 9-inch cast-iron main connecting reticulation thereto was installed. The capacity of reservoir is equal to 200,000 gallons. The capital cost was £4,573.

Muswellbrook.—A new concrete service reservoir with a capacity of 300,000 gallons was constructed at a capital cost of £3,636.

Nyngan.—An electrically-driven centrifugal pumping plant has been installed, and a transmission line erected, the total cost to 30th June, 1927, being £2,425.

Orange Mental Hospital.—This supply is drawn from the Gosling Creek Storage, which also supplies the town of Orange. It consists of duplicate electrically-driven centrifugal pumps, each having a capacity of 5,400 gallons per hour which pump through a 6-inch rising main to a reinforced concrete water tower with a capacity of 100,000 gallons, the water thence reticulating to the institution. The power for operating pumps is obtained from the Orange Council.

Queanbeyan.—A scheme consisting of an 8-inch gravitation main from the Canberra Federal Water Supply system to a concrete service reservoir with a capacity of 250,000 gallons and a service main and reticulation was completed by day labour at a capital cost of £33,627.

Tamworth.—A 12-inch main was laid by day labour in Carthage-street to take the place of the existing 3-inch pipe at a capital cost of £1,884.

Yass.—This work was commenced in 1925. It consists of a concrete storage dam with a holding capacity of 250 million gallons erected on the Yass River, just above the township, from which the water gravitates to a pumping station downstream of the dam. Electrically-driven pumps in duplicate, each with a capacity of 36,000 gallons per hour, lift the water through a 12-inch rising main to two 300,000 gallon reinforced concrete reservoirs whence it reaches the town reticulation through a 6-inch service main. The cost of the scheme to 30th June, was £51,673.

(2) Works under Construction.

Armidale.—Work was continued on the curved concrete dam on Puddledock Creek, a contract for which had been let during the previous year. This dam, which has a height of 55 feet, will augment the supply to the town of Armidale.

Albury.—The Albury Council is carrying out improvements to the present supply with material supplied by the Department. These consist of a new 15-inch rising main from pumping station to existing service reservoir, also the taking up and re-laying as an auxiliary service main of one of the existing 10-inch rising mains.

Balranald.—Work on the replacement of the steam plant by electrically-driven centrifugal pumps was continued during the year and will be shortly completed.

Broken Hill.—A contract has been let for the duplication of the Hathorn Davey Pumping Plant at the Umberumberka Storage, the additional machinery to have a capacity of 96,000 gallons per hour. The work is in progress, foundations have been completed, engine house extended and portion of the plant delivered on the site.

Condobolin.—The contract for the installation of the electrically-driven pumps and transmission line, which was let in the previous year, is in progress.

Cowra.—The installation of electrically-driven pumps to take the place of the existing steam plant is now approaching completion.

Casino.—Work is well in hand in connection with the pump now being installed in additional well.

Culcairn.—Work is in progress on the new pump well, a contract for which was let in the previous year. Some difficulty has been experienced in reaching the full depth of 150 feet but steps are being taken to overcome this.

Canowindra.—Work was continued on the scheme for the town. A reinforced concrete service reservoir with a capacity of 200,000 gallons has been erected by the State Pipe Works. The contract for the new pump well, rising main and reticulation is nearing completion and a tender has been accepted and work is in hand for electrically-driven centrifugal pumps in duplicate, each with a capacity of 9,000 gallons per hour.

Dubbo.—The contract which was let in the previous year for the installation of two electrically-driven pumps, one to be installed in No. 1 well and the other in No. 3 well, is now nearing completion.

Katoomba.—A reinforced concrete reservoir to supply Leura, with a capacity of 500,000 gallons, in course of erection by the State Pipe Works.

Lismore.—The Lismore Council is carrying out extensive alterations and extensions to the reticulation system of the town with material supplied by the Department.

Molong.—Good progress is being made with this contract, which consists of a gravitation scheme from Borenore Creek. The reticulation is completed and the gravitation main is well in hand. Work has been commenced on the curved concrete dam on Borenore Creek and the service reservoir is under construction.

Moree.—The contract for the new concrete lined pump well, which is to supplement the supply from the existing well, has been almost completed.

Taree-Wingham.—Good progress has been made on this contract, which is now nearing completion. The pump well, rising main, two concrete settling tanks (each with a capacity of 300,000 gallons), gravitation main, service reservoir (with a capacity of 350,000 gallons), and service main are all completed. The reticulation of the town of Taree is approaching completion and that of Wingham is about to be commenced. The pumping station is to be constructed by day labour, and a contract is being let for the engine-shed. Pumping machinery, consisting of plunger pumps in duplicate, each with a capacity of 25,500 gallons an hour, operated by a suction gas plant, will shortly be installed by the Government Dockyard.

(3) Works Proposed and Investigations.

Proposals were investigated for the augmentation of supplies in the following towns:—Broken Hill (for which a proposal to augment the supply by the construction of a storage on Yancowinna Creek was submitted to the Parliamentary Standing Committee on Public Works), Berry, Blayney, Blue Mountain Towns, Cowra, Goulburn, Gunnedah, Katoomba, Kiama, Leura, Lithgow, Mittagong, Moss Vale, Mudgee, Nowra, Nyngan, Parkes, Peak Hill, Quirindi, Singleton, Wagga.

Investigations for the conversion of the existing pumping plants to electric drive were carried out in connection with the water supplies of Deniliquin, Gundagai, Hay and Lismore.

Investigations of proposals for complete supplies for the following towns were dealt with:—Ardlethan, Barellan, Bega, Cargelligo, Coonabarabran, Gerringong, Gloucester, Gosford, Hillston, Kyogle, Lockhart, Mathoura, Narromine, Scone, The Rock, Walcha, Wallerawang, and Wyong.

Investigations were also carried out for the augmentation of water supplies to the following State Institutions:—Gosford Farm Home, Morrisset Hospital, Rabbit and Milson Islands Hospital, Scheyville Farm, Wombeyan Caves House.

(II) SEWERAGE.

(a) Metropolitan Sewerage and Stormwater Channels.

(1) Northern Suburbs Ocean Outfall Sewer.

No. 3 Section, Parriwi to Cammeray.—This section is complete, the sewage hitherto being dealt with at Folly Point and Chatswood Treatment Works now passing through to the ocean. The total amount of concrete placed in the tunnels and shafts to date is 14,202 cubic yards, the quantity for the year being 213 cubic yards. Total expenditure on this section is £198,086 to 30th June, 1927.

No. 4 Section, Cammeray to Berry's Creek.—All shafts have been sunk, giving a total excavation in shafts of 2,554 cubic yards. Excavation in tunnels amounts to 24,935 cubic yards, giving a total excavation to date of 27,489 cubic yards, the quantity for the year being 8,700 cubic yards. The concrete lining of tunnels is almost half completed, 3,860 cubic yards having been placed to date. Total expenditure on this section is £98,039 to 30th June, 1927.

No. 5 Section, Berry's Creek to Lane Cove.—Good progress has been maintained on this Section, all shafts having been sunk, giving a total excavation in shafts of 1,754 cubic yards, the total excavation in tunnels to date being 36,190 cubic yards. The tunnel has been concreted under Berry's Creek and near Gore Creek, and for a short length between Burns Bay and Lane Cove River, all in bad ground. In addition 1,370 lineal feet have been concreted under Greenwich. 1,915 cubic yards of concrete have been placed to date. Total expenditure to 30th June, 1927, is £107,487.

No. 5A Section, Lane Cove Crossing.—Work on the crossing proper is now in progress. All necessary plant has been put in place and the down leg (West side of River) has been sunk to a depth of 70 feet. Delay was caused here by an inflow of water, but the difficulty has been overcome by grouting with cement under pressure. The up leg (East bank) is sunk to a depth of 46 feet. These shafts will be about 160 feet deep. Total expenditure is £5,372 to 30th June, 1927.

No. 6 Section, Lane Cove to Ryde Railway Station.—Four compressors have been erected at Ryde village, completing such installation for the 6th Section. Working plant has been installed at 15 points, 14 of which are working. It is anticipated that 11 other working points will be required and plant is being erected at these places as it is made available from other parts of the work. Excavation has been completed in 12 shafts and is in progress in 2 others, the total excavation amounting to 2,695 cubic yards. Tunnelling is in progress at the adit at Lane Cove River and at 12 of these shafts. Length driven is 1,704 feet, and the amount of excavation is 4,800 cubic yards. The total length of the section is 21,195 feet. 1,354 cubic yards of excavation (other than rock) has been taken out in Herbert-street, Ryde, in open cut, and 388 cubic yards in rock for approach to adit at Lane Cove River. Total expenditure to 30th June is £51,014.

No. 7 Section, Ryde Railway Station to Dundas.—All compressor stations have been completed, Plant erection is complete at 19 out of a total of 20 shafts. Excavation has been commenced in 19 shafts, completed in 16, and is in progress in 1. The total excavation in shafts amounts to 3,308 cubic yards. Tunnelling is in progress at an adit near Dundas Railway Station and at 12 shafts. The length driven amounts to 2,024 feet, the total excavation being 6,300 cubic yards. The total length of the section is 17,496 feet. Excavation in approach to adit at Dundas amounts to 368 cubic yards and concrete under Kissing Point Road, Dundas, to 185 cubic yards. Total expenditure to 30th June is £63,139

West Middle Harbour Submain.—This section is in use to chainage 13,600 feet. At this point the sewage from Chatswood flows into the submain, thus relieving the pressure on the Chatswood Treatment Works. A further length to Moore's Creek at chainage 23,000 feet is ready for use and the whole of the excavation in shafts and tunnels is completed. The following pipes have been laid :—10,103 lin. ft. 4 ft. diameter, 6,815 lin. ft. 3 ft. 6 in. x 2 ft. 4 in., 5,796 lin. ft. 3 ft. 3 in. x 2 ft. 2 in., and 2,958 lin. ft. of concrete in situ in lieu of pipe of sizes 4 ft. diameter, 3 ft. 6in. x 2ft. 4in. and 3ft. x 2ft. 2 in. 600 lin. ft. of 3ft. 3 in. x 2 ft. 2 in. pipes have still to be laid, and two shafts have to be built to complete this section. Expenditure to 30th June is £255,399.

East Middle Harbour Submain.—All shafts have been sunk, giving a total excavation of 2,546 cubic yards. The tunnelling is well advanced. 2,589 cubic yards of excavation have been taken out, leaving approximately 295 cubic yards still to be excavated. Total expenditure to 30th June is £20,152.

Temporary Connection between East and West Middle Harbour Submains.—The aqueduct, consisting of 3 feet diameter steel pipes, total length of 250 lineal feet, is complete. The laying of reinforced concrete pipes 3 ft. 3 in. x 2 ft. 2 in. on the downstream end of aqueduct is also complete, leaving 150 feet of 3 ft. 3 in. x 2 ft. 2 in. pipes to lay on the upstream end of aqueduct to complete.

(2) Canterbury-Campsie-Belmore-Bankstown Sewerage.

This work is now almost completed, one shaft only remaining to be concreted. During the year the Metropolitan Water, Sewerage and Drainage Board completed the inlet chamber at the junction with Main Western Suburbs Sewer and also reticulated portions of Canterbury and Campsie, the sewage from this area now draining into the main sewer. 450 feet of 3 ft. 6 in. x 2 ft. 4 in. and 4,870 feet of 3 ft. 3 in. x 2 ft. 2 in. reinforced concrete pipes have been laid. 320 cubic yards of concrete have been placed in manholes and shafts. Fore-street Bridge and Cup and Saucer Creek Stormwater Channel have been completed. Cup and Saucer Creek Submain was commenced early in the year, and a length of 594 feet remains to be done. 3,126 feet of 2 ft. 6 in. diameter and 1,379 feet of 21 inch diameter reinforced concrete pipes have been laid. The necessary manholes have been built, 160 cubic yards of concrete being placed. A commencement has been made with the construction of Wolli Creek Submain. Expenditure for the year has been £31,066 and the total to 30th June, 1927, is £255,933.

(3) Lidcombe Drainage, Joseph-street Stormwater Channel Extension.

This work, which is an extension of the existing Joseph-street Stormwater Channel, has been about half completed. The channel extends from the Cemetery at East-street to the existing channel at James-street, the invert being of concrete and the sides of brick. About 1,544 ft. of excavation, 1,383 feet of concrete and 748 feet of brickwork have been completed. A timber footbridge at East-street has also been built.

(b) Newcastle Sewerage and Stormwater Channels.

Newcastle Sewerage Augmentation.—The scheme of amplification prepared by the Department was placed before the Parliamentary Standing Committee on Public Works, who recommended the construction of the scheme as submitted with the addition of the sewerage of Carrington ; the estimated cost is £610,000. During the year further surveys and investigations were made of an alternative proposal to place the main pumping station on the Treatment Works Site at Murdering Gully instead of near Merewether Beach, and an amended scheme has been prepared.

Maitland Sewerage.—Further preliminary surveys have been made, and borings have been taken along routes of proposed main sewers. A comprehensive sewerage scheme is being designed.

Newcastle Stormwater Drainage—Cottage Creek Scheme.

No. 1 Section, Parry-street to Wickham Basin.—220 feet of channel south of Parry-street have been completed. From Hunter-street to the Harbour outfall the channel is finished as well as the two bridges at the channel entrance. 12,000 cubic yards of excavation, 3,700 yards of refilling, 2,837 cubic yards of ballast, and 1,350 yards of concrete were used. The cost to 30th June, 1927, is £25,671.

No. 2 Section, Parry-street to Macquarie-street.—The Parry-street bridge has been lengthened and good progress made in the excavation of the channel to Union-street. 667 feet of channel have been completed. 10,000 cubic yards of excavation and 500 cubic yards of concrete were used. The cost to 30th June, 1927, is £9,021.

No. 3 Section, Racecourse Branch.—800 feet of the channel have been completed from Kemp-street to the entrance. 8,000 cubic yards have been excavated and 240 yards of concrete used. Cost to 30th June, 1927, is £4,803.

Merewether Stormwater Drainage.—A stormwater drain composed of Monier pipes has been completed from Ridge-street to the Merewether Beach. Tunnelling was resorted to north of Frederick-street through the sand hills. The following are particulars of the work :—Exacavation 235 cubic yards in tunnel, 2,846 cubic yards in trench ; Monier pipes, 48 inch—692 feet ; 36-inch—521 feet ; 30-inch—225 feet. 255 yards of concrete were used. The cost to 30th June, 1927, is £5,898.

Further surveys were made on the second section and the Racecourse Branch.

Throsby Creek Stormwater Drainage System.—No construction was carried out during the year, but part of the necessary machinery for construction was installed. Preliminary surveys were made of the main channel from Styx Creek junction to Lambton Branch junction, and of the Styx Creek Branch and sub-branches. Cost to 30th June, 1927, is £5,555.

(c) Country Towns Sewerage and Stormwater Channels.

(2) Works under Construction.

Dubbo.—This work which was commenced last year is well in hand. The reticulation is almost completed and good progress is being made with pumping station, rising main and treatment works.

Tamworth.—The reticulation and pumping station have been completed and treatment works are approaching completion. The pumping machinery is about to be installed.

Lismore.—The Low Level Sewerage commenced last year is practically completed with the exception of the installation of the machinery in the pump well.

(3) Works Proposed and Investigations.

Proposals were investigated for additional works at the following towns :—Albury, Bathurst, Goulburn, Hay, Katoomba, Murwillumbah, Narrandera, Lismore and West Tamworth.

Proposals for sewerage schemes at the following towns are being investigated and designed :—Bowral, Balranald, Casino, Forbes, Glen Innes, Parkes and Queanbeyan.

Public Institutions and District Hospitals.—During the period schemes were prepared for the following :—Balranald Hospital, Coff's Harbour Hospital, National Park Accommodation House and Rydalmere Mental Hospital.

Stormwater Drainage.—Investigations were carried out for additions to the stormwater drainage systems at Narrandera and Tamworth.

(III) WATER SUPPLY AND SEWERAGE TREATMENT AND FILTRATION.

Water Supply.—Reports have been made on filtration plants for Bowral and Mittagong. The highly coloured swamp water of the Bowral supply required special treatment and the design of the filtering plant was based on the reasearch work of the previous year. Chlorination has been recommended for the supplies of Katoomba and Singleton, the former on account of the possible pollution by road and railway traffic and the latter because of the risk of contamination of the well water by town drainage. Improvements to the softening plant at Singleton are also proposed. At Broken Hill chemical and bacteriological analyses have been made of both the supplies from Umberumberka and Stephens Creek. It was found necessary to filter the Umberumberka water for a few months. Designs are in hand for a treatment plant for the South West Tablelands Scheme. Consideration is being given to a proposal to filter and then de-aerate the water as a means of protecting the extensive pipe system against internal corrosion. A de-aeration plant is also being designed at the request of the Hunter District Water Supply and Sewerage Board for the Chichester Scheme. In order that the Department may exercise some supervision over the catchment areas of the Country Towns Water Supplies it has been arranged that half-yearly reports on their condition should be made by the local Health Inspectors and forwarded to this Department by the Health Department.

Sewerage.—The extent of stream pollution caused by the discharge of town drainage and sewage effluent has been further investigated. A number of treatment works have been inspected in conjunction with officers of the Health Department. At Goulburn, Bathurst, Lithgow and Orange it was recommended that all effluent not absorbed on the land should be chlorinated. At Katoomba new works are being designed. Reports have been made on treatment works sites for the sewage of Forbes, Griffith, Queanbeyan, Quirindi and Singleton. The guiding principle in each case has been to keep the effluent out of the rivers and make all possible use of it for irrigation. A considerable amount of work has been carried out for the Mental Hospitals including the installation of Imhoff tanks at Orange Mental Hospital. The sewage works at Orange, Bathurst, Lithgow, Goulburn, Hay, Narrandera, Wagga, Albury, and Liverpool have been visited regularly by the Departmental Inspector, the effluents sampled, and advice given on the management of the plant.

T. E. BURROWS, M.Inst.C.E., M.I.E.A.,
Chief Engineer for Water Supply and Sewerage
Chief Engeiner, N.S.W. Constructing Authority, River Murray Waters Act.

APPENDIX A.

RIVER MURRAY WATERS ACT.

ANNUAL REPORT FOR YEAR ENDED 30TH JUNE, 1927.

A.—Hume Reservoir.
- (i) Investigations and Designs.
- (ii) Land Acquisition.
- (iii) Construction.
  - (*a*) Road of Access.
  - (*b*) Quarry.
  - (*c*) Plant.
  - (*d*) Valves and Sluices for Outlet Pipes.
  - (*e*) Foundations for Dam.
  - (*f*) Concrete.
  - (*g*) Coffer Dam and Diversion Channels.
  - (*h*) Bethanga Bridge.
  - (*i*) General.

B.—Locks and Weirs.
- (i) Surveys and Borings.
- (ii) No. 15 Lock and Weir.
- (iii) No. 10 Lock and Weir.
  - (*a*) Investigations, Designs and Estimate.
  - (*b*) Construction.
    - (1) Plant.
    - (2) Excavation.
    - (3) Concrete.
    - (4) General.

A.—HUME RESERVOIR.

(i) *Investigations and Designs.*

A conference of Engineers representing the Commonwealth and States concerned met at the Hume, on 12th August, 1926, and unanimously decided to recommend to their respective Governments that the Hume Reservoir be constructed forthwith to completion, to impound 2,000,000 acre-feet, subject to the proviso set out in Resolution 4 adopted at the Conference of Ministers held on 9th August, 1924, as follows:—"Provided that if the reservoir be increased above the capacity of 1,100,000 acre-feet it be understood that the additional water shall be used for meeting the present allocation obligations under the River Murray Agreement and as a reserve for dry years, such reserve to be used at the discretion of the River Murray Commission." The Contracting Governments having signified their concurrence with this recommendation, amended designs for earth embankment, also retaining wall, South Bank, were submitted to and approved by the River Murray Commission.

The design of the energy dissipator for the spillway section of the dam has been finalised on the information gained from the working model, and has received the approval of the River Murray Commission.

(ii) *Land Acquisition.*

A plan has been prepared showing the land to be acquired and a tabulated statement thereon indicates the dates by which successive areas of land will be required. The Valuer-General has been requested to take action to acquire the areas in accordance with this schedule, submitting recommendation for Ministerial approval in each instance before closing with the owners. During the year 5,095 acres were acquired, making a total acquisition to date of 5,852 acres.

(iii) *Construction.*

(*a*) *Road of Access.*—The road of access was maintained in first-class condition during the year; the surface from entrance gate at the Albury siding to 100 yards inside the entrance gate at the township has been treated with bitumen.

(*b*) *Quarry.*—After a lull in the operations at the quarry while the foundations of the dam were being prepared inside the coffer dam, the work has been speeded up during the last five months to keep pace with the accelerated concreting programme, and for the past three months it has been found necessary to work two shifts. A dump of broken granite is being formed at a suitable spot alongside the quarry line for a reserve supply to be drawn upon when necessary.

(*c*) *Plant.*—The extension of the trestle-work for the second belt (Belt B) of the concrete belt conveyor has been erected, and the belt, with motive power, installed and put into operation. Owing to the original dimensions of the concrete walls for which the belt conveyor was designed having been increased, it has been necessary to get additional plant to deal with the enlargements. A hoist tower has been installed as the best means of doing so. It is a twin tower of steel structure, 160 ft. high, and has been erected a little beyond the south end of Belt B. From that position concrete can be poured to the extreme downstream end of the wing wall—the most remote point at which concrete will be required. Other items of plant received include:—Ruston steam navvy for the quarry; circular iron tank of 30,000 gallons capacity on an elevated stand for town and works water supply; portable air compressor; concrete chuting; air hoist; Leyner sharpener; jinker; lathe, 15 in. centres and gap; 36-in. saw bench; 6-in. and 4-in. centrifugal pumps; two Thorneycroft lorries and one trailer; Ford truck; two Sergeant rock drills and six jack-hammers.

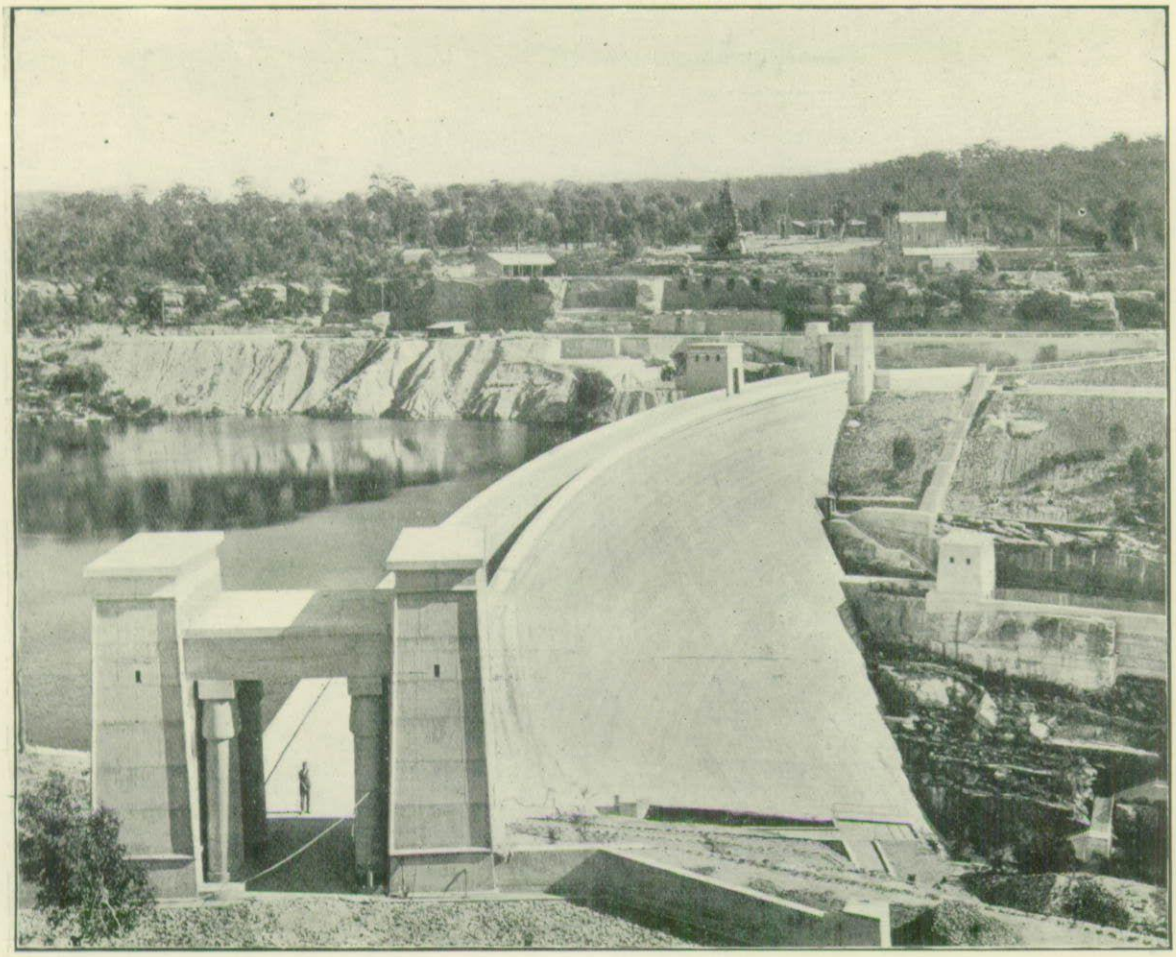
(*d*) *Valves and Sluices for Outlet Pipes.*—Six 7 ft. 6 in. needle valves have been received from Blakeborough and Sons, Ltd., and seven Stoney sluices from Ransomes and Rapier, Ltd.

(*e*) *Foundations of Dam.*—Wet weather delayed the start of excavations inside the coffer dam for a short time after the water impounded in the coffer dam had been pumped out, and a Ruston steam navvy commenced digging on the Victorian side of the old river-bed on 11th August. A commencement was also made at this time with cranes on the excavations immediately south of the point to which the concrete foundations of the dam were taken in the first stage of the operations before the river was diverted. The Bucyrus drag-line excavator was ferried across the river on the pile-driving pontoon at the end of September, and began operations inside the coffer dam in October.

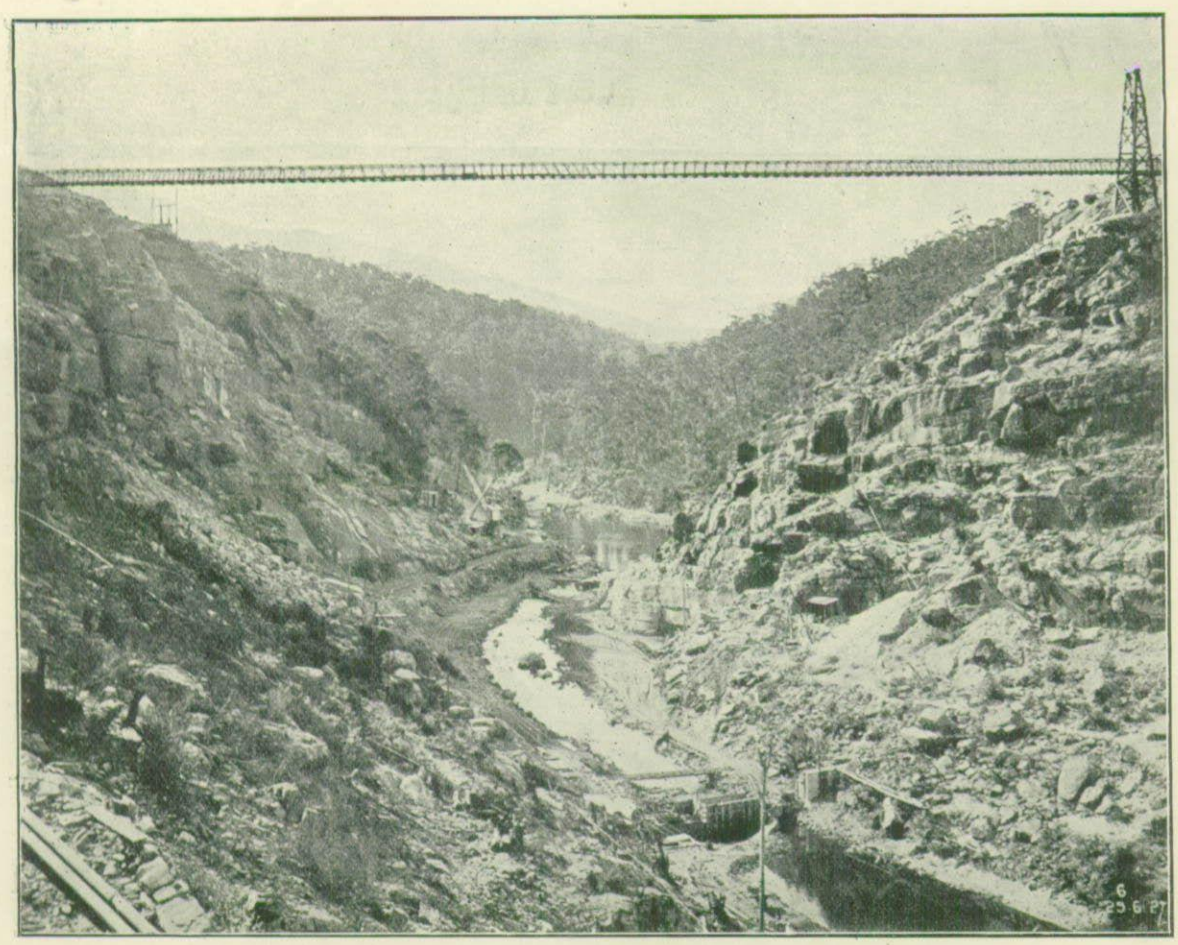
Foundations for the main wall have now been excavated with the exception of a fault, to within 45 feet of the face line of the south wing wall, which is as near as it is safe to go, to the present position of the cableway tail tower. In the fault referred to, it has been necessary to go to a depth of 33 feet below the surrounding rock foundations, and this fault is still being followed up, but shows signs of soon petering out. An isolated section of the foundations, 60 feet by 30 feet, has been excavated at the junction of the main wall with the south wing wall and core wall to allow of a block of the concrete wall being built to its ultimate height to receive the tail tower of the cableway, and thus raise it to an effective height for future operations. This section was sunk as a shaft and reached a maximum depth of 90 feet below the natural surface before a satisfactory foundation was found. The excavations for the south wing wall are in progress. No rock has yet been disclosed and it is clear that the foundations will be much deeper than for the main wall. Three shifts were worked in sinking the shaft, and two shifts have been worked on the other excavating operations.

The quantity of excavation for the year was 141,900 cubic yards, the quantities in the various materials to date being 334,400 cubic yards of earth, 311,000 cubic yards of decomposed granite and 146,500 cubic yards of rock, making a grand total of 791,900 cubic yards.

(*f*) *Concrete.*—Concreting is in progress over the whole area of the foundations that have been passed as satisfactory and the aim is to place 2,500 cubic yards per week. As a special effort 953 cubic yards were completed in one day of 7½ hours net running. The concrete pillar for the cableway tail tower mentioned under heading "a" is now almost completed to the required height. Work on the downstream toe of the main wall opposite the stilling pool and gap between the toe and the floor of the stilling pool, which had to be abandoned last year when the river rose above 520 R.L. has been completed to such a level that preparations for the placing of some of the sluice outlets can be proceeded with. The sand supply has been augmented to the extent of 24,000 cubic yards by letting contracts for the getting of sand from various deposits in the river bed.

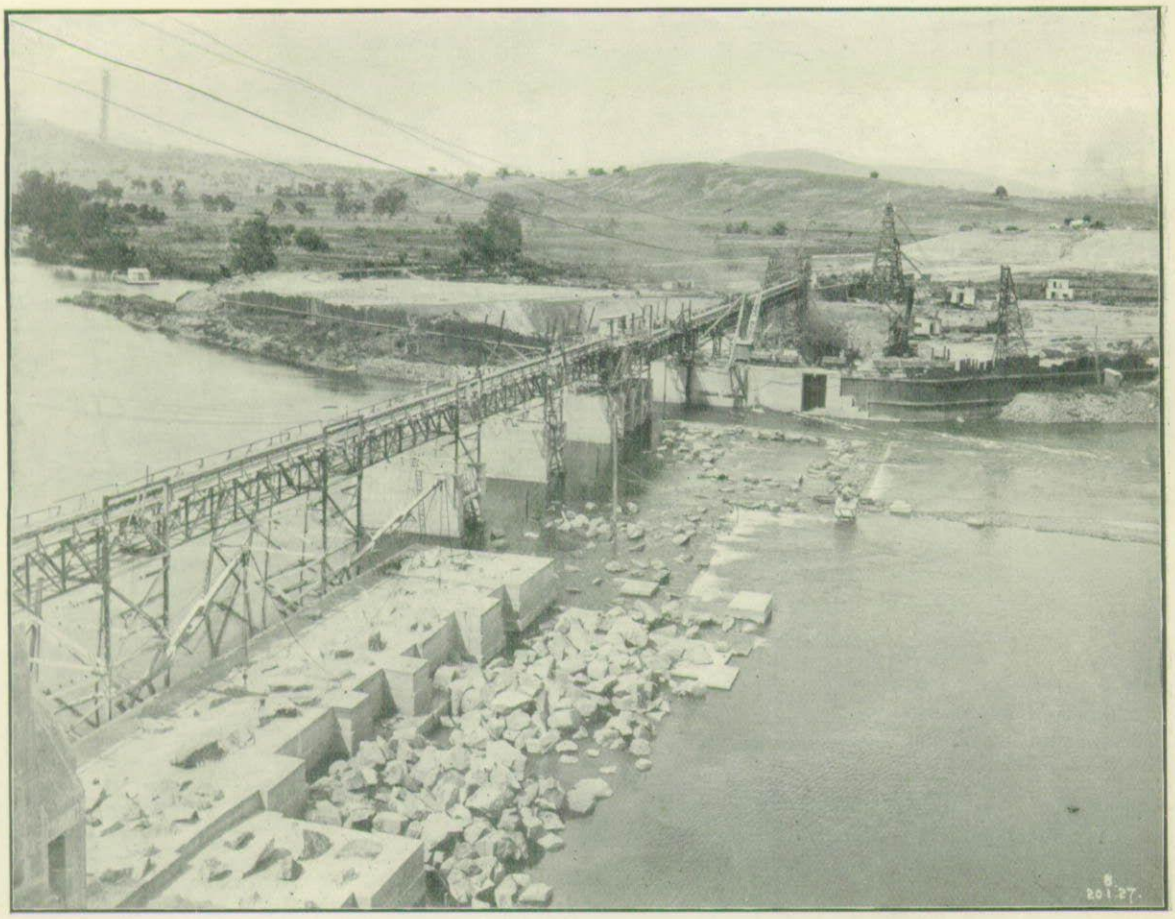


Avon Reservoir : General view of completed work showing entrance pylons and courtyard, access steps and valve houses.



Nepean Reservoir : General view of Dam site showing suspension bridge, upstream diversion wall, and excavation for foundations.

Hume Reservoir : View showing excavations for foundations for Spillway and South Wing Wall ; also trestle supports for Concrete Belt Conveyer.



Hume Reservoir : General view of works showing construction of Concrete Dam, Diverted River and Coffer Dam in New South Wales, and earth embankment in Victoria.

The total amount of concrete placed during the year was 42,200 cubic yards, the total to date being 114,500 cubic yards.

(*g*) *Coffer Dam.*—The walls of the coffer dam were completed early in July, and then the north-west corner next the main wall on the downstream side was stiffened with extra steel and timber. The earth filling of the coffer dam across the old river bed with the supporting banks against the steel and timber sheeting was completed by the end of August. The de-watering was started at the end of July, and it was soon found that the tightness of the coffer dam was satisfactory. For some months past the quantity of water pumped per day amounts to only 150,000 gallons.

(*h*) *Bethanga Bridge.*—At the request of the Victorian Authorities the earthworks for formation of a siding to the bridge site branching off the quarry line near the quarry have been executed and the railway track, including metal ballasting, has been laid to the centre line by this Department. A cutting on the centre line of the bridge for the approach to the New South Wales end of the bridge is still incomplete.

(*i*) *General.*—The number of men employed on the work is 650. The health of the community has been good. A cottage of the Senior Staff Officers type, a half unit of barracks, a building for the accommodation of a policeman, an extension of the office, and an addition to the store have been built, and accommodation for foremen and gangers, and an addition to the staff camp are in progress.

B.—Locks and Weirs.

(i) *Surveys and Borings.*

Murrumbidgee River.—In connection with the design of a system of locks and weirs on this river the traverses on both sides of the river and cross section levels between have been continued from 50 miles above the junction with the Murray River to 72 miles above that junction.

Locks Nos. 12 to 17.—Contour surveys have been proceeded with in connection with Locks Nos. 12 to 15 to ascertain the flooded areas and levee banks required, and to decide on the location and the pool levels of locks. Two alternative sites at 276¾ and 277¾ miles above Wentworth respectively have been selected for Lock No. 17, and borings are being carried out on these sites.

Boring Plants.—A second boring plant has been provided and placed in commission, and a third plant has been ordered.

(ii) *No. 15 Lock and Weir.*

The location of this lock has been finalised and contour plans and plans showing general arrangements of lock and weir have been prepared and approved by the River Murray Commission. An estimate of the cost of construction at £302,400 has also been approved. Designs for the layout of the construction and township areas have been prepared. Surveys have been completed for a branch railway 5 ft. 3 in. gauge and access road from Robinvale to the lock site. Preparatory work for commencing on the construction is proceeding.

(iii) *No. 10 Lock and Weir.*

(*a*) *Investigations, Designs and Estimates.*—Designs have been completed comprising the lock and lock gates with operating machinery and valves, the navigable pass equipped with hinged trestles, faced with Boule panels and sluices provided with stop logs, which may be removed in times of flood. Drawings have been prepared which have received the approval of the River Murray Commission. The estimated cost is £337,000.

A test was carried out to ascertain the permissible pressures on the clay foundation, with the result that the clay carried a weight of 5 tons per square foot satisfactorily.

(*b*) *Construction.*—(1) *Plant.*—A derrick crane has been erected at Mildura to facilitate unloading from the railway trucks. A 50 b.h.p. National crude-oil engine has been installed at the workshop, and is giving satisfaction.

(2) *Excavation.*—Owing to a high river, excavation within No. 1 coffer dam could not be continued until 12th November. The quantity of excavation for the year is 4,200 cubic yards, and the total to date 59,500 cubic yards.

(3) *Concrete.*—The concrete foundations to floor level of the two lock walls have been completed, the wing walls have been brought up to a considerable height into the banks and the end blocks under the gates built. In all, about 6,000 cubic yards of gravel concrete and 750 cubic yards of limestone concrete have been deposited. 1,800 tons of cement were delivered for the work by river from South Australia, making a total of 2,800 tons stored in main shed. About 15,000 cubic yards of gravel were obtained from Bet Bet, in Victoria, and conveyed by railway to Mildura, and from thence transported by river to the lock. Altogether 18,300 cubic yards of gravel have been delivered.

(4) *General.*—I regret to have to record the retirement through ill-health of Mr. E. M. de Burgh, M.Inst.C.E., from the position of Chief Engineer of the Water Supply and Sewerage Branch of the Public Works Department of New South Wales, and also that of Mr. C. Simons, Wh.Sch., Acting Chief Engineer, of the same Department. Consequent thereon the following appointments have been made:—Mr. T. E. Burrows, M.Inst.C.E., Chief Engineer; Mr. Gerald Haskins, A.C.S.E., Deputy Chief Engineer; Mr. J. K. Ross, M.A., B.Sc., Assoc.M.Inst.C.E., Inspecting Engineer; and Mr. S. W. Jones, B.E., Assoc.M.Inst.C.E., Resident Engineer, Hume Dam. Mr. de Burgh has been so long associated with the River Murray Works, both in investigation and construction, that the loss of his services and experience will be a very considerable one to the Department and to Australia. Mr. de Burgh was associated with the late Mr. Dethridge in the preliminary work leading up to the Murray Waters Agreement, and his knowledge of the various aspects of the scheme was most profound and valuable. Mr. Simons has also given very valuable service in connection with design and construction of those works now under construction by this State, and it is regretted that owing to the age limit for Public Servants in this State his retirement was necessary in June, 1927.

(Sgd.) T. E. BURROWS, M.Inst.C.E., M.I.E.A.,
Chief Engineer for New South Wales,
River Murray Waters Act.

Harbours, Roads, and Bridges Branch.

Annual Report 1926-27.

On the transfer of Mr. T. E. Burrows from the office of Chief Engineer of this Branch to take charge of the Water Supply and Sewerage Branch, Mr. R. Vowell entered upon duties in charge of the Branch on 8th June, 1927.

The total expenditure on construction and maintenance of harbour works, dredging, roads, bridges, ferries, public watering-places, &c., amounted to £870,242 2s. 7d., as detailed hereunder:—

	£	s.	d.
Harbour works (including dredging)	426,488	17	9
Roads	122,167	0	6
Bridges	215,037	16	11
Punts and ferries	76,693	14	10
Public watering-places	29,854	12	7
	£870,242	2	7

Local Government inquiries, numbering 103, were conducted by officers of the Branch for the Department of Local Government, including 88 applications from councils for loans totalling approximately £2,528,157.

District officers under the control of the Branch supervised road works in the country for the Main Roads Board, the Department of Local Government and the Lands Department. The inspection of Water Rights cases and the supervision of the sinking of shallow bores in the Western Division was also undertaken for the Water Conservation and Irrigation Commission.

HARBOUR WORKS.

The major improvement works in hand at Coff's Harbour, Port Kembla and Newcastle were continued by day labour without interruption, and the construction by contract of the new ocean jetty at Byron Bay was still in progress at the end of the year. Details of the works are referred to later.

The larger repairs and improvements which have been in progress during the year include the following:—

Byron Bay—General repairs of existing jetty and moorings.
Woolgoolga—General repairs of existing jetty and moorings.
Coff's Harbour—General repairs of existing jetty and moorings.
Nambucca River—Repair of training wall and tie wall.
Manning River—Extension of southern spur wall (about concluded).
Cape Hawke Harbour—Training wall and bank protection.
Newcastle—Renewal of parts of Dyke Wharf.
Newcastle—Renewal of parts of King's Wharf.
Port Kembla—Extension of No. 4 Jetty.
Moruya River—Construction of spur wall (still in hand).

Dredging.

No additions have been made to the plant during the year. Plans and estimates have been prepared for the construction of an electrically-driven suction dredge, and preliminary design for electric booster units for dredge "Botany," as well as minor alterations in connection with plant. The quantity of material lifted in the year totalled 3,974,665 tons, costing 12·4d. per ton, as compared to 11·5d. per ton for the previous year's output. Details of the operations are indicated in the accompanying appendices.

"Returned to Office" arrived at 27-2-28

River Entrances.

The depths at various entrances have been maintained by visits of the bar dredges, the delays to traffic which have occurred having been at the smaller entrances where the larger part of the designed works is still incomplete. Particulars of the depths on the bar and crossings of the various river entrances are indicated in Statement D.

General Maintenance.

The expenditure (excluding dredging and major construction works separately referred to) on the maintenance of the various harbour and river works and ocean jetties amounted to £43,497 1s. 9d.

Docks.

The transactions of the docks at the Tweed, Richmond, Clarence and Manning Rivers are detailed in Statement E.

Hydrographic Surveys.

Resurvey of Newcastle Harbour was completed, as was also Cook's River between Tempe Dam and Burwood-road. In addition, the essential surveys in connection with dredging work have been carried out and orders subsequently issued for work necessary under that heading.

Inland Rivers.

Darling River.—The snagging of this river from Wentworth to Burtundy, about 70 miles, and also at Higgins' Cutting, was undertaken.

Bourke Lock, Weir and Wharf.

The expenditure in maintenance and repairs has been £152 9s. 3d. on the wharves and £213 14s. 2d. on the weir. The amount of river traffic has shown continued decrease, due principally to improved road transport, two outward and three inward steamers only being recorded in the year, handling 44 tons of cargo.

A flood gauge has been installed at Brenda, which, besides being of service as a flood warning, will facilitate the operations of the weir.

Swamp Drainage.

There have been no additional Trusts or Unions gazetted during the year, the total operating still standing at 28 Trusts and 20 Unions.

The Trust works have been well maintained, resulting in increased yields, particularly at Mooball and Crabbe's Creek, where the area of sugar cane planted has been extended considerably, enhancing the value of the lands.

During April, 1927, an inquiry was held in regard to adjustment of certain differences in the affairs of Mooball and Crabbe's Creek Trust.

The proposed formation of a Union at Empire Vale, Richmond River, was the subject of an inquiry which had not concluded at the close of the year.

Byron Bay.

The new jetty construction was continued by contractors, and, except for certain subsidiary work, was completed to Pier 106 at the end of the year. The contract payments amounted to £20,230 for the year, bringing the total to £35,010.

The manufacture of the two 3-ton cranes for use at this jetty was well advanced, and will be completed in ample time for service when the jetty is opened for traffic. The expenditure on this item amounted to £3,750.

The total expenditure on this jetty and appurtenances equalled £26,673 13s. 9d. for the year.

In addition, the existing jetty has been efficiently maintained at a cost of £574 14s.

Woolgoolga.

The jetty at this roadstead suffered severe damage by gales during the year; repairs to the extent of £1,151 10s. 2d., were effected, including renewing three piers.

Coff's Harbour.

During the period under review a new district was established with headquarters at Coff's Harbour, and in addition to the Coff's Harbour improvements and maintenance, it embraces public works within the Shires of Nambucca, Bellinger, Dorrigo, Nymboida and Orara. The district operations commenced as from the 1st of September, 1926.

Coff's Harbour.—The breakwater works were continued throughout the period.

Construction expenditure...	£30,385 17s. 6d.
Tonnage of stone quarried	80,737 tons.

Northern Breakwater.—The repair of damage caused by gales of June, 1925, was continued and concluded, 151 tons of stone being deposited in the period at a cost of £138 0s. 10d.=18s. 4d. per ton. The total quantity of stone placed in this wall has amounted to 401,095 tons, costing £184,477 13s. 2d.= 9s. 2·4d. per ton.

Eastern Breakwater.—Extended 100 feet to chainage 200 feet. The amount of stone deposited, 18,187 tons, cost £14,516 1s. 7d., making the total to date 93,226 tons at a cost of £60,577 10s. 1d.=12s. 11·9d. per ton.

Concrete Work.—42 concrete blocks, each 40 tons, costing £1,830 13s. 9d., were manufactured, and, together with one in hand at the close of the previous year, were tipped along the sea side and centre of wall. Concreting of the top of this wall was carried out to chainage 150 feet, using 422 tons of concrete, costing £451 7s. 5d. This work has efficiently protected the wall over the length treated, which has not suffered any damage by subsequent gales.

The total expenditure on the Eastern Breakwater=£69,478 14s. 8d.

Reclamation Wall.—Continued 609 feet to chainage 2,208 feet. The stone tipped amounted to 18,957 tons, bringing the total to 145,404 tons, costing £80,005 10s. 2d.=11s. per ton.

Coff's Harbour Jetty.—The expenditure on maintenance of the jetty and approaches amounted to £3,869 17s. 10d., which has been above average, due to extensive renewal of piles, girders and decking.

Nambucca River.

A length of 672 feet of training wall and 198 feet of tie wall was repaired by concreting and filling at a cost of £1,443 12s. 2d.

Manning River.

Southern Spur Wall Extension.—This wall was continued a distance of 322 feet to the full length 700 feet. Only subsidiary work of cleaning up and assembling plant remained to be done at the close of the year. The quantity of stone placed during the year totalled 14,460 tons at a cost of £8,456 3s. 11d. =11s. 8·4d. per ton. The stone amounted to 39,635 tons, costing £25,934 15s. 10d., including plant charges £2,030 17s. 7d., which will be subject to adjustment as transfers are made.

Cape Hawke Harbour.

The training wall at the upper end of Tuncurry was continued from chainage 186 feet and completed to 300 feet. The total stone tipped to date amounted to 3,693 tons at a cost of £1,846 15s. 0d. = 10s. per ton.

The northern temporary training wall was repaired and strengthened with 396 tons of stone, costing £217 6s. 0d.

Newcastle.

Submarine Rock Excavation.—Whenever the weather and sea conditions permitted, the rock drills "Digger" and "Miner" were employed on this work, the drills concentrating mainly on the area north of the 500 feet entrance channel. It is anticipated that increased depth at the entrance on this northern section will be available for shipping during the ensuing year, and will also facilitate work on the southern side of main channel.

An analysis of the work carried out during the year, and the total to 30th June, 1927, is tabulated hereunder.—

Position of work.	No. of holes drilled.	Total length drilled.	Explosives used.	Stone lifted.
				cub. yds.
Bar	388	3,463	2,815	1,245
Additional on north side of main channel	609	5,340	4,835	1,291
Basin Entrance	5,022	44,028	14,721	37,834
Off Stockton	.....	.....	.....	.....
Totals during 1926–27	6,019	52,831	22,371	40,370
Previous totals to 30th June, 1926	21,054	163,721	68,670	36,035
Grand total to 30th June, 1927	27,073	216,552	91,041	76,405

The sea wall in approach to the southern breakwater was strengthened with mass concrete at the toe between Nobbys and the wave trap, at a cost of £388 7s. 10d.

Dredging.—A summary of the year's operations is as follows.—

Description.	Tons.
Harbour improvements and maintenance	1,612,487
Reclamation	175,593
River dredging	Nil.
Total tonnage	1,788,080
	£ s. d.
Cost	85,217 12 0

The tonnages include rock lifted in submarine rock excavation.

Lee Wharf Extension.—The construction of the 540 feet extension of this wharf was continued, and at the close of the year the work was completed except for minor items. The expenditure for the year amounted to £8,285 5s. 1d., bringing the total to £20,022 10s. 4d.

Rail and Road Connection, Lee Wharf to Wickham Wharf.—The extension of the existing roadway from Lee Wharf along foreshore towards Wickham has been completed for a distance of 1,200 feet, with a width of 33 feet, and the railway siding laid for its entire length, except for ballasting. The bridges over Cottage Creek entrance for both road and rail have been completed.

General Maintenance.—Extensive repairs at No. 3 Berth, King's Wharf and Dyke Wharf from No. 4 Crane downstream were carried out at a cost of £2,894 10s. 3d.

The minor maintenance and repairs at the following places—Market Wharf, Timber Wharves, Nos. 1, 2, and 3, Coal Wharf, Stockton and Carrington Dolphins, and general harbour maintenance amounted to an expenditure of £8,418 13s. 0d.

Submarine Water Mains.—An 8-inch water main was laid across the harbour bed from Carrington to Walsh Island, and a 6-inch main from Walsh Island to Stockton. These works were carried out by the Department at the request of the Hunter District Water Supply Board.

Wollongong.

The coal shipped during the year amounted to 37,531 tons, producing a revenue of £987 1s. 1d which shows a reduction on the previous year's trade.

The expenses on shipping and minor repairs totalled £1,441 11s. 7d.

The strengthening of the breakwater was continued with mass concrete and concrete blocks at an expenditure of £349 3s. 4d.

The footbridge giving access to the Lighthouse has been renewed at a cost of £153 8s. 7d.

Port Kembla.

Owing to the depletion of the old quarry the amount of suitable stone available for breakwater purposes has steadily decreased. The distribution from the quarry, which totalled 69,020 tons, is shown hereunder :—

	tons.
Eastern Breakwater Repairs	7,421
Sea Wall	3,414
State Metal Quarries	57,942
Miscellaneous	243
	69,020

The total quantity of stone quarried in connection with these harbour works has been 2,878,978 tons. The development of the new quarry has been continued, and there are now very favourable indications of satisfactory stone being available for breakwater purposes during the coming year, when it is anticipated the whole of the quarry operations will be transferred to this site.

The main line from the new quarry to Port Kembla, which was regraded and relaid during the preceding year, has been extensively used in haulage, mostly on account of the establishment of the Steel Works in transportation of plant and material.

The total expenditure for the year on the new quarry and railway connections has been £14,578 16s. 1d.

Eastern Breakwater.—No new construction was carried out, the only work undertaken being repair work at the latter end of the year when 7,421 tons were placed at a cost of £16,784 1s. 3d. = 45s. 3d. per ton. The total quantity of stone now tipped amounts to 980,395 tons, costing £233,882 12s. 9d., excluding concreting.

Workshop and Plant.—In addition to the normal work of attention to the rolling-stock and shipping appliances, structural steelwork in connection with additions to the power-house has also been undertaken at the shops. Two locomotives, Nos. 24 and 37, have been completely overhauled.

The coal loading plant on No. 1 Jetty has worked efficiently, calling for little attention.

Jetties.—These have all been maintained in good condition, the expenditure in repairs and renewals having been £422 12s. 5d. on No. 1, £191 12s. 2d. on No. 3, and £464 17s. 10d. on No. 4.

The bulk of the material and plant required in connection with the 300 feet extension of No. 4 Jetty has been received ready for construction during the ensuing year. This extension, when completed, will conveniently accommodate the larger vessels discharging general merchandise.

The moorings have been overhauled and are in serviceable condition.

Haulage and Shipping.—Appendices A, B and C indicate the traffic and shipping details of the port during the year.

Moruya.

The spur wall at this entrance has been continued a distance of 332 feet to 524 feet at a total cost of £8,267 19s. 1d., using 38,020 tons of stone.

BRIDGES.

The national bridges under the control of this Department are valued at approximately £3,500,000, and, owing to the age of many of the structures and the small amounts voted in previous years, considerable expense was incurred in connection with their maintenance. The amount of this expenditure for the current year has been £86,486. Large expenditure was incurred on several individual bridges, as shown hereunder :—

	£		£
Barooga Bridge	1,544	Redbourneberry Bridge	1,546
Wagga Bridge	1,850	Hampden Bridge	1,476
Coonamble Bridge	1,158	Glebe Island Bridge	2,845
Warialda Bridge	1,382	Holdsworthy Bridge	3,870
Belmore Bridge	2,274	Pyrmont Bridge	3,964
Coorei Bridge	1,584	Ricketty-street Bridge	1,076
Monkerai Bridge	1,786		

Pyrmont Bridge.—Operation of Swing Span.—The usual information in respect of these operations is submitted as follows :—

Number of openings	3,641
B.T.U. consumption	3,050
Cost of current	£12 14s. 2d.
Number of vessels passed through	4,669

From 1st July, 1902, to 30th June, 1927, the swing span of this bridge has been operated 141,842 times to permit the passage of vessels, the cost of electric power being £430 17s., an average of ·729 of a penny per opening of swing span and gates.

Bridge Construction.

The following bridge construction works were in hand during the year :—

Mildura Bridge.—This work has been fully described in previous reports and is approaching completion. Two of the three contracts in connection with the work have been completed and the remainder is well under way. The expenditure during the year, after allowing for refund from the Victorian Government, has been £13,202.

Abbotsford Bridge.—At the end of the year the whole of the piers had been constructed and approximately half of the steel superstructure had been erected. The work has been delayed considerably by the low state of the river and to delays from other causes within the contractor's province. The embanked approaches have been completed and the cost of the whole work during the year has been £9,140, after allowing for refund from the Victorian Government.

Euston Bridge.—This work is being rapidly brought to completion by the Victorian Railway Department. The amount contributed by New South Wales for the year was £10,325.

Bridge over Murray River at Gonn Crossing.—This bridge was completed during the year and it is expected that the railway will be in use very shortly. The estimated cost was £49,000. The completed cost has been £59,791, the difference being due to extra cost of laying a permanent way for the railway and to increase in wages and other items not allowed for in the estimate. The expenditure for New South Wales during the year has been £2,055.

George's River Bridge.—The work of erection of this bridge is proceeding under contract by the State Monier Pipe and Reinforced Concrete Works for the Sutherland Shire Council. Owing to faulty information regarding the foundations as disclosed by the borings considerable difficulty has been met with and has involved a radical alteration in the design of the foundations. Work, however, is now proceeding satisfactorily.

Yarrawa Bridge.—This work has been completed but the final payment has not yet been made. The expenditure during the year has been £5,058.

Dingo Creek Bridge.—This work which was undertaken for the Local Government Department was completed during the year, the total cost being £4,158 11s. 5d.

Tallywalka Creek Bridges near Wilcannia.—Better progress has been made on this work during the year, the expenditure being £6,765. It is expected that these bridges will be completed during the coming year.

Kynnumboon Bridge.—This bridge which was commenced during the year has been practically completed, the expenditure during the year being £4,604.

Tallywalka Creek Bridge at Menindie.—The renewal of this bridge has just been completed by day labour at a cost of £4,455.

Bridge over Cook's River at General Holmes Drive.—The steelwork supplied by the Government Dockyard has been delivered and the erection of the steel work is now proceeding. The contractors, McLean Construction Co. Ltd., have nearly completed the balance of the structure and completion is expected prior to the end of this year. The expenditure during the year has been £9,602.

Byangum Bridge.—This bridge has been completed during the year. The total cost has been £6,191 5s. 10d., of which £1,311, was expended during this year. The structure has since been handed over to the Tweed Shire Council.

Bridge over Willandra Creek, Road Booligal to Ivanhoe.—The contract, which was let to J. A. Sylvander, was cancelled and further contract was entered into with J. A. Jackson and Sons at £1,646. The work has since been completed at a cost of £1,875 4s. 7d.

Bridge over Goobang Creek, Condobolin.—This bridge was completed during the year at a total cost of £3,800 4s. 8d.

Bridge over Wyaldra Creek at Beryl.—This contract was approaching completion at the end of the year, the year's expenditure having been £3,744.

Mulwala Bridge.—The remains of the old bridge, which had been replaced by a steel and reinforced concrete structure, were removed during the year at a cost of £1,215 12s. 6d.

Bridge over Merrowie Creek, Road Booligal to Ivanhoe.—The contractors, Messrs. J. A. Jackson and Sons completed the renewal of this structure at £2,500 7s. 8d.

Bridge over Narran River at Bangate.—Owing to the delay in commencement of this work by the contractors the contract has been cancelled and it has been decided to construct the work by day labour. Materials have been ordered and work will comence shortly.

Bridge over Box Creek, Road Whealbah to Trida.—This contract has also been completed during the year, the completed cost being £1,167 5s. 10d.

Emigrant Creek, near Ballina.—The work on this bridge has been completed with the exception of the removal of the old bridge, which has been delayed through the necessity of providing a new pipe line for the Ballina Water Supply. The expenditure during the year has been £6,882.

Bridges over Willandra Creek, Road Clare to Ivanhoe.—These two bridges have been completed at a cost of £1,693 1s. 6d.

Bridge over Polygonum Swamp, Bourke.—Work is proceeding steadily on this bridge and is nearing completion. The expenditure during the year has been £8,015.

Bridge over Lachlan River, Collett's Crossing.—This work is being pushed along satisfactorily and completion is expected this year. The expenditure during the past year has been £6,692.

Allan's Creek Bridge, near Wollongong.—This contract has been completed at a cost of £1,496 16s 3d.

Gladesville Bridge.—The reconstruction of the roadway of this bridge has been delayed owing to the Tramway Department carrying out repairs to their portion of the deck. Work, however, is now in progress. Expenditure during the year has been £1,866.

Bridge over Cockfighter Creek, at Warkworth.—The new superstructure has been erected on the old piers of this bridge by day labour. The actual cost has been £3,825 3s. 1d., as against the estimate of £4,000.

Bridge over Williams River at Clarencetown.—The superstructure of this bridge has also been renewed by day labour at a cost of £6,968 19s. 7d.

The following new works were undertaken:—

Tarrion Creek Bridge, near Brewarrina.—Contract was entered into for the renewal of this bridge with H. Woodward at £3,649 11s. The new construction will consist of eight beam spans on driven piles.

Merrimajeel Creek, Road Booligal to Oxley.—The contract was let to H. Woodward at £1,039 9s. 4d. for the construction of a two-span timber bridge. The work has been completed at a cost of £1,170 6s. 4d.

Bridge over Willandra Creek, Road Whealbah to Trida.—The new bridges over the bywash and overflow at Radcastle's Dam are being constructed by contract and will consist of one bridge of three spans 25 feet each, and one of one span of 15 feet. A contract has been entered into with W. Bailey and Sons at £1,346 3s. 4d.

Bridge over Bellinger River at Urunga.—This bridge is being constructed as a national work, the Local Council contributing £4,500 towards the cost. Contract has been entered into with Mr. A. Oxenford at £15,912. The bridge will consist of three composite truss spans of 91 feet and twelve approach spans, all on driven piles. Work had not commenced at the end of the year.

Bridge over Castlereagh River at Gilgandra.—Tenders were invited for this work on two occasions but on each occasion only one tender was received and was regarded as too high. Fresh tenders are being invited.

Bridge over Barwon River at Boonangar.—Plans and specifications have been prepared for this boundary work and tenders have been invited.

Bombala Bridge Footway.—To afford safe transit for foot passengers a footway has been added to Bombala Bridge.

Bridge over Yass River at Hardwick Road.—Owing to the Yass Water Supply backing up the water at this crossing it has been necessary to construct a low level timber bridge to provide access. The bridge will consist of three spans on potted piles. Contract has been let to L. J. C. Mansfield at £965 3s. 6d.

Bridge Works Investigated.

In addition to the above, the following bridge works have been under consideration during the year:—

Bridge over Three Mile Creek at Wentworth.—Plans have been prepared and work will be put in hand by day labour at an early date.

Asphalt Pavement for Wellington Bridge.—To afford a better wearing surface it was decided to construct a pavement of sheet asphalt, but on the invitation of tenders none suitable were received. Further consideration is being given to this matter.

Taemas Bridge.—The new bridge at this crossing has not yet been commenced. A new site has been selected and survey of the approach roads and borings for the foundations are now in progress. The expenditure during the year has been £1,127.

Bridge over Belmore River at Gladstone.—The piers of the old bridge are in such a state that renewal of the structure is necessary and plans and specifications are being prepared for renewal.

Bridge over Middle Billabong, Mossgiel to Hillston.—To provide an outlet for the wool traffic at all times it has been decided to construct a bridge over this crossing. Tenders will be invited during the year.

Lennox Bridge Widening.—Funds have not been available for this work but it is hoped that the work can be commenced during the next financial year.

It has been decided to provide additional footway accommodation at Camden Bridge and Undercliffe Bridge and work is in progress by day labour. A footway will also be added to Stonequarry Creek at Picton.

The additional footways at Murwillumbah and Gasworks Bridge are still under consideration.

Bethanga Bridge.—The construction of the Hume Reservoir will cut off the residents of the village of Bethanga from the railway line and the River Murray Commission has decided to construct a bridge giving access to Bethanga from Albury. The structure will consist of nine steel truss spans on reinforced concrete piers, the estimated expenditure being £180,000. The construction of the piers is in hand by the State Rivers and Water Supply Commission of Victoria and it is proposed to invite tenders for the supply of steelwork and the erection when delivered.

Marra Creek, Road Carinda to Brewarrina.—Plans and specifications are in hand for this work and tenders will be invited when funds become available.

The construction by the Victorian Government of the new railway from the Murray River at Genn to Wakool River at Stony Crossing will necessitate the construction of several bridges to provide access to the new line, and surveys have been made of two of these.

The following were also investigated:—

Nepean River at Douglas Park.	Hunter River at Maison Dieu.
Gywdir River at Gravesend.	Hunter River at Bowman's Crossing.

ROADS.

Western Division.—The amount voted for roads in the Western Division for the year was too small to cope with the actually necessary requirements to continue the work of new formation and clearing, the amount expended being £25,904 as against an amount of £22,600 voted.

Kosciusko and Jenolan Caves Road.—General maintenance and improvements on the national roads to the two popular tourist resorts proceeded as in past years and absorbed an expenditure of £6,143. The construction of a parking area at Jenolan Caves at a cost of £832, and of a road to the woodstack at the back of the Hotel Kosciusko at a cost of £548, were carried out with funds provided by the Tourist Department.

Abercrombie Caves Road.—A commencement was made on the construction by day labour of road to the Abercrombie Caves; the amount of £1,060 having been spent up to 30th June, 1927.

Extensive work is projected by way of deviations on the Jenolan Caves, a new line with very much better grades having been located for practically the whole length of the national road.

Another road which has been explored and located is one to join up Jenolan Caves with Wombeyan Caves, which when made will provide a round road from Sydney *via* Jenolan and Wombeyan Caves and back.

Road Woodenbong to Queensland Border.—The natural difficulties connected with the construction of this road are still very pronounced and the work is still some distance from completion. The forming throughout the whole length of 9¼ miles has been completed, of which about 2 miles has been metalled. The expenditure for the year having been £18,196, making the total expenditure to date £35,220.

Main Roads.

The following works have been carried out by this Department on main roads with money provided by the Main Roads Board, partly supplemented by Commonwealth Votes:—

Great Northern Road Reconstruction.

Cattai Creek to Dural Turn-off.—The work consisted of 9½ miles of formation, of which 5 miles was metalled with local ironstone, and 2¼ miles gravelled. Total cost, £53,201.

Great Southern Road Reconstruction.

(*a*) *Northern Boundary of Picton Municipality to the Great Southern Railway.*—This comprised 2¼ miles of reformation covered with bituminous macadam thoroughly consolidated. Cost, £18,421.

(*b*) *Southern Boundary of Picton Municipality to Great Southern Railway.*—Total length 6,900 feet (1⅓ mile), of which 1,400 was covered with waterbound macadam, and the balance with bituminous macadam. Cost, £12,561.

Main South Coast Road.

(*a*) *Nowra to Clyde Shire Boundary.*—This work consisted of 4½ miles of ballast and metal covered with a surface coat of asphaltum and costing £41,763; was completed early in the financial year.

(*b*) *Within Ulladulla Municipality.*—The existing heavy grades on a length of this road were replaced by a deviation with easy grades, and a total length of 2,068 lineal yards formed, ballasted, and metalled and asphaltum surfaced at a cost of about £11,560.

On completion of these works the maintenance of same was taken over by the Main Roads Board.

WORKS CARRIED OUT FOR THE LANDS DEPARTMENT.

Daceyville Levelling.—11 acres levelled and grassed at a cost of £1,264.

Bondi Sandhills Development.—(*a*) 17 acres levelled and covered at a total cost of £16,432. (*b*) Concrete roads, a total length of 2,000 lineal yards of streets was constructed of concrete, 24 feet wide, at a cost to the 30th June, 1927, of £10,156.

Relief Works.—Filling in behind sea-wall, Fort Scratchley, Newcastle, £1,293. King Edward Park Drive, Terrace-street to The Look-out, Newcastle, £1,198.

PUNTS, FERRIES AND LAUNCHES.

The expenditure for the year on the twenty-three national ferries controlled by the Department amounted to £50,497. The vote of £49,000 falling short of actual requirements by £1,497.

Coraki Ferry.—A new steam punt for this ferry was built in Sydney by Morts Dock and Engineering Company and put on the ropes at Coraki in December.

This is a wooden punt with a carriage-way of 64 ft. 1 in. x 14 ft. 6 in. and gross tonnage 75, and cost £12,148.

Grafton Ferry.—To cope with the greatly increased traffic consequent on the opening of the North Coast Railway and the break in continuity of same at the Clarence River a much larger punt than that heretofore in use was built at Newcastle by the Government Dockyard and put on the ropes at Grafton in December, 1926. This is a steel punt, 128 ft. long x 21 ft. 6 in. wide, with a gross tonnage of 257, and cost £22,486.

A necessary addition to this ferry was carried out during the year, namely, a new coal bunker at a cost of £870.

Louth Ferry, Darling River.—To replace the present punt at Louth the construction of a new punt was put in hand by day labour at Bourke, the cost to 30th June, 1927, being £411, and the total estimate £1,100.

Parramatta River.—The new ferry service between Putney and Mortlake referred to in last year's report is not yet installed, though late in the financial year the work in connection with the immediate approaches was put in hand by the Department *pari passu* with the construction by the respective councils of the roads in approach thereto, and one of the existing punts has been overhauled in readiness for use on completion of the approaches and landings.

George's River Ferry Service.—Owing to the unforeseen delay in completing the bridge over George's River at Tom Ugly's Point, it has been found necessary to instal an extra punt for the Dover Point service, and an order has been placed on the Government Dockyard for the construction of a punt similar to that lately carried out by the Dockyard for Grafton Ferry.

PUBLIC WATERING-PLACES.

Unfortunately the whole of the Western Division is again in the throes of a very severe drought and opportunity was taken of the low state of many of the tanks to have them cleaned of silt, and thus the amount voted from Revenue for the year was not sufficient to meet the necessary requirements, the amount voted being £18,500 and the expenditure £20,676.

From the Public Works Fund the expenditure was £9,178 and the works carried out:—

Mokeley Tank, in the Broken Hill District. In hand by contract. Expenditure to end of year, £859.

Milroy Tank, in the Bourke District. In hand by contract. Expenditure to end of year, £1,040.

Bokhara Dam, in the Bourke District. In hand by day labour and almost completed. Total cost to date, £2,143.

Gamalally and Piangobla Tanks, in the Moree District, were excavated during the year by contract, and the public watering-places established at a cost of £1,686 and £1,906 respectively.

Llanillo Tank, in the Moree District, was commenced by contract, the cost to 30th June being £554.

Weetalibah Waterholes, also in the Moree District, were resumed and established as a public-watering place, cost of resumption being £74.

Grawin Water Supply.—Owing to the opening of a new opal field at Grawin it became imperative to provide a water supply for the miners. A bore was sunk and salt water met with. At the end of the year a second bore in a new locality was being put down by contract.

R. VOWELL, M.I.C.E., M.I.E.A.,
Chief Engineer, Harbours, Roads and Bridges.

The Under-Secretary.

Port Kembla.

Traffic and Shipping Returns. — Statement A.

Traffic.	Tons.
A. Northern Sidings to No. 1 Jetty (excluding Kembla)	231,929
B. Mount Kembla Colliery, delivered Northern Sidings, thence No. 1 Jetty	86,076
D. Mount Kembla Colliery, delivered No. 3 Jetty Sidings, thence No. 3 Jetty	74,947
E. Mount Lyell Sidings to No. 3 Jetty	.....
F. Northern Sidings to No. 3 Jetty (excluding Kembla)	52,335
G. Departmental convenience, Mount Lyell Loop to No. 1 Jetty, Kembla	.....
H. Northern Sidings to No. 4 Jetty	6,395
Ha. Electrolytic R. and S. Company's Sidings to No. 4 Jetty (slag)	.....
Total	451,682

Shipping.	
Quantity shipped at No. 1 Jetty	318,005
" " No. 3 Jetty	127,282
" " No. 4 Jetty	6,395
Total	451,682

Traffic (Other than for Shipment).

Direction.	tons. cwt. qrs.
Inwards	62,616 2 2
Outwards	92,589 0 3
Total	155,205 3 1

Summary of Accounts—Wollongong Office.

Port Kembla. — Statement B.

	£ s. d.	£ s. d.	£ s. d.
Haulage and Shipment of Coal—			
Shipping	26,093 10 4		
Haulage	2,039 15 3		
Berthing	2,010 12 1		
Launch	793 5 0		
Gangway	177 0 0		
Hawsers	661 5 4		
2 ton Electric Crane	395 7 2		
5 ton "	682 6 11		
Telephone	5 11 8		
Sale of water	376 10 0		
Way leave	391 16 8		
Anchorage	14 0 0		
Wages, Cr.	72 16 3		
Sundries	77 17 6		
		33,791 14 2	
Navigation Department—			
Harbour dues	7,128 3 2		
Tonnage	5,152 12 11		
		12,280 16 1	
Electric Power—			
Local Lines	8,298 16 9		
Moss Vale Line	12,132 1 1		
Kiama Line	14,027 13 8		
		34,458 11 6	
Resumed Properties Department—			
Rent of cottages	922 1 4		
" land	1,338 18 0		
" camping area	14 0 0		
Sanitary fees	43 6 0		
		2,318 5 4	
Port Kembla Harbour Works—			
Spalls	10,299 3 2		
Hire of wagons	16 10 2		
Boat fees	5 10 0		
Sundries	118 2 8		
Stock	701 15 5		
Outside services	616 4 9		
		11,757 6 2	
Outside Port Kembla and Wollongong.			
Services		928 14 0	
Wollongong.			
Shipping	909 0 3		
Coal into bin	42 1 6		
		951 1 9	
			96,486 9 0

PORT KEMBLA. STATEMENT C.

Trade and Shipping Returns.

Vessels entering Port Kembla.	1923–24.		1924–25.		1925–26.		1926–27.	
	Arrivals.	Net Registered Tonnage.	Arrivals.	Net Registered Tonnage.	Arrivals.	Net Registered Tonnage.	Arrivals.	Net Registered Tonnage.
Overseas	106	323,822	125	393,428	147	489,754	155	498,914
Coastal	234	52,501	221	48,626	202	44,618	248	58,802
Interstate	134	195,280	132	189,253	96	124,781	107	151,287
Totals	474	571,603	478	631,307	445	659,153	510	709,003

Principal Exports.

Item.	1923–24.		1924–25.		1925–26.		1926–27.	
	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.
		£		£		£		£
Cargo coal	204,298	204,298	157,833	157,833	161,632	161,632	213,223	213,223
Bunker coal	120,274	120,274	132,151	132,151	110,247	110,247	161,286	161,286
Coke	52,891	52,891	59,431	59,431	47,880	47,880	77,173	77,173
Copper	4,252	291,953	3,300	221,746	3,132	207,808	2,211	152,522
Bluestone	115	3,910	348	11,832	391	13,294	403	13,387
Slag	.....	.....	.....	.....	.....	.....	.....	.....
Fertilizers	30,865	182,500	35,306	220,800	37,625	230,500	39,537	236,000
Fluxes, etc.	.....	.....	300	900	546	2,154	.....	.....
Manufactured Metals	9,760	1,228,477	11,969	1,240,650	9,246	979,626	7,400	800,555
Totals	422,455	2,034,303	400,638	2,045,343	370,699	1,753,141	501,233	1,654,146

Principal Imports.

Item.	1923–24.		1924–25.		1925–26.		1926–27.	
	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.
		£		£		£		£
Blister Copper	11,435	1,033,086	10,590	916,912	9,003	770,879	7,903	550,430
Ore	1,636	16,166	1,433	19,421	650	8,866	3,985	51,410
Concentrates	3,174	36,810	4,226	60,292	1,701	83,970	1,207	18,471
Matte	1,679	35,310	3,294	55,617	6,931	116,440	2,324	29,514
Phosphate rock	14,552	33,216	15,236	35,303	15,175	35,136	24,432	59,119
Sulphur	1,043	7,109	3,232	15,456	3,939	18,008	2,194	13,160
Pyrites	4,408	10,395	.....	.....	.....	.....	.....	.....
Fertilizer (by rail)	.....	.....	3,538	41,228	2,406	27,818	1,669	19,376
Bags and packing materials (by rail)	.....	.....	465	21,556	408	22,055	500	22,299
Lead	.....	.....	.....	.....	1,969	72,971	800	24,976
Other Materials	.....	.....	.....	.....	224	14,426	778	48,212
Totals	37,927	1,172,092	42,014	1,165,795	42,406	1,170,569	45,792	836,967

Port Kembla—Statement C—*continued.*

Financial Statement.

Item.	1923–24.		1924–25.		1925–26.		1926–27.	
	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.
	£	£	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Haulage and shipment of coal ...	28,088	17,311	26,461 13 10	17,970 15 6	25,856 3 1	19,108 11 3	33,791 11 6	18,594 0 10
Power House ...	15,884	12,369	28,236 17 10	20,695 18 7	35,291 12 3	21,551 12 9	34,458 11 6	28,996 1 10
Totals.....£	43,972	29,680	54,698 11 8	38,666 14 1	61,147 15 4	40,659 4 0	68,250 3 0	47,590 2 8

Particulars of River Entrances of New South Wales. Statement D.

Name of Port.	Depth on Bar prior to commencement of work. Position variable.	Sailing distance from Sydney.	Total length of River.	Limit of Navigation for Boats drawing 4 feet.	Catchment Area of River.	Area of Tidal Compartment.	Proposed width of River Entrance between Breakwater.	Depths during the year 1926–27 at Low Water Spring Tides.						Anticipated Depth on Completion of Scheme.
								Maximum.		Average.		Minimum.		
								Bar.	Crossing.	Bar.	Crossing.	Bar.	Crossing.	
	ft in.	Sea mls.	St. mls.	St. mls.	Sq. mls.	Acres.	Sq. mls.	ft.	ft. in.	ft. in.	ft in.	ft. in.	ft. in.	ft. in.	ft. in.	ft.
Tweed	3 0	372	46	24	418	5,000	8	500	7 6	8 6	5 6	8 0	3 0*a*	6 0	9
Richmond	7 0	328	149	68	2,683	6,800	10½	1,000	13 6	12 0	10 11	11 4	6 3*b*	10 6	12
Clarence	8 0	294	247	67	8,505	34,000	53	1,400	13 6	12 6	11 6	11 7	9 8	10 6	18
Bellinger	3 0	228	76	15	479	1,640	2½	500	6 9	7 0	5 1	4 11	4 0	3 6	9
Nambucca	4 9	219	58	9	552	2,730	4¼	500	6 6	5 6	4 8	3 11	2 5	2 0*c*	9
Macleay	5 0	208	214	39	4,581	3,750	6	700	9 0	8 0	7 6	8 0	5 9	8 0	12
Hastings	5 0	112½	110	19	1,389	6,400	10	650	7 6	4 6	6 0	3 11	4 0*d*	3 3	10
Camden Haven	4 6	159½	18	13	238	7,240	11⅓	400	7 3	6 6	6 2	6 1	4 0*e*	5 6	8
Manning	8 0	141	141	29	3,164	6,800	10½	800	8 0	9 6	6 5	8 3	4 6	7 0	12
Cape Hawke ...	2 3	125	46	17	514	21,930	34⅓	400	6 0	15 0	3 7	8 11	1 9	6 0	9
Lake Macquarie	...	50	...	...	291	26,000	40½	...	5 6	6 0	4 8	4 1	3 10	3 0	...
Crookhaven (including Shoalhaven River).	11 0	71	205	22	2,801	2,808 6,533	4⅓ 10½	...	13 6	8 6	13 6	8 6	13 6	8 6	12
Bateman's Bay	4 0	129	70	24	696	3,750	6	...	12 0	...	6 4	...	4 0	...	10
Moruya	6 0	139	93	4	609	1,550	2½	...	25 0	10 6	23 1	9 6	23 0	9 0	9
Wagonga	...	158	9	5	52	1,650	2½	340	9 0	7 0	7 2	7 0	6 0	6 0	10

a Tweed River Minimum Bar, 1 day only.
b Richmond River " " 1 " "
c Nambucca River " Crossing 1 " "
d Hastings River " Bar, 1 " "
e Camden Haven " " 1 " "

Dock Transactions. Statement E.

	Terranora Dock, Tweed River.	Riley's Hill Dock, Richmond River.	Ashby Dock, Clarence River.	Cundle Dock, Manning River.
No. of Government vessels docked	11	12	9	8
Tonnage of Government vessels docked	667	1,220	1,012	60
No. of private vessels docked	9	.....	4	.....
Tonnage of private vessels docked	479	.....	370	.....
*Revenue received during year	£121 16s. 0d.	.....	£56 18s. 0d.	.....
Expenditure, docking private vessels	£140 12s. 1d.	.....	£35 9s. 0d.	.....
Cost—Dock maintenance and repairs	£55 5s. 2d.	£223 10s. 2d.	£375 18s. 3d.	£134 3s 4d.

*Dock dues only.

DREDGE SERVICE.

Summary of Work and Cost of Dredging at various Ports for year 1926-27.

Port—	Tonnage.	Cost. £ s. d.
Tweed River	151,080	9,469 19 8
Byron Bay Dredging	1,500	393 19 1
Byron Bay Moorings	.....	444 8 8
Coff's Harbour Dredging	500	165 4 1
Coff's Harbour Moorings	.....	262 12 2
Woolgoolga Moorings	.....	147 1 2
Richmond River	487,588	27,640 9 0
Clarence River	232,889	13,665 2 9
Bellinger River	110,530	4,977 16 10
Nambucca River	235,860	11,902 16 0
Macleay River	44,300	2,179 0 6
Port Macquarie	33,250	2,389 2 10
Manning River	12,300	1,671 7 4
Cape Hawke	128,093	3,545 11 5
Newcastle	1,788,080	85,820 1 4
Lake Macquarie	57,500	4,274 2 9
Port Hacking	4,750	443 10 10
Botany Bay	3,150	947 11 4
Cook's River	249,274	12,782 9 9
Hawkesbury River	38,657	3,022 12 0
Bateman's Bay	59,500	2,863 14 6
Moruya	313,964	13,843 10 5
Narooma	21,900	3,094 14 4
	3,974,665	205,946 18 9
Cost of Tug Service other than Dredge Service		14,188 4 9
		£220,135 3 6

DREDGE SERVICE.

Estimated Value of Dredging Plant as at 30th June, 1927.

Vessel—	Station.	Valuation. £
Antleon	Bar Harbour	35,000
Ballina	Moruya	12,000
Bellingen	Bellinger River	2,500
Botany	Cook's River	5,000
Chindera	Tweed River	6,500
Clarence	Newcastle	9,500
Como	Cook's River	2,000
Coraki	Richmond River	1,600
Forster	Cape Hawke	6,000
Gosford	Hawkesbury River	4,500
Harrington	Manning River	8,500
Harwood	Tweed River	1,400
Hexham	Newcastle	14,000
Hunter	Newcastle	30,000
Juno	Newcastle	27,500
Jupiter	Bar Harbour	25,000
Lansdown	Manning River	200
Latona	Bar Harbour	20,000
Macksville	Nambucca Heads	3,000
Maclean	Clarence River	3,000
Morpeth	Newcastle	12,000
Minmi	Newcastle	14,000
Neptune	Coastal Rivers	58,000
Richmond	Richmond River	2,300
Stockton	Newcastle	14,000
Swansea	Newcastle	3,000
Tethys	Bar Harbour	21,000
Tempe	Undercliffe	2,200
Urunga	Nambucca Heads	2,800
Wallsend	Newcastle	14,000
Wickham	Newcastle	1,600
		£362,100

DREDGE SERVICE—*continued.*

Estimated Value of Dredging Plant, &c.

Tug or Steam Barge—

	Station.	£
Cardiff	Newcastle	2,500
Casino	Newcastle	1,000
Croki	Cook's River	700
Eden	Newcastle	5,000
Grafton	Newcastle	26,500
Hamilton	Newcastle	3,300
Hinton	Newcastle	1,100
Lismore	Newcastle	26,500
Mayfield	Newcastle	1,000
Orestes	Newcastle	18,000
Moruya	Newcastle	3,000
Paterson	Newcastle	2,500
Rhea	Newcastle	18,000
Taree	Newcastle	1,500
Waratah	Newcastle	3,300
		£113,900

Summary.

	£
Valuation—Dredges	362,100
Tugs and Steam Barges	113,900
Punts, Pontoons, Pipes and Spare Gear	44,000
	£520,000

STATEMENT of Ladder Dredge Expenditure for twelve months ending 30th June, 1927.

Ladder Dredge.	Where working.	Material lifted.	Tons lifted.	Hours dredging.	Hours working.	Expenditure.	Pence per ton.	Cost per hour dredging.	Cost per hour working.	Percentage of working hours.							Remarks.
										Dredging.	Coaling.	Removals.	Bad weather.	Waiting for punts.	Repairs.	Other causes.	
						£ s. d.	d.	£ s. d.	£ s. d.								
"Clarence"	Newcastle	Mud	249,800	953	2,180	6,789 5 5	6·5	7 2 6	3 2 3	43	4	18	2	9	15	9	
"Hunter"	,, ...	Mud and sand	732,500	781	2,163	7,400 3 9	2·4	9 9 6	3 8 5	35	6	16	1	7	25	10	
"Juno"	,, ...	Rock, sand, and mud	254,580	846	2,170	5,523 19 7	5·2	6 10 7	2 10 11	40	1	17	...	5	32	5	
"Lansdowne"	.....	.....	.....	.....	.....	127 14 3	...	.....	.....	...	...	...	...	...	...	...	
"Qrara"	.....	.....	.....	.....	.....	286 0 8	...	.....	.....	...	...	...	...	...	...	...	
"Richmond"	.....	.....	.....	.....	.....	88 3 0	...	.....	.....	...	...	...	...	...	...	...	
		Totals.....	1,236,880	2,580	6,513	20,215 6 8				39	4	17	1	7	24	8	
		Averages	.....	.....	.....	.....	3·9	7 16 9	3 2 1								

STATEMENT of Large Sand-pump Dredge Expenditure for twelve months ended 30th June, 1927.

Large Sand-pump Dredge.	Where working.	Material lifted.	Tons lifted.	Hours dredging.	Hours working.	Expenditure.	Pence per ton.	Cost per hour dredging.	Cost per hour working.	Percentage of working hours.							Remarks.
										Dredging.	Coaling.	Removals.	Bad weather.	Disposal of silt.	Repairs.	Other causes.	
						£ s. d.	d.	£ s. d.	£ s. d.								
"Ballina"	Moruya	Clay, timber, sand, and silt.	147,850	652	2,174	6,634 13 1	10·7	9 6 10	3 1 0	30	1	27	1	...	35	6	
"Caindera"	Tweed River	Mud and sand	115,305	387	2,193	4,689 11 2	9·7	12 2 4	2 2 9	18	3	14	...	...	61	4	
"Hexham"	Newcastle	Mud, sand, and stone.	163,662	823	2,173	6,567 7 6	9·6	7 19 7	3 0 5	39	1	23	...	...	18	19	
"Morpeth"	.....	.....	.....	.....	.....	22 15 3	...	.....	.....	...	...	...	...	...	...	...	
"Stockton"	.....	.....	.....	.....	.....	522 6 0	...	.....	.....	...	...	...	...	...	...	...	
"Harrington"	Richmond River	Sand	95,067	666	2,165	6,698 8 6	16·9	10 1 2	3 1 11	31	4	30	4	...	6	25	
"Antleon"	Newcastle, Lake Macquarie, Botany Bay, Port Hacking, Narooma, Bateman's Bay, Clarence River	,,	144,300	386	1,541	13,215 8 5	22·0	34 4 9	8 11 6	25	6	23	2	20	10	14	Extensive overhaul and out of commission 4 months.
"Latona"	Macleay River, Manning River, Byron Bay, Clarence River, Tweed River, Richmond River, Coff's Harbour, Bellinger River, Nambucca River, Port Macquarie	,,	175,300	502	2,371	12,723 17 6	17·4	25 6 11	5 7 4	43	5	26	1	9	8	8	
"Jupiter"	Clarence River, Richmond River, Newcastle	,,	363,700	579	2,236	13,246 12 1	8·7	22 17 7	5 18 6	26	5	12	2	21	29	5	
"Tethys"	Macleay River, Clarence River, Byron Bay, Manning River, Richmond River, Newcastle, Bateman's Bay	,,	192,100	435	2,333	13,779 9 0	17·2	31 13 6	5 18 2	19	7	18	6	14	28	8	
"Neptune"	Coff's Harbour, Woolgoolga, Macleay River, Clarence River, Hawkesbury River, Moruya	,,	338,114	1,204	2,807	13,524 16 7	9·6	11 4 8	4 16 4	45	5	24	1	8	9	8	
		Totals	1,735,398	5,634	19,993	91,625 5 1											
		Averages	.....	.....	.....	.....	12·67	16 5 3	4 11 8	31	4	22	2	8	22	11	

Statement of Small Sand-pump Dredge Expenditure for twelve months ended 30th June, 1927.

Small Sand-pump Dredge.	Where working.	Material lifted.	Tons lifted.	Hours dredging.	Hours working.	Expenditure.	Pence per ton.	Cost per hour dredging.	Cost per hour working.	Percentage of working hours.							Remarks.
										Dredging.	Coaling.	Removals.	Bad weather.	Waiting for punts.	Repairs.	Other causes.	
						£ s. d.	d.	£ s. d.	£ s. d.								
"Bellingen"	Bellinger River	Mud and sand	95,780	1,181	2,183	3,843 19 10	9·6	3 5 1	1 15 3	54	6	20	...	...	14	6	
"Botany"	Cook's River	Sand, mud, and clay	105,872	1,149	2,207	3,978 1 11	9·0	3 9 3	1 16 1	52	1	15	1	...	18	13	
"Forster"	Cape Hawke	Sand	128,093	1,453	2,183	3,441 1 8	6·4	2 7 4	1 11 6	67	...	16	1	...	11	5	
"Gosford"	Newcastle, Hawkesbury River, Cook's River.	Mud, sand, and shell	65,352	840	2,035	3,682 8 10	13·5	4 7 8	1 16 2	41	2	36	...	...	10	11	
"Macksville"	Nambucca River	Sand and gravel	154,660	1,297	2,191	3,531 11 8	5·5	2 14 5	1 12 3	59	3	20	...	...	14	4	
"Maclean"	Clarence River	Mud, clay, sand, and shingle.	25,089	1,018	2,176	3,004 6 3	28·7	2 19 0	1 7 7	47	2	12	3	2	13	21	Working as a grab dredge.
"Swansea"	Newcastle	Mud, sand, and shell	121,559	1,011	2,169	3,556 2 4	7·0	3 10 4	1 12 9	46	3	16	1	8	17	9	
"Tempe"	Cook's River	Clay and mud	20,098	1,907	3,303	3,815 19 1	45·5	2 0 0	1 3 1	57	1	7	1	...	23	11	Retubing boiler, and working double shift 7 months.
		Totals	716,503	9,856	18,447	28,853 11 7											
		Averages	.....	.....	.....	.....	9·66	2 18 7	1 11 3	53	2	18	1	1	15	10	

Statement of Grab Dredge Expenditure for twelve months ended 30th June, 1927.

Grab Dredge.	Where working.	Material lifted.	Tons lifted.	Hours dredging.	Hours working.	Expenditure.	Pence per ton.	Cost per hour dredging.	Cost per hour working.	Percentage of working hours							Remarks.
										Dredging.	Coaling.	Removals.	Bad weather.	Waiting for punts.	Repairs.	Other causes.	
						£ s. d.	d.	£ s. d.	£ s. d.								
"Como"	Cook's River	Hard sand and mud	106,540	1,221	2,183	3,019 4 2	6·8	2 9 5	1 7 8	56	2	7	1	3	25	6	
"Coraki"	Richmond River	Sand and mud	9,221	896	2,183	1,569 7 7	38·5	1 15 0	0 14 5	41	7	17	1	...	17	17	Working with 2 Grabs.
"Harwood"	Tweed River	Sand, rock, and mud	10,775	1,182	2,186	1,782 0 0	39·7	1 10 2	0 16 4	54	9	11	1	...	12	13	
"Minmi"	Newcastle	Rock, sand, mud, and rubbish.	18,900	914	2,318	5,196 18 11	65·9	5 13 9	2 4 10	39	1	27	3	5	17	8	
"Seaham"	.....	.....	.....	.....	.....	57 8 1	...	.....	.....	...	...	...	...	...	...	...	
"Urunga"	Nambucca River	Gravel	10,300	564	2,184	3,751 18 6	87·4	6 13 1	1 14 4	26	3	16	...	...	45	10	Delivering on shore. Working with transporter.
"Wallsend"	Newcastle	Rock, sand, and mud	99,260	1,243	2,184	3,702 9 5	8·9	2 18 9	1 13 11	57	2	14	2	10	9	6	
"Wickham"	"	Sand, stone, and mud	30,888	1,002	2,172	2,807 7 9	21·8	2 16 0	1 5 10	46	5	14	2	9	14	10	
		Totals	285,884	7,022	15,410	21,886 14 5											
		Averages	.....	.....	.....	.....	18·3	3 2 4	1 8 5	46	4	15	1	4	20	10	

STATEMENT of Tug and Hopper Barge Expenditure and Work for twelve months ended 30th June, 1927.

Tug or Hopper Barge.	Where employed.	Tons towed.	Miles run towing.	Miles run special service.	Total working hours.	Hours attending.	Cost of towing.	Cost of special service.	Cost per ton.	Cost per mile towing.	Cost per mile special service.	Cost per hour working	Cost per hour attending.	Percentage working hours.					Remarks.
														Steaming.	Coaling.	Repairs.	Bad weather.	Other causes.	
"Cardiff"	Newcastle and Northern Rivers	169,875	5,747	1,105	2,285	2,175	£ s. d. 2,117 1 9	£ s. d. 582 0 3	d. 2·9	s. d. 7 4	s. d. 10 6	s. d. 23 7	s. d. 24 10	57	6	5	1	31	
"Casino"	.....	.....	.....	.....	.....	.....	36 11 2	.....	...	...	...	...	...	...	...	...	...	...	
"Croki"	Cook's River	106,540	2,001	147	2,200	1,939	588 17 4	38 6 6	1·3	5 11	5 3	5 8	6 6	42	4	12	...	42	
"Eden"	Newcastle	88,555	5,379	1,124	2,237	2,071	1,889 7 8	617 5 8	5·1	7 0	11 0	22 5	24 2	55	6	7	1	31	
"Hamilton" ...	Richmond River.....	.....	.....	1,407	717	531	.....	2,622 1 10	...	...	37 3	73 2	99 7	35	2	26	1	36	
"Hinton"	Newcastle	125	8	7,438	2,537	2,374	2 9 2	2,915 11 1	2·8	6 2	7 10	23 0	24 7	70	5	6	...	19	
"Mayfield" ...	,, ...	.....	.....	6,809	2,550	2,511	.....	931 14 10	...	...	2 9	7 4	7 5	70	9	2	...	19	
"Moruya"	Newcastle & Coastal..	1,490	46	8,820	2,646	2,614	11 8 1	2,281 3 3	1·8	5 0	5 2	17 4	17 6	59	5	1	...	35	
"Paterson" ...	Newcastle	86,155	1,950	1,214	2,243	1,896	1,201 13 0	1,227 5 7	3·3	12 4	20 3	21 8	25 7	47	5	15	1	32	
"Taree"	,, ...	12,125	619	9,855	2,556	2,279	192 4 5	2,101 15 7	3·8	6 3	4 3	17 11	20 2	68	5	11	...	16	
"Waratah".....	Newcastle & Coastal..	128,220	4,277	2,013	2,986	2,473	2,463 4 9	3,044 10 5	4·6	11 6	30 3	36 11	44 7	42	2	17	1	38	
"Grafton"	Newcastle	415,500	2,697	.....	2,177	2,014	5,473 16 1	.....	3·2	40 7	...	50 3	54 4	21	2	8	...	69	
"Lismore"	,, ...	324,000	2,363	.....	2,174	1,878	5,638 9 2	.....	4·2	47 9	...	51 10	60 1	19	1	14	...	66	
"Orestes"	Newcastle & Coastal..	125,550	1,216	988	2,263	1,634	6,140 6 7	1,062 6 7	11·7	101 0	21 6	63 8	88 2	16	2	28	...	54	
"Rhea"	Newcastle	113,400	1,289	.....	2,178	1,491	5,119 8 4	.....	10·8	79 5	...	47 0	68 8	10	1	32	...	57	
	Totals	1,571,535	27,592	40,920	31,749	27,880	30,874 17 6	17,424 1 7											
	Averages	.....	.....	.....	.....	.....	.....	.....	4·7	22 5	8 6	30 5	34 8	44	4	13	...	39	

COMPARATIVE STATEMENT of Quantity and Cost of Work done by Ladder Dredges (with Towing) for Periods as stated.

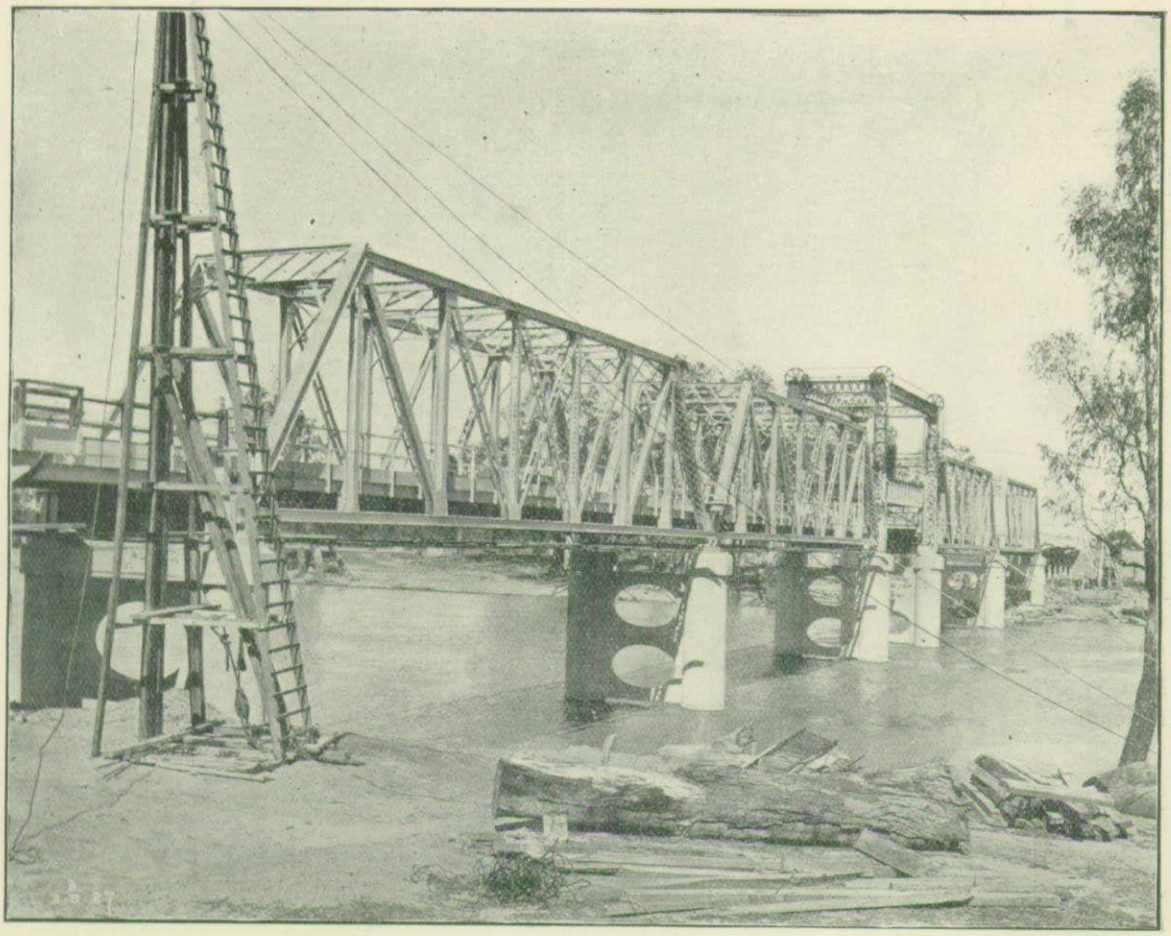
Ladder Dredge.	Where Working.	1st July, 1925, to 30th June, 1926. Dredging, Towing and Repairing.			1st July, 1926, to 30th June, 1927. Dredging, Towing and Repairing.			Remarks.
		Tons.	Expenditure.	Pence per Ton.	Tons.	Expenditure.	Pence per Ton.	
			£ s. d.	d.		£ s. d.	d.	
"Clarence"	Newcastle	323,830	12,907 7 5	9·6	249,800	13,727 6 2	13·2	
"Hunter"	,, ...	333,000	19,827 19 1	14·3	732,500	18,581 5 10	6·1	
"Juno"	,, ...	247,700	14,590 16 2	14·2	254,580	17,117 11 3	16·1	
"Richmond"	Richmond River.....	83,625	7,018 2 2	20·0	.....	471 3 6	.....	Out of Commission.
"Orara"	.....	.....	.....	.....	.....	286 0 8	.....	Do
"Lansdowne"	.....	.....	109 10 1	.....	.....	127 14 3	.....	Do
	Totals.....	988,155	54,453 14 11	13·2	1,236,880	50,311 1 8	9·7	

Comparative Statement of Quantity and Cost of Work done by Large Sand Pump Dredges (with Towing) for Periods as stated.

Large Sand Pump Dredge.	1st July, 1925, to 30th June, 1926. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	1st July, 1926, to 30th June, 1927. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	Where Working.	Tons.	Cost. £ s. d.	Pence per Ton d.	Remarks.
		£ s. d.	d.		£ s. d.	d.					
"Ballina"	51,191	6,917 3 9	32·4	147,850	6,847 13 3	11·1	Moruya				
"Chindera" ...	180,088	4,887 3 4	6·5	115,305	4,794 0 11	9·9	Tweed River ...				
"Hexham" ...	199,430	7,279 6 1	8·7	163,662	6,684 14 1	9·8	Newcastle				
"Morpeth" ...	.....	9 7 0	.....	.....	22 15 3	.....	.....				
"Stockton" ...	.....	753 5 4	.....	.....	522 6 0	.....	.....				
"Harrington"	.....	10,191 13 7	.....	95,067	8,795 11 5	22·2	.....				
							Lake Macquarie.	57,500	4,274 2 9	17·8	
							Botany Bay	3,150	947 11 4	72·2	
"Antleon" ...	153,950	5,967 4 9	9·3	144,300	13,296 3 10	22·1	Port Hacking	4,750	443 10 10	22·4	
							Narooma	21,900	3,094 14 4	33·9	
							Bat man's Bay.	35,500	2,217 14 3	15·0	
							Clarence R.	21,500	2,318 10 4	25·9	
							Richmond R.	255,900	7,655 8 7	7·2	
"Jupiter"	631,850	8,589 5 5	3·4	363,700	13,307 3 8	8·8	Clarence R.	2,800	393 16 6	33·8	
							Newcastle ...	105,000	5,257 18 7	12·02	
							Macleay R....	5,250	366 15 4	15·4	
							Manning R.	7,750	540 2 0	16·1	
							Byron Bay...	1,500	393 19 1	63·3	
							Richmond R.	2,150	146 3 0	16·3	
							Clarence R....	14,250	540 2 0	9·09	
"Latona"	130,150	11,408 19 3	21·0	175,300	12,784 9 1	17·5	Nambucca R.	70,900	4,454 4 6	15·08	
							Pellinger R.	14,750	1,029 7 3	16·7	
							Ft. Macquarie	33,250	2,389 2 10	17·2	
							Tweed River	25,000	2,789 9 0	26·8	
							Coff's Harbour.	500	165 4 1	79·3	
							Richmond R.	125,250	8,881 9 5	17·02	
							Clarence R.	36,750	2,243 13 3	14·06	
"Tethys"	299,425	13,124 17 9	10·5	192,100	13,884 18 3	17·3	Macleay R.	25,550	1,311 15 10	12·3	
							Byron Bay Moorings.	.....	444 8 8	...	
							Manning R.	4,550	1,003 11 1	52·9	
							Moruya	166,114	6,995 17 2	10·1	
							Bateman's Bay.	24,000	646 0 3	6·5	
							Clarence R....	132,500	4,774 4 0	8·6	
"Neptune" ...	378,586	8,168 8 7	5·2	338,114	13,629 6 4	9·7	Coff's Harbour.	.....	409 13 4	...	
							Woo'goolga Moorings.	.....	.....	...	
							Macleay R....	13,500	530 9 4	9·4	
							Hawkesbury River.	2,000	273 2 3	32·8	
	2,024,670	77,301 14 10	9·2	1,735,398	94,570 2 1	13·1	Tota's				

Comparative Statement of Quantity and Cost of Work done by Small Sand Pump Dredges (with Towing) for Periods as stated.

Small Sand Pump Dredger.	Where Working.	1st July, 1925, to 30th June, 1926. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	1st July, 1926, to 30th June, 1927. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	1926–27. Tons.	Cost. £ s. d.	Pence per Ton d.	Remarks.
			£ s. d.	d.		£ s. d.	d.				
"Bellingen"...	Bellinger River...	114,520	3,807 19 8	7·9	95,780	3,948 9 7	9·9				
"Botany" ...	Cook's River ...	104,359	4,547 18 9	10·5	105,872	4,109 3 1	9·5				
"Forster".....	Ca e Hawke.....	83,591	3,700 0 10	10·6	128,093	3,545 11 5	6·6				
	Newcast'e.....							11,931	505 1 3	10·2	
"Gosford"	Hawkesbury R.	77,995	5,377 5 8	16·5	65,352	4,228 11 11	15·5	36,657	2,749 9 9	18·0	
	Cook's River ...							16,764	974 0 11	13·9	
"Macksville"	Nambucca River	109,072	7,674 18 1	16·9	154,660	3,592 3 3	5·6				
"Maclean" ...	Clarence River...	27,450	3,931 15 5	34·4	25,089	3,108 16 0	29·7				
"Swansea" ...	Newcast'e.....	114,894	3,875 18 6	8·1	121,559	5,599 16 11	11·1				
"Tempe" ...	Cook's River	25,429	2,857 6 2	26·9	20,098	3,920 8 10	46·8				
	Tota's.....	657,310	35,773 3 1	13·1	716,503	32,143 1 0	10·76				



Bridge over Murray River at Mildura on Road Mildura to Euston : Four steel truss spans, one vertical lift span, and eleven reinforced concrete approach spans.

Bridge over Murray River at Abbotsford on Road Mildura to Wentworth : Four steel truss spans, one vertical lift span, and nine reinforced concrete approach spans.

Comparative Statement of Quantity and Cost of Work done by Grab Dredges (with Towing) for Periods as stated.

Grab Dredge.	Where Working.	1st July, 1925, to 30th June, 1926. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	1st July, 1926, to 30th June, 1927. Dredging, Towing and Repairing. Tons.	Expenditure.	Pence per Ton.	Remarks.
			£ s. d.	d.		£ s. d.	d.	
Como"	Cook's River ...	88,810	4,903 5 6	13·3	106,540	3,688 16 11	8·3	
Coraki"	Richmond River	10,026	2,182 4 6	52·2	9,221	1,680 13 1	43·9	
Harwood" ...	Tweed River	15,283	1,779 11 11	27·9	10,775	1,886 9 9	42·0	
Minmi"	Newcastle.....	22,420	4,123 8 11	44·1	18,900	5,933 19 6	75·3	
Seaham"	.....	.....	.....	.....	.....	57 8 1	.....	
Urunga" ...	Nambucca River	19,897	2,476 7 1	29·9	10,300	3,856 8 3	89·8	
Wallsend"...	Newcastle.....	152,680	5,766 1 2	9·1	99,260	7,305 9 7	17·6	
Wickham"...	Newcastle.....	23,385	3,659 5 2	37·5	30,888	4,504 8 10	34·9	
	Totals	332,501	24,890 4 3	17·97	285,884	28,922 14 0	24·3	

Cost of Services performed by Tugs on Work other than Dredge Service.

Vessel.	Harbour Works Newcastle. Hours.	Cost.	Removal of Rock. Hours.	Cost.	Pilot Duty. Hours.	Cost.	Other Special Services. Hours.	Cost.	Total Cost per Tug.
				Richmond River.					
		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
"Cardiff",.....	230	285 8 5	9	11 3 4	19	23 11 7	...	.....	320 3 4
"Croki"	...	.....	...	.....	...	.....	116	38 6 6	38 6 6
"Eden"	493	596 14 2	17	20 11 6	...	.....	...	.....	617 5 8
"Hamilton"	...	.....	...	.....	157	775 5 6	65	320 19 4	1,096 4 10
"Hinton"	1,864	2,291 2 10	508	624 8 3	...	.....	...	.....	2,915 11 1
"Mayfield"	2,511	931 14 10	...	.....	...	.....	...	.....	931 14 10
"Moruya"	2,345	2,056 12 11	68	59 12 9	...	.....	29	25 8 8	2,141 14 4
"Orestes"	...	.....	...	.....	...	.....	78	343 16 6	343 16 6
"Paterson"	746	955 13 9	176	225 9 5	...	.....	36	46 2 5	1,227 5 7
"Taree"	845	850 11 3	1,185	1,192 16 8	...	.....	58	58 7 8	2,101 15 7
				Newcastle.					
"Waratah"	180	400 17 9	18	40 1 9	352	783 19 2	...	.....	.....
				Sydney.					
	...	.....	...	.....	552	1,229 7 10	...	.....	2,454 6 6
Totals.....	...	8,368 15 11	...	2,174 3 8	...	2,812 4 1	...	833 1 1	14,188 4 9

Average Cost of Dredging and Towing for Periods as stated.

Class of Dredge.	1st July, 1925, to 30th June, 1926. Tons Lifted.	Hours Dredging.	Dredging only. Expenditure.	Average Cost per ton.	Average Cost per hour Dredging.	Dredging and Towing. Expenditure.	Average Cost per ton.	1st July, 1926, to 30th June, 1927. Tons Lifted.	Hours Dredging.	Dredging only. Expenditure.	Average Cost per ton.	Average Cost per hour Dredging.	Dredging and Towing. Expenditure.	Average Cost per ton.
			£ s. d.	d.	£ s. d.	£ s. d.	d.			£ s. d.	d.	£ s. d.	£ s. d.	d.
lder ...	988,155	2,918	29,465 8 8	7·2	10 1 11	54,453 14 11	13·2	1,236,880	2,580	20,215 6 8	3·9	7 16 9	50,311 1 8	9·7
rge Sand Pumps.	2,024,670	6,179	74,156 11 3	8·8	12 0 0	77,301 14 10	9·2	1,735,398	5,634	91,625 5 1	12·67	16 5 3	94,570 2 1	13·1
all Sand Pumps.	657,810	9,106	33,447 8 6	12·2	3 13 5	35,773 3 1	13·1	716,503	9,856	28,853 11 7	9·66	2 18 7	32,143 1 0	10·76
ibs ...	332,501	7,235	18,513 13 3	13·4	2 11 2	24,890 4 3	17·97	285,884	7,022	21,886 14 5	18·3	3 2 4	28,922 14 0	24·3
Totals, &c.	4,002,636	25,438	155,583 1 8	9·3	6 2 4	192,418 17 1	11·5	3,974,665	25,092	162,580 17 9	9·8	6 9 7	205,946 18 9	12·4
	Add—Cost of Services of Tugs on work other than Dredge Service.		£12,868 16s. 6d.					*Add*—Cost of Services of Tugs on work other than Dredge Service.		£14,188 4s. 9d.				
	Total Expenditure, £205,287 13s. 7d.							Total Expenditure, £220,135 8s. 6d.						

Electrical Engineering Branch.

Annual Report, 1926–27.

I.—Introduction.

The two principal works controlled by this Branch, the Port Kembla Electricity Undertaking and the Hydro-electric Development at Barren Jack, have again shown steady progress.

Considerable improvements as regards the operation of the Port Kembla system have been made, both at the power station and in connection with the transmission systems. A new schedule of rates was brought into force in February, 1927, which has resulted in considerable increase in the number of consumers. This has necessitated many additional sub-stations and in some cases, short service lines to give supply. The result of these additions to the system will not be fully appreciated until next year. The extension of the 33 kV transmission line from Kiama to Nowra has been put into service, but up to date the town of Berry only has been connected.

The Barren Jack system has not progressed as favourably as was expected. It was hoped to give supply to the majority of the towns to be connected in May, 1927, and the construction programme was drawn up accordingly. The construction of the power house building has introduced many difficulties which have hampered progress. To date the building walls have now reached the level of the roof trusses, but until the building is properly covered the erection of the electrical machinery cannot proceed. The hydraulic machinery is in course of erection. These delays will further postpone the supply of power from six to seven months, a fact which is causing some general dissatisfaction among the towns concerned.

The transmission line construction is now being all carried out by day-labour and is proceeding steadily to keep pace with the power station.

The negotiations for the supply of power to the Federal Capital from Barren Jack have not yet been definitely completed; the survey of the line to give this service has been completed.

The proposal for the development of the power available from the Shoalhaven River has been considered by the Hydro-electric Committee and recommended.

Progress has also been made regarding the investigation of the water power resources of the State. The Committee's knowledge in this regard is becoming more definite and the information available from various sources is now being drawn up to a standard form to enable comparisons to be more readily made.

It is gratifying to report that the active co-operation with other Government bodies is being maintained.

II.—Control of Electricity Supply.

Previous reports have pointed out that though this Department has no definite authority for controlling public electricity supply in the State, considerable influence was exercised through co-operation with the Local Government Department.

This influence has been continued and reports have been made in respect to loan proposals in connection with electricity supply in the following cases:—

Narromine,
Peak Hill,
Coonamble,
Wentworth,

and in regard to agreements to grant trading franchises in the following:—

Port Macquarie,
Macksville,
Taree,
Warialda,
Scone,
Barraba,
Lockhart,
Ballina,
Bingara.

In all reports this Department has insisted on the standards adopted by the State being incorporated.

The standard agreement for trading franchises has also been revised in the interests of conformity.

Advice was given to the Dorrigo Shire Council in connection with the extension of electricity supply to North Dorrigo.

Consideration was given to a proposal for the supply of electricity to Moama from the Victorian Electricity Commission.

The proposal involved—

(*a*) The supply of electricity in bulk across the border, *i.e.*, from another State.

(*b*) The retail distribution within the township.

A report has been submitted.

III.—Hydro-Electric Investigations.

During the year the investigations and survey of hydro-electric proposals was continued with one survey party, while systematic stream gauging was carried out by two field parties working part time.

Surveys.

Tia River.—A complete survey of the Tia River development was carried out and this, with the surveys of the Apsley and Yarrowitch Rivers, has been plotted. Of these, which are all in the same district, the Tia is undoubtedly the best as it has a very good storage, a reasonably short hydraulic line and a gross head of 1,073 feet. The probable power on a 50 per cent. load factor is 7,000 h.p.

Barrington Tops.—A preliminary investigation was made of the whole of the Barrington Tops area embracing the head waters of the following rivers:—Paterson, Allyn, Williams, Chichester, Wangat, Kerripit, Barrington and Gloucester. Although the rainfall at the high elevation of the Plateau probably averages 60 inches per annum, the catchment areas are small and generally only diurnal storage is possible.

The investigation showed that the Barrington River afforded the most favourable possibilities, that 8,000 h.p. could be developed on a 50 per cent. load factor at 1,500 feet elevation and that this could be increased to 20,000 h.p. by the addition of three other interconnected power stations at suitable points on the river down to an elevation of 535 feet above sea-level.

Tooma River.—A comprehensive survey was made of the Tooma River, including a storage at elevation 4,050 feet above sea-level, alternative diversion weir sites above the junction of Toolong Creek and conduit thence to a power station on Yellow Bog Creek. The gross head would be 1,390 feet and the probable power on a 50 per cent. load factor would be 20,000 h.p.

This would form the first stage, while the second stage would comprise a small storage on Yellow Bog Creek below No. 1 Power Station, conduit thence to a point above the Tooma River and pressure pipe to No. 2 Power Station on the Tooma River at elevation 832 feet above sea-level. The gross head would be 1,453 feet and the probable power on a 50 per cent. load factor would be 23,500 h.p.

This proposal, even without the storage, would form an excellent tie-in station with Hume Reservoir since the winter storage period at Hume corresponds with a high flow period of the Tooma.

The figures quoted above are based on minimum flows and there is little doubt that when tied-in with the Hume Reservoir considerably greater power can be developed by utilising more fully the available winter flow.

Stream Gauging.—Daily readings are now being recorded at fifty stations and periodical visits were made throughout the year by the field staff for gauging at the various stations.

Bristol Weekly Auto-height Recorders were established on the Mongarlowe and Corang Rivers which are the main tributaries of the Shoalhaven above the proposed take-off point at Meangora Bend.

A new Bristol 30-day Auto-Recorder, electrically driven, was put in at Buddong Creek to replace the old machine. This has worked well and gives a continuous chart for the month.

A weekly Bristol Recorder was installed at a new gauging station on the Tooma River, and a new station was established on the Swampy Plains River near Murray Gates.

Method of Recording Data.—From the daily heights recorded at the gauging stations and the "rating curve" established from periodical gaugings by current meter methods, the maximum, minimum and mean cusec flows and acre-feet discharge are tabulated in the following form :—

River at.....

Year.....

Month.	Discharge in Cusecs.			Acre-feet.
	Maximum.	Minimum.	Mean.	
January				
February				
December.....				
Totals				

The mean monthly flows are used for plotting mass curves, behaviour diagrams and storages and the resulting power graphs, while the maximum flows are useful in designing spillway discharges during floods.

Maximum and minimum development cards based on American and Canadian practice are also kept. In the former, the months of each year are arranged consecutively in order of minimum seven-day discharge. The lowest of the six high months is then taken and the average discharge for the lowest seven consecutive days in that month is taken as the maximum flow. The average of such yearly flows is considered to be the maximum to which development can be carried.

For minimum development the average of the lowest two consecutive seven-day periods is taken.

Inventory cards of the power resources of each stream are also kept. These are prepared in accordance with the standard card adopted by the Australian Commonwealth Engineering Standards Association, a completed sample of which is below :—

INVENTORY CARD—WATER RESOURCES.

Undeveloped Power (50 *per cent. Load Factor*).

1. *River.*—Shoalhaven.
2. *Fall or Rapid.*
3. *Location.*—24 miles due east of Tarago, Ry. Station.
4. *Accessibility for Transport.*—First-class main road Tarago to Nerriga *via* Braidwood, 62 miles, thence 8 miles to site, or Tarago to Nerriga *via* Oallen 43 miles, or Nowra to Nerriga, 42 miles of hilly road. All machinery. &c., could be landed on site by aerial ropeways across the river from points on the left bank 30 miles from railhead.
5. *Area of Drainage Basin.*—1,078 square miles above Devil's Bridge Dam site, 1,166 square miles above Meangora Weir.
6. *Annual Rainfall.*—Max. . Min. . Average, 30 inches. Years recorded, 36.
7. *Control Dams.*—Main storage at Devil's Bridge, dam to 175 feet above bed. Weir at Meangora Bend to 50 feet above bed.
8. *Useful Capacity of Storage.*—Devil's Bridge 8,400 M. cub. ft.; Meangora 75 M. cub. ft.
9. *Area of Surface.*—3,800 acres.

10. *Influence of Storage on Outflow.*—Complete regulation of ordinary average flow.
11. *Head.*—Average net head 814 feet in two stages.
12. *Water Flow Available.*—Minimum regulated flow, 170 cusecs; average regulated flow, 330cusecs.
13. *Distance of Offtake to Power House.—Upper Stage*—Conduits and tunnel, 11,810 feet; pressure pipe, 231 feet. *Lower stage*—Tunnel, 12,700 feet; pressure pipe, 809 feet.
14. *Character of Country.*—River flowing in deep gorge with cliffs and steep sidings.
15. *Estimate of Cost.*—Hydraulic headworks, £1,323,700. Generating plant, £379,300.
16. *Possible Power at 80 per cent. Efficiency.*—36,000 kW.
17. *Market for Power and Distance from Power House.*
18. *Sources of Data.*—Gaugings from 1909. Detail surveys by Electrical Branch, Public Works Department.

IV.—Barren Jack Hydro-Electric Development.

Power Station.—While progress has been made with the construction of the power station building and the erection of the turbine portion of the machinery is nearly complete, the rate of progress has been considerably below expectations.

The overall dimensions of the building, which is all reinforced concrete, are 78 feet x 77 feet, while the height from floor of the draft tubes, some 12 feet below the bed of the river, to the top of the parapet wall, is 74 feet. When it is remembered that the building is subject to flood water pressure to a height of 51 feet above the floor of the draft tubes and 32 feet above the turbine floor, and that the floors themselves have to carry very heavy loads, it will be seen that unusual conditions exist, and very massive construction had to be adopted.

The overturning of the centre pier between the draft tube openings (referred to in last year's report) that occurred in May, 1926, took some considerable time to rectify, owing to the difficulty of obtaining a dry river-bed with the somewhat heavier rainfall than usual. This took some three months to rebuild. Special care had also to be taken in constructing those portions of the building that will be below flood level to ensure the effective bonding of the concrete, and thus secure the proper distribution of the flood stresses in the building itself.

The superstructure walls are now approaching roof principal level, so that the main building should soon be completed.

The whole of the main portions of both turbines have been erected, and preparation is now being made for the erection of the generators on the floor 18 feet above the turbine floor.

The excavation of the tail water channel down to draft tube floor level is being considerably hampered by the discharges from the storage and by leakage from the upper sluices. Heavy pumping is necessary, and a large quantity of gravel has to be removed from the tail water area. On completion of the main building, rapid progress should be made with the erection of the balance of the plant, the transformer bank and substation.

Surge Pipe.—The erection of the 7-feet diameter surge pipe, which runs from the power station up the steep slope of the hill to full level of the storage, was successfully completed in September, 1926. It necessitated heavy concrete supports and anchors throughout, and the whole was a difficult piece of work on account of the heavy weights to be handled on a 38-degree slope.

The whole of the pressure and surge pipe was put under the pressure due to the head in the storage in March, 1927. This amounted to 80 lb. per sq. inch, and under that pressure the whole line was satisfactory.

Additional Power Station.—The load already in sight, and the probable expansion within two or three years to the full capacity of the station now under construction, has necessitated the consideration of further additions, and proposals are now being investigated for an additional power station to increase the total capacity to 20,000 kW.

The additional station will be built immediately behind the dam at the Stoney Sluice outlets, from which the supply to the turbines will be taken, while provision will be made for a full discharge from the sluices under maximum head conditions. The transmission lines and equipment of the system now under construction has sufficient capacity for the additional station, so that the extra cost to raise the supply to 20,000 kW will be for the hydraulic work, power-station building, generating plant and transformers and switchgear.

It will be remembered that the average discharge from the dam was limited during the four winter months to 165 cusecs, which corresponds to the present installation of 5,000 kW. Owing, however, to the requirements for irrigation not having reached the capacity for which the dam was designed, the Irrigation Commission has consented to the winter discharge being increased to 450 cusecs till 1935.

It is evident from a study of the river flow that it will be necessary to frequently discharge large volumes of water during winter months. The limit of 165 cusecs, therefore, while nominally operating for four months per annum, has been shown to actually only average two months per annum over a period of years. During the remaining ten months, up to 20,000 kW would be readily obtainable. It is doubtful under these circumstances whether it will not be more economical to instal fuel reserve plant to meet this two months' deficiency, when circumstances necessitate, rather than develop further water powers on the Tumut River tributaries, as was originally proposed.

V.—Transmission Lines of the Barren Jack System.

The whole of the constructional work in connection with the Barren Jack transmission lines and substations is carried out with day labour by this Department. Main construction camps were established at Saw Mill Creek, Childowlah, and Mistake Creek, and depots at Gundagai, Harden, Cootamundra and Jugiong.

During the year portions of the route were resurveyed, and a survey was made for a line from Bogalara to Canberra and the Federal Territory.

The double circuit transmission line from the power-house at Barren Jack to the switch structure at Bogalara has been completed with the exception of about 2 miles of stringing.

This portion of the line is carried on steel towers through mountainous country.

From Bogalara a single circuit line is completed through Jugiong, Murrumburrah, and Cootamundra to Junee. From Bogalara another single circuit line will be constructed through to Canberra, in the Federal Territory. From Murrumburrah a spur line to Young is well in hand.

Construction on the continuation of the line from Junee to Wagga is commencing.

The first section of the line from Barren Jack through to Gundagai is proceeding. This section is carried on steel towers and traverses mountainous and rough country.

Generally, the transmission lines of the Barren Jack system have presented many problems quite outside those of an electrical nature.

Miles of the line traverse practically virgin country where made roads are unknown. Much of it is mountainous.

In many places it has been necessary to build new roads. On the first section from Barren Jack to Gundagai, owing to its rugged nature, and to maintain efficient transport of material, in one case pontoons had to be used, while in several instances wire ropeways had to be employed over gorges.

In wet weather the position is further complicated by bogs and swollen creeks. These difficulties are inseparable from the construction of any transmission system that, though feeding country centres, traverses in between sparsely populated districts. They are, however, unique in New South Wales, inasmuch as the Barren Jack transmission lines are the first of any extent to be constructed in this State.

Substation and Switch Structures.—The main step-up station is situated adjacent to the power-house at Barren Jack. The generated pressure of 6,600 volts is stepped up to 66,000 volts, and fed to the transmission lines through triple pole oil circuit breakers.

Material for this step-up station has all been delivered, and work is proceeding satisfactorily. Step-down substations and switch structures will be installed at Jugiong, Murrumburrah, Cootamundra, Junee, Gundagai, Tenandra, Wagga, Young, and Bogalara.

At Junee the substation is completed, and erection is proceeding on the others.

Transformers for these substations are partly of local and partly of British manufacture.

Patrolmen's cottages have been erected at Gundagai, Cootamundra, Parson's Creek, and Bogalara. One is under construction at Murrumburrah.

Communication.—For the efficient maintenance of high tension systems, it is essential that the communication lines must be above the possibility of breakdown.

On the Barren Jack system, the ordinary telephones are supplemented by wireless stations at the power-house and the principal load centres, and also a portable transmitting and receiving station for the use of the transmission line patrolmen.

The wireless equipments have been temporarily installed in the construction camps at Sawmill Creek and Mistake Creek for communication to Jugiong and Gundagai. These have been found most useful.

Standard Equipment.—A considerable amount of work has been done on standardisation of equipment. Standard designs have been prepared and adopted for 66,000, 33,000 and 6,600 volt switch structures, switching equipment, substations, line arrangements, and transmission details.

VI.—Hydro-Electric Committee.

The Special Expert Committee on Hydro-electric Development, consisting of Mr. E. M. de Burgh, M.Inst.C.E., Chief Engineer, Water Supply and Sewerage Branch, Mr. H. H. Dare, M.Inst.C.E., Commissioner, Water Conservation and Irrigation Commission, and Mr. H. G. Carter, Assoc.M.Inst.C.E., Chief Electrical Engineer, held three meetings, when matters dealing with the power available on the Tumut River and tributaries was discussed and the general reports on the Shoalhaven River development.

In respect of this latter development the Committee resolved as follows:—

(1) "That the Shoalhaven Scheme as set forth in Mr. Carter's report of 6th August, 1926, is a proper proposal for the Government to submit to the Parliamentary Standing Committee for inquiry and report as part of their policy of the development of the State.

(2) "That while Mr. Carter deals with the scheme in three stages of capital expenditure and output, the scheme should be submitted as a whole, that is, on an estimated cost of £2,413,000, with a maximum effective power of 50,000 kilowatts, and that, following on authorisation, the order in which the various sections of the scheme are constructed and the outlay thereon be a matter for consideration from time to time as funds are made available and development proceeds.*

(3) "That the Chairman drafts a report setting out the views of the Committee and the above recommendations for transmission to the Under-Secretary for Public Works. Such report to be submitted for consideration and approval at next meeting."

This report was subsequently drafted and submitted to the Under-Secretary in due course.

VII.—Port Kembla Electricity Supply.

Detail descriptions of this system have been given in previous reports. Considerable extensions are in progress at the power station, due to the increased demand for power and the necessary additions have been made to the transmission and distribution system accordingly. The general operation has been satisfactory, and the interruptions to supply have been materially reduced. This improved service is due partly to alterations to lines and equipment (which are still being further improved), and partly to improved organisation and personnel. Linesmen's cottages have been acquired at suitable strategic points on the transmission system, and are now directly in telephonic communication with the power house. Additional telephones are placed at intermediate points on the lines and at all important substations. Each maintenance linesman is provided with means of transport and is in charge of a definite section of line. By this means the various linesmen can be quickly located and any troubles rectified with the minimum of delay.

* These estimates include reserve fuel plant. The figures given above under "Water Resources" are for water power only.

The finances of this system are now being placed on a proper basis. The capital value was determined at £188,136 on 30th June, 1926. During the present year the additional capital expenditure has been £49,482. The financial position from the operating point of view has been steadily improving, although the undertaking as a whole has not yet reached a stage when it can put aside the proper amount due for depreciation.

This is due principally to the large amounts spent on improvements (amounting to some £6,000) with a view of increasing the reliability of the system. This has all been paid from the revenue account, as a charge against operating expenses.

Some reduction in the rates was made in February, 1927; these have now been established as follows:—

Inner Zone.—£6 per kVA of maximum demand per annum, plus ·6d. per kWH (maximum, 1·65d. per kWH).

Middle Zone.—£6 per kVA of maximum demand per annum, plus ·75d. per kWH (maximum, 1·8d. per kWH).

Outer Zone.—£8 per kW (or at option of consumer, £7 per kVA) of maximum demand per annum, plus 1d. per kWH (maximum, 1·9d. per kWH).

These rates are for supply at 6,600 volts. If supply at low voltage is required, rates are quoted according to circumstances.

These improvements to the system, both as regards reliability and rates, have resulted in considerable increase in demand.

Contracts have been arranged with the Southern Blue Metal Quarries Ltd. for the supply of 800 h.p. at their quarries at Gingenbullen, some 4 miles beyond Moss Vale, and with the New South Wales Associated Blue Metal Quarries Ltd. for their quarries at Bass Point, near Shellharbour (300 h.p.), and at Bombo (250 h.p.).

Large increases in power demand are being made by the State Metal Quarries at Bombo, and the Railway Commissioners' quarry, also at Bombo. The townships of Berry, Dapto, Unanderra, Figtree and Port Kembla have been connected to the Department's system during the year.

These additions are expected to make a material improvement to the output and revenue of the undertaking, although their effect had not been greatly felt up to 30th June.

The statistics for the last three years are as follows:—

	1924–25.	1925–26.	1926–27.
Units generated	5,494,682	5,919,640	6,780,673
Units output	5,126,390	5,496,780	6,236,610
Units sold	4,291,185	4,500,889	5,026,086
Maximum load	2,090	2,240	2,360

Most Efficient Week.

	1924–25. 5–7–24.	1925–26. 16–1–26.	1926–27. 25–6–27.
Units generated	97,250 kWH.	121,600 kWH.	152,120 kWH.
Units output	90,820 ,,	112,520 ,,	145,180 ,,
Coal per unit generated	2·31 lb.	2·36 lb.	2·49 lb.
Coal per unit output	2·5 ,,	2·55 ,,	2·69 ,,

Annual Output on Feeders.

	1924–25.	1925–26.	1926–27.
Local feeders, 6,600 volt	533,513	508,389	595,856
Western feeders } 33,000 volt	3,151,922	3,289,318	3,683,420
Southern feeders } 33,000 volt			
Wollongong, 6,600 volt	605,590	703,182	746,810

Arrangements are now in hand to obtain an authorising Act for the system as a whole, permitting of capital expenditure up to £800,000.

Power House.—The first extensions of the power house, in accordance with the design of the ultimate station of 20,000 kilowatts, consists of one complete unit, comprising a boiler, turbo generator, and coal bunkers, particulars of which were given in last report.

Satisfactory progress has been made with the necessary alterations and extensions to the building.

The whole of the excavations have been completed for floor and bunker columns. Floor girders have been fabricated and erected; walls have been built, and the roof altered and extended where necessary.

The work has been hampered to a certain extent by the difficulty in obtaining structural steel. Some progress has been made in the excavations for the new circulating water system, described in last report. A temporary system has been arranged pending completion of the final scheme, but the matter of the installation of the new system is now one of some urgency. It will be noted from the statistics for the past three years that the coal consumption per kW has increased. This is largely due to the inadequacy of the present circulating water arrangements.

Remote controlled oil circuit breakers have been installed on each of the main outgoing 33 kV lines with most satisfactory results. A small 75 kW generating set has also been set up in the main engine room for emergency purposes and to provide an independent supply for the power house auxiliaries.

The whole of the existing plant has received a thorough overhaul during the year.

The existing switchgear at the power house is now fully taxed, and is inadequate to deal with the increasing capacity of the station.

After a careful investigation of the various types of switchgear available, an order has been placed for " Reyrolle " armoured switchgear. These switches are large enough to cope with the total capacity of the ultimate power house.

Particulars are as follows :—

Type " Reyrolle," 2 B 2.
Rating 12,000 volts, 800 amps.
Rupturing capacity, 435,000 kVA.
Solenoid operation.
Duplicate busbars.
Drawout features.
Remote control.

The installation of this apparatus will leave the switchgear at Port Kembla on a thoroughly safe basis, and future extensions on the same lines will complete the station of 20,000 kilowatts capacity.

Transmission Line System.—The alterations of the insulators on the 33 kV transmission lines near the sea coast from pin to suspension type has now been completed. At the same time, the general construction of the southern end of the Kiama line was altered to conform to the Department's standard practice, adopting galvanised steel cross-arms. Three 10 in. suspension type disc insulator units are used in series.

The Nowra transmission line (33 kV)—from Kiama to Bomadery—some 22·2 miles, was completed during the year and put into service. A supply was given to the town of Berry on 24th May. This line has suspension insulators from Kiama to Gerringong, and pin insulators from Gerringong to Nowra.

The 33 kV system has been further extended from Bowral through Moss Vale to the Southern Blue Metal Quarries property at Gingenbullen, some 4 miles beyond Moss Vale.

The total length of 33 kV line now in service is some 88·25 miles.

Considerable extensions have also been made to the 6·6 kV system; this is now the standard pressure adopted by the Department for secondary distribution. The chief of these extensions was in connection with the supply to Central Illawarra Municipal Council, which involved the construction of lines along the main South Coast road between Dapto and Figtree.

New 33 kW substations have been erected at Unanderra, Bomaderry, Berry, Mount Kembla, Gingenbullen and Aylmerton. These were all of the Department's standard design, employing switches and equipment designed in the Department.

A design for a new substation of 1,800 kVA near Kiama to replace the existing Bombo 600 kVA substation has been completed. This is expected to be commenced early in the coming year, and will be equipped with automatic reclosing circuit breakers. This substation will have all its main equipment indoors on account of the proximity to the sea and the resulting heavy deterioration of outdoor equipment.

6·6 kV substations have been constructed near Dunmore, at Dapto, Figtree, Unanderra, Brownsville, and Port Kembla.

Reference to the improved organisation for maintaining the transmission line system has already been made.

Consideration is now being given to the construction of a tie line (33kV) between Kiama and Moss Vale, which, in addition to providing an alternative means of supply—thus improving reliability—will also serve the townships of Robertson and Jamberoo.

Municipal Electricity Supply Schemes.—During the year the reticulation of the townships of Port Kembla, Unanderra, Dapto, Brownsville, Figtree and Mt. Drummond has been carried out by the Department for the Central Illawarra Municipal Council. This scheme, as previously reported, comprises five substations, 7½ miles of 6·6 kV transmission line and 25 miles of low tension reticulation. The whole of this was put into service during the year.

Consideration is also being given to the reticulation of the township of Gerringong. It is proposed that this shall be carried out by the Department and the supply retailed direct to individual consumers on account of the inability of the local council to undertake this service.

VIII.—Power Development in New South Wales.

Owing to the importance of the coal deposits in the Clarence and Richmond River basins, a visit was made to this district in September, 1927, in company with two representatives of the Mines Department, with a view to personally inspecting these coal outcrops and ascertaining the possibility of their utilisation for the supply of power in this rich and growing district.

There is evidence of a large tertiary coalfield underlying the whole of these river basins with outcrops of coal occurring at the head of the Tweed River, at Nimbin on the divide between Tweed and Richmond Rivers, at Woodburn near the mouth of the Richmond, and near Maclean on the Clarence.

No detail survey of the field or investigation of the quantity of available coal has yet been made, and it was recommended that the Department of Mines be asked to undertake a general survey with a view of ascertaining the extent of the deposit, thickness of seams, and quality of coal.

From investigations made it is anticipated that no great difficulty would be experienced in using this coal, which has a calorific value of over 10,000 B.T.U.'s per lb. in properly designed furnaces.

After an analysis of the existing electrical supply in the district covered it was evident that the electrical development of the three river valleys should be undertaken independently at present; that is to say, one power house should be situated in each valley.

As the demand justified, the transmission systems would be extended to eventually interconnect with one another.

A detailed report covering the whole of the electrical development of the Clarence and Richmond River coal lands has been compiled and submitted for consideration.

IX.—Standardisation Committees.

Officers of this Branch have represented the Public Works Department on the various State and Sectional Committees created by the Australian Commonwealth Standards Association.

X.—Work for other Branches and Departments.

Water Supply and Sewerage Branch.

Nepean Dam.—Plans for the substation and the complete electrification of the construction works including the reticulation of the dam township have been prepared and material ordered. The substation has been erected and is now in service.

Cordeaux Dam.—A small permanent substation of 50 kVA capacity has been erected and low tension current is supplied to the Dam.

Avon Dam, Hume Reservoir, Northern Suburbs Ocean Outfall Sewer, Canterbury and Campsie Sewerage Works.—The electrical equipment has been supervised and inspections made as requested.

Harbours, Roads and Bridges Branch.

Dredging of Cook's River and Shea's Creek Canal.—The dredges for these works will be electrically operated and estimates for the necessary substation and transmission lines have been prepared.

General.

Country Towns Water Supply.—Satisfactory progress has been made in the installation of electrically operated pumping stations at Yass, Condobolin, and Cowra.

Installations have been completed at Orange Mental Hospital and Blackheath. The electrical design and supervision have been carried out by this Branch.

State Metal Quarries.—Plans for a substation to control 1,200 h.p. for the Bombo State Quarry have been drawn up and material ordered. Erection is proceeding under the supervision of this Branch.

Department of Agriculture.

Hawkesbury Agricultural College.—Specifications were prepared for electrical equipment, and supervision was given in rewiring of cable towers and repairs to generator.

Water Conservation and Irrigation Commission.

Advice has been given from time to time on matters connected with the electrical system on the Irrigation Areas. A special investigation was made early in the year in collaboration with the Resident Electrical Engineer with a view to establishing the rates on a more uniform and attractive basis.

Rates were drawn up which have been in the main adopted by the Commission and arrangements were made by co-operation with the Electrical Employers' Association of New South Wales to hold an electrical exhibition at Leeton and Griffith. This took place in August, 1926, and attracted considerable local interest. The results both of this exhibition and the rates have not as yet come up to expectations, but it is hoped that this will be rectified in the near future.

There can be little doubt that the more extended use of electricity on the irrigation farms will make the conditions of living more amenable and attractive.

A second turbo alternator of 750 kW capacity was ordered and installed in the Yanco Power House during the year. This brings the effective capacity of this power house to 1,100 kW.

Department of Mines.

Officers of this Branch act as Examiners at the Motor Drivers and Mines Electricians' examinations held by the Department of Mines.

During the year 67 candidates for motor drivers' and 18 candidates for mines electricians' certificates were examined.

Suggested standard rules to govern electrical installations in proximity to inflammable liquids have been drafted and submitted to the Mines Department.

A special investigation was made into the circumstances of a fatal accident by electric shock at the Mt. Pleasant Colliery.

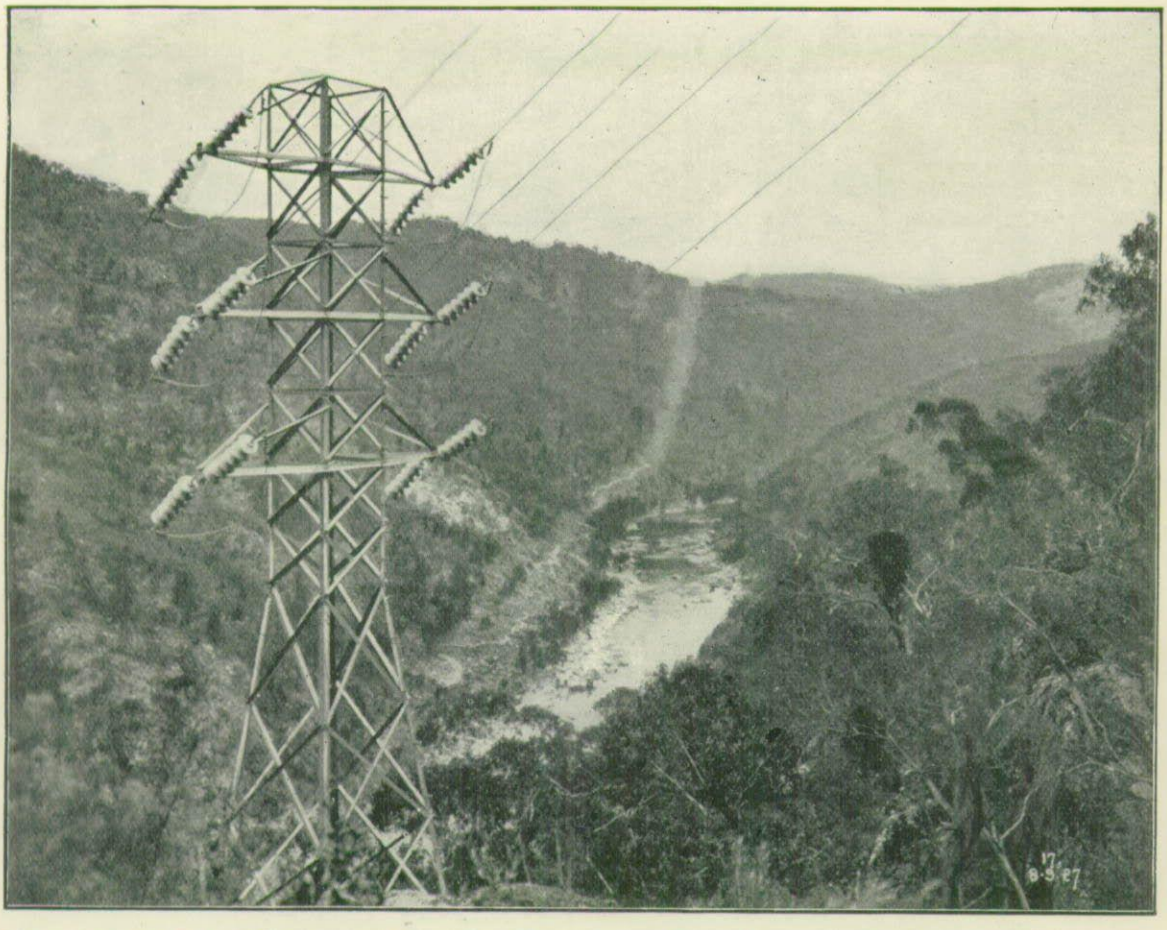
Department of Local Government.

Assistance has been given to the Local Government Department by reviewing loan proposals and franchise agreements in the cases already mentioned.

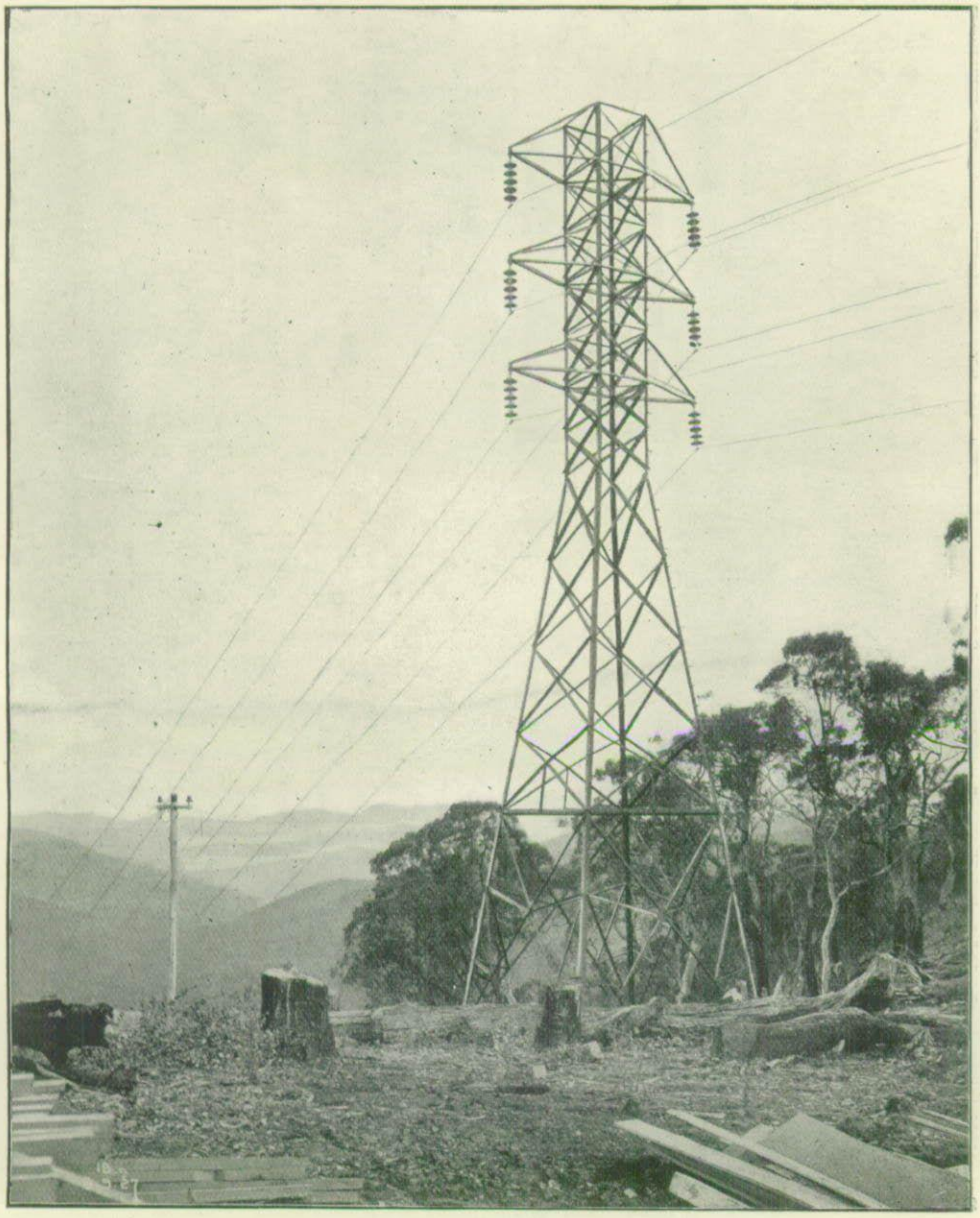
Education Department.

The electrical equipment of Drummoyne Carpentry Workshops is supervised.

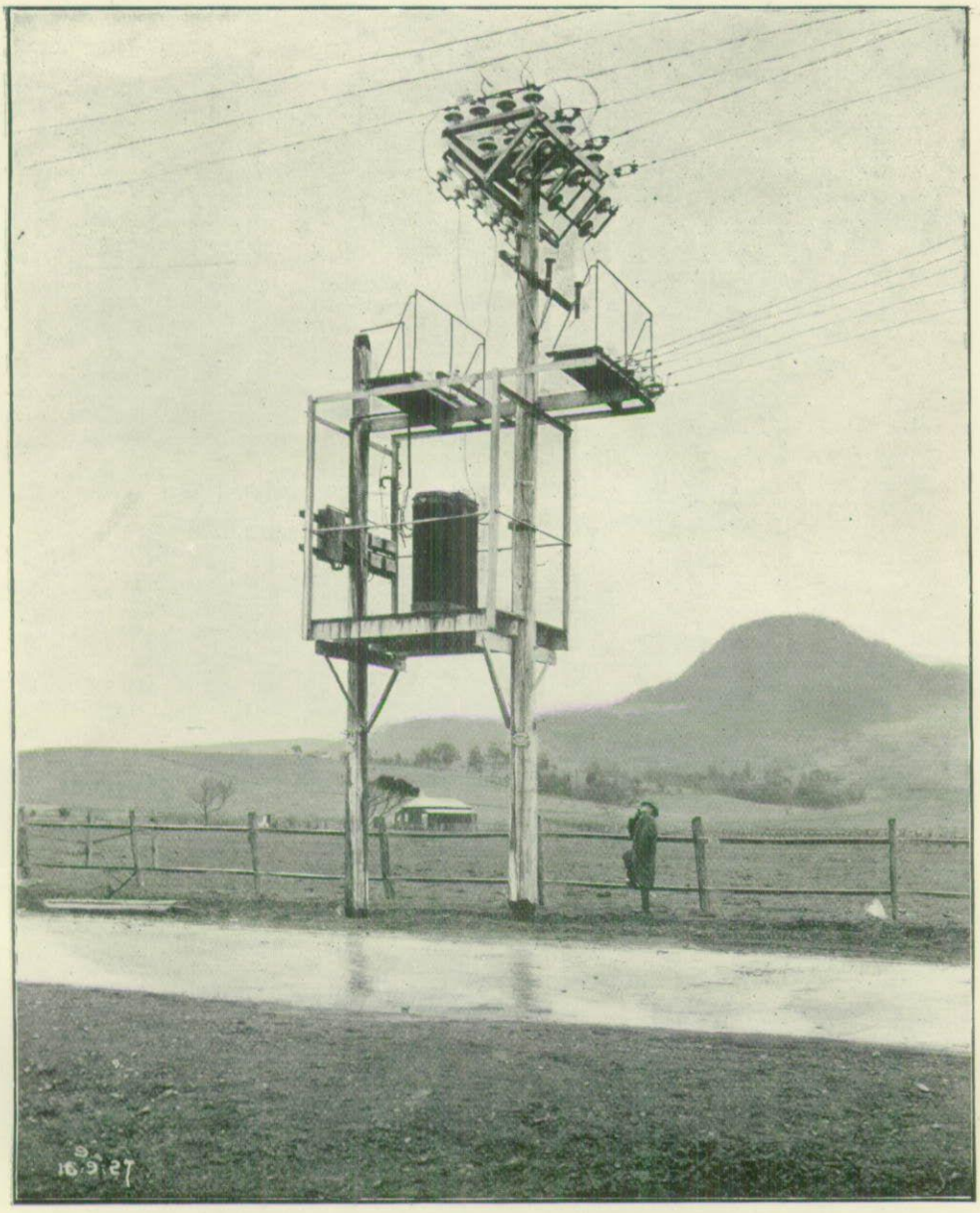
Barren Jack Hydro-Electric Development: View of work from top of Dam on 6th September, 1927, showing pipe line, power house, and transmission lines.



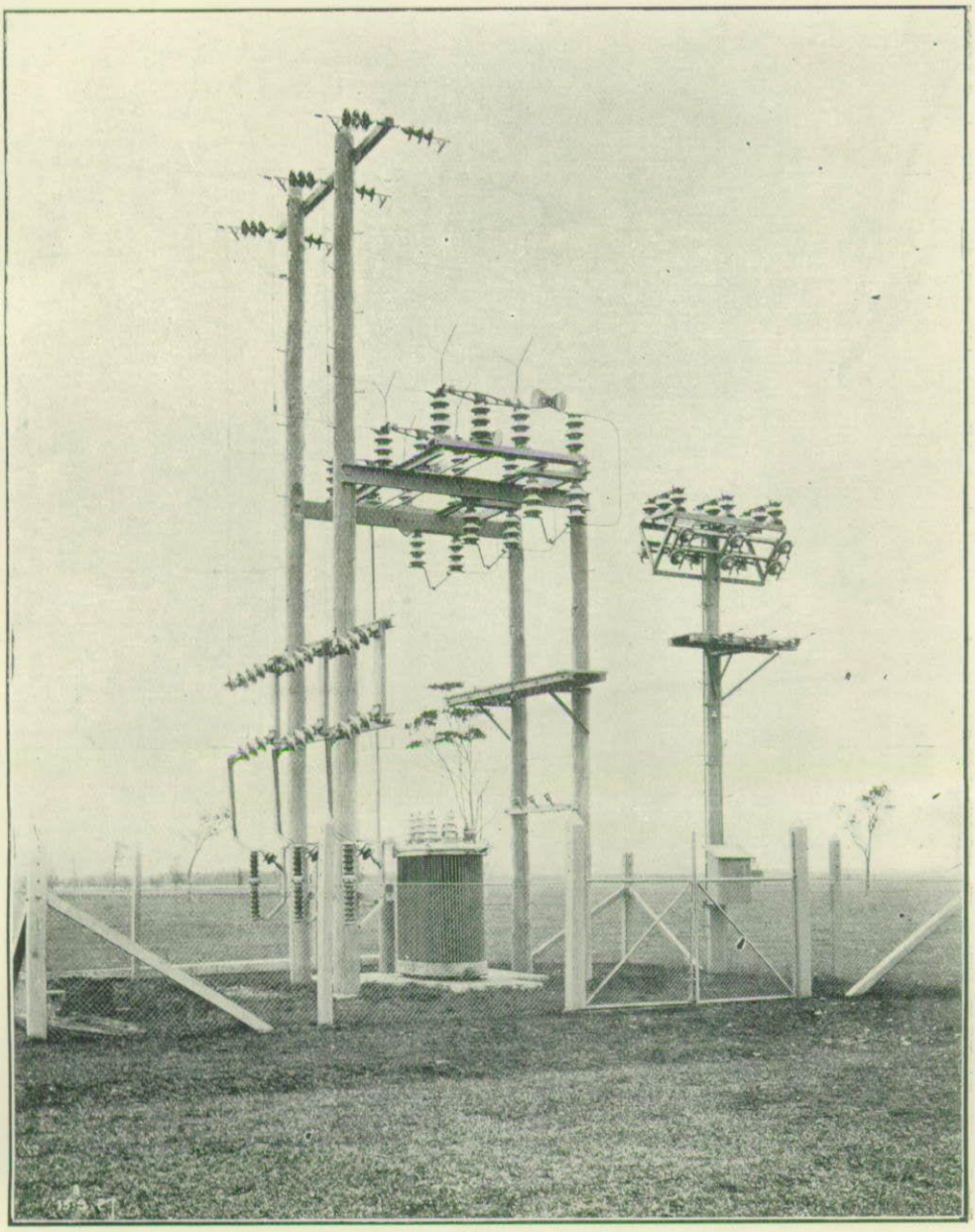
Barren Jack Hydro-Electric Development: View from Tower No. 3 to Murrumbidgee River looking along Gundagai Line.



Barren Jack Hydro-Electric Development: Standard Transmission Line, Double Circuit Tower.



Standard 6,600-Volt Substation, 100 kVA capacity : Central Illawarra Municipality, Unanderra.



Standard 33 kV Substation, 250 kVA capacity (barbed wire yet to be fixed) : Berry Substation.

Tourist Resorts.

Jenolan Caves.—Alterations have been made in the position of cable towers, and the erection of the supplementary oil engine and generator has been completed.

Kosciusko.—The electric hot water service outlined in last report has been satisfactorily installed. A scheme has been submitted to the Bureau for the augmentation of the electricity supply.

Wombeyan Caves.—The electric installaonti has made satisfactory progress. The oil engines and generators have been installed and tested and the transmission line erected. The Caves House is now connected and lighted. Wiring of caves is proceeding.

XI.—Staff.

The staff, on the 30th June, 1927, consisted of thirty in Head Office and twenty field officers. This is an increase of two officers at Head Office and six field officers during the twelve months. It is accounted for by the increase in field construction work and the operations of the Port Kembla system.

Some extensions have been made necessary to the Drawing Office accommodation, due to the increased staff. Building alterations to meet this condition were carried out during the year.

In expressing my appreciation of the efficient and loyal service given by all members of the staff during the year, I would particularly like to draw attention to the work carried out by the field officers engaged in the erection of the Barren Jack transmission lines in the face of most difficult country and circumstances.

H. G. CARTER,
Chief Electrical Engineer.

Government Architect's Branch.

Report for year 1926–27.

Report of the operations of the Government Architect's Branch for the period 1st July, 1926, to 30th June, 1927.

The certified expenditure is set forth hereunder and for the purposes of comparison that of the two preceding years is also scheduled.

Vote or Account.	1924–25.	1925–26.	1926–27.
	£ s. d.	£ s. d.	£ s. d.
Loans	111,392 6 1	98,647 5 8	88,849 6 11
Consolidated Revenue	50,659 5 0	71,018 5 11	65,233 18 6
Public Works Fund	66,343 1 5	70,435 11 5	92,195 12 7
Special Deposits	2,741 9 11	6,337 5 6	24,011 7 0
Other Departments	79,377 11 0	134,084 0 5	107,100 1 2
	£310,513 13 5	£380,522 8 11	£377,390 6 2

Officers of this Branch have also supervised for the Department of Education a number of school buildings in the country districts of the State, the total cost for the twelve months amounting to £200,658 16s. 2d.

Drawing Office.

Contract Drawings.

The following works, for which contract drawings, estimates, and specifications have been prepared, are the most important of those dealt with during the year :—

Public Trust Office, Phillip-street.—Plans and specifications are in course of preparation for the erection of a new building for the Public Trustee and Staff in Phillip-street, Sydney.

The building will have twelve floors and a basement. The basement, ground, first, and second floors will be reserved for the Public Trustee and staff, while the upper floors will be let as offices. The caretaker's quarters and lunch rooms for staff in the Public Trustee's Department will be located on the top floor. Provision is made for possible extension of the official staff to occupy the third floor if necessary.

The building will be constructed of steel and reinforced concrete. The front to Phillip-street up to the second floor will be faced with granite and with free-stone above to the crowning cornice. The main staircase and corridors will be finished in marble to a height of 6 ft. 6 in. with rubber covered floors and steps. The fittings on the floors occupied by the Public Trust Office will be of Queensland maple. Two high-speed elevators will be provided.

The estimated cost is £98,000.

Sydney Hospital—New Wards, Casualty and Operating Block.—A six-storey building has been designed with basement and six floors. The centre portion of the building will contain the stair hall, stairs and lift. On one side of the ground floor will be a department for casualty cases and on the other, ambulance cases, each having a separate entrance at the extreme ends of the building. The space allotted to casualty patients will be subdivided by steel and glass partitions into waiting room, dressing rooms, cubicles, &c., while that for ambulance cases will be similarly subdivided into operating theatre, sterilizing, receiving and observation rooms and cubicles. Each of the floors two to five will contain two main wards giving a total accommodation for forty-two beds for male and forty-two beds for female patients. Doctors' rooms, duty rooms, linen and day rooms, &c., will also be located on these floors, and balconies along the two main frontages will extend for almost the full length of the wards. The fifth floor will comprise the operating section.

The construction will be modern and fire-proof, consisting of steel framing and reinforced concrete walls and floors.

The estimated cost is £67,000.

Royal North Shore Hospital.—The new home for nurses will have three floors providing accommodation for 114 bedrooms for nurses and staff, together with all necessary lavatory accommodation. A large number of the rooms will have access to wide sleeping-out verandahs. Writing rooms will be provided on each floor, and in addition there will be a large dining room and recreation room on the ground floor. The estimated cost is £55,000.

New drawings are now in course of preparation for a larger scheme of four floors at an additional estimated cost of £12,300.

Newcastle Hospital—Nurses' Quarters Additions.—The additions to the nurses' quarters at Newcastle Hospital will make provision for seventy-five more nurses, and will be carried out in brickwork with fire-proof construction throughtout, finishing with a flat roof. A lift, giving access to each floor, is included in the scheme which, it is anticipated, will require a sum of about £31,000 to complete.

Orange Mental Hospital—Additional Buildings.—A matron's residence and a gatekeeper's lodge are now in course of erection.

Other buildings for which plans have been completed include the following :—

Two (2) blocks for sick and infirm patients;

Four (4) blocks for unrecovered patients, an administrative block in connection with the main hospital division, and one block for staff quarters.

The buildings for sick and infirm patients will be single-storey brick structures, H shape. The accommodation to be provided in each building will comprise four dormitories for eighty-three beds, nine single rooms, two day rooms and a large dining room.

The buildings for unrecovered patients will be two-storey brick structures.

Each building will contain two dormitories of forty-four beds, eleven single rooms, a day room and a dining room.

The administrative block will be another single-storey building of brick and stone. This block will furnish rooms for the medical superintendent, medical officer, manager, clerks, chief attendant, visitors, and library with a recreation room in the attic.

The staff quarters block will be a replica of nurses' quarters building already erected.

To meet the cost of these buildings a sum of more than £100,000 will be required.

Canterbury Memorial Hospital—Erection.—This new hospital will consist of an administration block, two ward blocks (each of ten beds), kitchen block, operating block, isolation block, laundry block and morgue. Provision is made for the extension of the ward blocks to accommodate twenty beds to each ward, also to add another storey; thus each ward block will eventually become capable of accommodating forty beds.

Future additions considered include two more ward blocks, nurses' quarters, and maternity, X-ray and out-patients' blocks. The ultimate accommodation of the hospital will be about 180 beds.

The estimated cost of the work now proposed exceeds £30,000.

Manly Peace Memorial Hospital—Additional Buildings.—New buildings planned during the year include those for nurses' quarters, maternity block and a morgue.

The nurses' quarters will be three storeys in height and will be erected in two sections. The first section will contain a suite of rooms for the matron's use, also forty-nine bedrooms for the nursing staff and maids with suitable reception, sitting room, sleeping-out and other accommodation.

The maternity block and morgue will be in harmony with other buildings to be erected, having brick walls and tiled roofs.

The sum required to complete these additional buildings will be about £28,000.

Lithgow District Hospital—New Ward Block.—The new buildings will comprise a main ward block of four wards making provision for a total of sixty-four beds and having wide verandahs and balconies on either side, together with an operating and X-ray block attached. The main building will be two storeys in height and the operating block a single storey. Ramped covered ways will provide access between the existing kitchen and the new wards.

The existing isolation block will be converted into a children's ward.

The estimated cost is £26,200.

Maitland District Hospital—New Nurses' Home.—This new building, which will occupy the most elevated portion of the hospital grounds, has been designed in the colonial style and will have two floors. The usual provision has been made for the matron, sub-matron, sister, twenty-nine nurses and five domestics, and includes wide verandah and balcony sleeping-out areas.

A future extension will make available a further fifteen bedrooms for nurses. The cost of the work included in the present contract will be about £17,500.

Liverpool State Hospital—Nurses' Quarters.—The site is in Elizabeth-street, adjoining the old Moore College. The building will be carried out in brick with tiled roof.

The design is in the colonial style, conforming with the original hospital buildings erected by Governor Macquarie.

The plan is of the H shape and provision has been made for the nursing staff of thirty and domestics five. Hot water, electric light, and sewerage services are to be installed. Future extension has been provided for on the north front.

About £17,000 will be required for the present contract.

Broughton Hall—Administrative Block and Nurses' Quarters.—This additional building will be three storeys in height and will be built of brickwork generally, with fire-proof corridors and staircases. It has been designed to accommodate the various administrative offices on the ground floor and quarters of nurses on the upper floors. Included in the administrative section on the ground floor will be a lecture room, laboratory, and dispensary.

In addition to a suite for the sister, bedroom accommodation will be provided on the first and second floors for thirty-two nurses, with a large nurses' sitting room on each floor.

The cost of the building is estimated at £15,700.

Central Police Barracks—Additions and Alterations.—These additions will include two additional storeys over the whole of the existing main building, with a lavatory annex on each floor.

The roof will be flat, a covered portion affording shelter during exercise duty, or recreation. The existing kitchen wing will also be raised two storeys, a flat roof completely covered serving as a band and recreation roof. A main stair-well of fire-proof construction will serve also as a fire-escape, and corridors and balconies on each floor will lead to this central escape.

Additional fire escapes will be provided at the extremities of the buildings.

The work will conform in most respects with the existing buildings, and fire hydrants, electric light and water services will be available on all floors and on the roof. The cost has been estimated at £14,700.

Kiama District Hospital—New Buildings, &c.—The present site being considered unsuitable, it is intended to abandon the existing Hospital as soon as new buildings become available.

The plans prepared provide for a new administrative and ward block, a new isolation block, a new morgue and the conversion of the residence known as "Barroul" into a kitchen and nurses' quarters.

These buildings complete with all services, fencing, and septic tank are expected to cost upward of £12,000.

Wagga Wagga Police Buildings—Erection.—A new office and barrack building and two residences are included in this contract. The office and barrack building is to be erected on the old gaol site. It will contain four large and two small offices and four large barrack rooms with balcony over. Stables and garages will be provided at the rear.

The two residences, for inspector and sergeant respectively, will be erected on a different site in the same street.

Each residence will have three bedrooms and the necessary living rooms, offices, verandahs, &c. The cost of these buildings was estimated at about £9,400.

Dubbo District Hospital—Additions and Alterations.—A new female ward block, an extension of the nurses' quarters and the addition of domestic staff quarters to the kitchen block are the main features in this scheme. The verandahs to the main hospital block will also be extended and made fly-proof and the sewerage scheme re-arranged. Besides the increased domestic accommodation, these additions will provide fourteen beds more for patients and five extra bedrooms for nurses. The cost will be about £9,000.

Royal South Sydney Hospital—Out-patients and X-Ray Departments.—Requirements having outgrown the present accommodation, a new and larger out-patients' department has become necessary. A contract now in course of preparation will make provision for this work, also for the erection of a new X-Ray department, which building will house a large pathological laboratory. The cost of these additions is expected to reach £8,000.

Omitting works estimated to cost less than £1,000 each, other contracts prepared during the year include the following:—

Ariah Park Police Station and Court House	Erection.
Barham Police Station	New Buildings.
Brewarrina District Hospital	Additions and improvements.
Burrangong District Hospital	Children's ward, &c.
Burwood Court-house	Additions.
Callan Park Mental Hospital	Chief attendant's cottage.
Canowindra Memorial Hospital	New nurses' quarters.
Clarence-street. Police Station	Alterations and additions.
Collaroy Police Station	Erection.
Cook's River Police Station	Alterations.
Coolabah Police Station	New buildings.
Darlinghurst Court-house	Accommodation for jurors.
Deniliquin Hospital	Sewerage.
Dungog Police Station	New sergeant's residence.
Earlwood Police Station	Residence and gaol.
Gilgandra Court-house	Removal, re-erection, and additions.
Government Tourist Bureau	Counters, screens, partitions, &c.
Grafton Land Board Office	Additions and alterations.
Gravesend Police Station...	New building.
Gunnedah District Hospital	Maternity block.
Kandos Court-house	Erection.
Marrickville District Hospital	Boiler house and morgue.
Nyngan District Hospital	Additions and alterations.
Nyngan District Hospital	Nurses' quarters, &c.
Parramatta District Hospital	New laundry.
Police Traffic Office (Kent-street) ...	Alterations.
Pymble Police Station	New buildings.
Quirindi District Hospital	Isolation block.
Quirindi District Hospital	Additions and alterations to nurses' quarters.
Rachael Forster Hospital	V.D. clinic.
Raleigh District Hospital	New nurses' quarters.
Rookwood State Hospital	Forage store.
Royal Prince Alfred Hospital	Alterations to administrative block.
Sydney Hospital	Accommodation for medical officers.
Tamworth Police Station...	Garage, stables, &c.
Trundle Court-house	New building.
West Kempsey Police Station	New residence and gaol.

Sketch Plans.

Among works which have been considered during the year and for which sketch plans and estimates have been prepared, those listed hereunder include the most important:—

Public Buildings.

New public offices, Bridge, Phillip, and Young streets.

Hospitals.

Auburn District Hospital	New buildings.
Auburn District Hospital	Nurses' quarters.
Ballina District Hospital	New buildings.
Balmain District Hospital	Maternity block.
Bourke District Hospital	Operating and maternity blocks.
Camden District Hospital	Nurses' home.
Coast Hospital	Medical officers' quarters.
Crown-street Women's Hospital	Isolation and laundry blocks.
Dungog District Hospital	Alterations and additions.
Griffith Hospital	New buildings and conversion of old buildings, &c.
Kurri Kurri District Hospital	Additional nurses' quarters.
Lake Cargelligo Hospital	New buildings.
Macleay District Hospital	Nurses' quarters.
Mathoura District Hospital	New buildings.
Mudgee District Hospital	Isolation block.
Newcastle Hospital	Out-patients' and V.D. departments.
Orange District Hospital	Additions.
Parramatta District Hospital	New children's ward.
Parramatta Mental Hospital	Nurses' home.
Royal Prince Alfred Hospital	Casualty and clerical department.
Sydney Hospital	Additions to pathological department.
Wallsend M.D. Hospital	Complete hospital scheme.
Wollongong District Hospital	Additions to nurses' quarters.
Yass District Hospital	Alterations, additions, and remodelling.

Court-houses.

Griffith	New building.

Police Buildings.

Delungra	Office and constables' quarters.
Griffith	Lock-up and keepers' quarters.
Gulargambone	New police station and Court-house.
Maroubra Junction	New building.
Mortdale	New building.
Strathfield	New building.
Turramurra	New building.

Special Drawings.

The visit of their Royal Highnesses the Duke and Duchess of York was the occasion for the preparation of many drawings for ceremonial purposes and for street decorations. The City Railway, the Sydney Harbour Bridge, and the Zoological Gardens, at Taronga Park, also made considerable demands upon the time and skill of the staff.

Inspections, Valuations, and Reports.

As in former years, the Branch has made available to the Fair Rents Court, the Water, Sewerage, and Drainage Board, and the Sydney Harbour Bridge Resumptions the services of officers for the purposes of making inspections and valuations, furnishing reports and investigating claims as required.

Summary.

Plans prepared :—	
Originals	937
Copies	4,531
Total	5,450
Specifications :—	
Drafts	262
Copies	1,451
Total	1,713

Metropolitan District.

Court-houses.

Campsie.—The structure is of brick generally, with tiled roof; a central feature of the main front is a portico of handsome stonework. A commodious court-room, handsomely treated and well equipped, together with offices, is provided. Cost, about £7,350.

Katoomba.—A new court-room and offices to replace the old court-room, &c., total cost £5,166. The work has been carried out with stone walls and a slate roof. The whole premises are now an important feature in the architecture of this leading mountain resort.

Police Stations.

Lidcombe.—A new brick building, completed at a cost of £4,193, erected on a corner site, and comprising police living rooms, a charge room and cell provision.

State Hospitals.

Waterfall Sanatorium.—New boiler house and laundry, modern in all respects as regards planning and equipment, are in course of erection. The cost of the building only is approximately £6,764.

Parramatta Mental Hospital.—Residential quarters for the medical officer and the manager, comprising two cottages, were completed at a cost of £5,582. The structures are of brick with tiled roof.

Gladesville Mental Hospital.—A new residence of brick with tile roofing for the accommodation of the senior medical officer was erected at a cost of £2,880.

Subsidised Hospitals.

Marrickville District Hospital.—This building is in course of remodelling and extension, at a cost of approximately £20,000, comprising four new and modern wards for patients and a new morgue and boiler house structure, whilst the kitchen block is to be remodelled.

Blue Mountains District Anzac Memorial Hospital, Katoomba.—This institution has recently been completed at a cost of about £17,000. The new premises are situated on the Main Western Road, between Katoomba and Leura, and comprise an administrative and ward block, operating block, kitchen block, nurses' home, laundry, morgue and isolation blocks. Sewerage, hot water and steam services installed. The buildings are of brick with tile roof and Georgian style of architecture.

John Storey Memorial Dispensary.—The dispensary is erected to the memory of the late John Storey, a former Premier of New South Wales, and is situated in Regent-street, built in old Gothic style of architecture in brick and stone. The building is an adjunct to the operations of the Sydney Hospital, the cost of the premises being £6,570.

Tourist Resorts.

Jenolan Caves House.—An extensive addition has been made to the premises during the year; the work comprising an addition to the dining-room and the provision of further bedroom accommodation, costing about £7,340.

Hotel Kosciusko.—A new concrete building is in course of erection, making provision for housing the whole of the staff and for laundry and boiler requirements. The approximate cost is £22,000.

Buildings Generally.

National Library.—Additions are being carried out, comprising the Dixon wing, an extension to the south, and the Country Book Section, and extension to the east. The new work is of stone from the Maroubra State Quarries. The approximate cost is £60,000.

Wentworth House, Restoration.—Restoration and renovation works have been carried out at this historic building under the supervision of this Branch.

CONTRACTS COMPLETED OR IN COURSE OF ERECTION DURING YEAR COSTING OVER £500.

Particulars of Work.

	£	s.	d.
Balmain and District Hospital—new wards and alterations	5,823	9	8
Callan Park Mental Hospital—renovations, painting	809	0	0
Carrara Hospital—erection of attendant's cottage	1,545	5	3
Coast Hospital—repairs and painting lazarettes	1,253	5	7
Gladesville Mental Hospital—painting and renovations	1,409	0	0
,, ,, senior medical officers' quarters, erection...	2,880	18	8
Parramatta Medical Hospital—painting, &c.	2,159	0	0
,, ,, residences for Manager and Med. Officers	5,551	19	2
Rookwood State Hospital—extend fire service	1,811	15	6
,, ,, repairs and painting	1,133	6	6
Parramatta Mental Hospital—new water services	1,867	5	5
Girls' Industrial School, Parramatta—water services, fire and domestic...	685	0	0
National Art Gallery—pedestals for equestrian statues	1,063	6	0
Jenolan Caves House—extension of dining-room	7,340	18	0
Hawkesbury Agricultural College—refrigerating room, erection	1,001	11	6
Shakespeare Memorial, Botanic Gardens—removal and erection of gates	1,159	13	0
Lidcombe Police Station—erection	4,066	8	9
Blue Mountains Anzac Memorial Hospital—erection	17,094	10	0
Callan Park Mental Hospital—roof repairs	688	0	0
,, ,, buildings for Repatriation Department ...	11,531	14	11
Marrickville District Hospital—alterations, &c.	19,195	18	3
Manly Peace Memorial Hospital—erection	61,842	0	0
John Storey Memorial Dispensary—erection	6,569	11	2
Sydney Hospital—additional accommodation for medical officers ...	3,617	0	0
Royal Prince Alfred Hospital—isolation block, erection	10,167	0	0
Waterfall Sanatorium—laundry block and boiler house	6,763	6	11
Hotel Kosciusko—staff accommodation recreation hall	21,850	0	0
Campsie Court-house—erection	6,920	0	0
Burwood Court-house—alterations, &c.	1,193	10	10
Katoomba Court-house—alterations and additions	4,920	11	8
Cook's River Police Station—alterations	1,328	0	0
Mitchell Library, Dixon wing, &c.	57,540	0	0
Wentworth House—renovations	1,250	0	0
Waterfall Sanatorium—open-air wards	558	0	0
,, ,, additional dormitories	1,500	0	0
Long Bay Penitentiary—warder's cottage	1,055	0	0

	£	s.	d.
Jenolan Caves House—erection, chilling block	1,300	0	0
Wentworth House, Vaucluse—new conveniences	800	0	0
Old Government House, Parramatta—renovations	591	15	0
Long Bay Penitentiary—water service installation	811	14	0
Parramatta Gaol—renewal, eaves gutters	565	0	0
Penrith Police Buildings—erection of residence for Officer-in-Charge ...	1,361	18	0
Rookwood State Hospital—erection night nurses' quarters	1,426	0	0
Metropolitan Boys' Shelter—cubicles, laundry and observation room ...	591	17	3
Children's Court—additions and alterations	4,360	2	9
Valuer-General's Dept.—arrangement of new offices in Phillip House ...	668	12	9
Prince of Wales Hospital, Randwick—repairs and painting; auxiliary for Coast Hospital...	574	14	5
Public Works Dept.—installation of automatic telephones, alterations ...	534	0	0
,, ,, alterations to ladies retiring room, H.O.	610	0	0
Police Traffic Offices—alterations	2,763	10	0

Country Districts.

District Office Returns.

The Officer administering the work carried out by the District Officers reports the following particulars of expenditure on architectural work during the year :—

District.	Public Works Department Buildings.			Education Department Buildings.		
	£	s.	d.	£	s.	d.
Armidale	2,917	10	1	19,820	3	4
Bathurst	73,536	12	9	32,691	17	8
Broken Hill	4,994	11	5	2,555	13	1
Bourke	385	18	0	13	6	11
Coff's Harbour	445	16	0	2,450	18	0
Cootamundra	25,216	17	8	39,244	16	5
Dubbo	5,924	13	3	1,525	16	6
Goulburn	6,815	15	2	28,166	13	7
Hay	1,386	9	0	98	5	1
Kempsey	2,840	18	10	10,504	17	5
Lismore	16,533	0	10	10,464	17	0
Moree	2,411	10	7	1,414	4	8
Newcastle	39,215	1	4	23,066	11	7
Port Kembla	7,976	1	6	20,501	16	0
Tamworth	3,163	5	1	8,138	18	11
Totals	£193,764	1	6	£200,658	16	2

Country Works Costing over £500 completed or in Course of Construction during the Year.

	£	s.	d.
Casino Court-house—repairs, &c.	736	0	0
East Maitland Gaol—roof repairs	677	5	0
Merewether Police Station—erection	3,025	0	0
Port Macquarie Pilot Station—additions	665	10	0
Bombala Court-house—repairs	640	0	0
Tweed Heads Police Station—repairs, &c.	1,727	0	0
Bombala Hospital—tank and stand	620	0	0
Orange Mental Hospital—water supply	1,500	0	0
,, ,, ,, —sewers, &c.	2,500	0	0
,, ,, ,, —fencing	600	0	0
,, ,, ,, —matron's cottage	2,004	16	10
,, ,, ,, —gate-keeper's cottage	2,127	7	3
,, ,, ,, —kitchen and laundry block	17,938	7	9
,, ,, ,, —four ward blocks	46,835	3	4
Dubbo Court-house—repairs, &c.	929	0	0
Broken Hill Police Barracks—recreation room	922	0	0
Portland Hospital—additions	687	10	0
Tenterfield Hospital—nurses' quarters	2,790	0	0
Dunedoo Court-house—erection	2,330	10	0
Kurri Kurri Hospital—boiler house	812	0	0
Burrowa Hospital—nurses' quarters	1,523	10	0
Broken Hill Police Station—N.C.O.'s quarters	3,023	16	0
Gundagai Hospital—additions	704	19	2
Lismore Hospital—isolation block	6,665	0	0
Orange Land Board Office—alterations	641	12	0
Kenmore Mental Hospital—repairs	718	2	1
Wellington Hospital—additions	1,960	10	0
Collarenebri Hospital—maternity block	1,280	10	0
Young Court-house—erection...	11,997	0	0
Grafton Land Board Office—additions	1,392	0	0
Coonamble Hospital—X-ray room	720	0	0

	£	s.	d.
Deniliquin Hospital—sewers, &c.	1,390	0	0
Berrima District Hospital—isolation block	3,563	17	6
Tamworth Hospital—additions	8,975	0	0
Kurri Kurri Hospital—additions, &c.	17,898	5	0
Dubbo Hospital—additions	7,949	0	0
Lismore Works Office—additions	1,580	0	0
Cessnock Hospital—sewerage	833	0	0
Yeoval Police Station—new cells	825	3	0
Tamworth Police Station—additions, &c.	1,516	18	0
Hay District Hospital—additions, &c.	899	10	0
Bathurst Gaol—sewerage	2,785	7	0
Spring Hill Police Station—erection	2,599	0	0
Blayney Hospital—sewerage	759	0	0
Abermain Police Station—erection	2,578	0	0
West Wyalong Police Station—officer's quarters	2,878	16	5
Ganmain Court House—erection	5,748	2	3
Broadmeadow Police Station—erection	2,080	0	0
Wollongong Works Office—erection	3,805	6	1
Lawrence Police Station—erection	2,200	0	0
Maclean Hospital—kitchen block, &c.	2,183	8	4
Kyogle Court-house—erection	5,344	0	0
Dubbo Hospital—additions	1,010	10	0
Bombala Hospital—additions	689	10	0
Ardlethan Police Station—erection	5,282	12	0
Cowra Hospital—alterations, &c.	587	10	0
Bathurst Hospital—additions	2,548	0	0
Kyogle Police Station—erection	4,479	7	6
Culcairn Police Station—erection	5,500	2	5
Muswellbrook Police Station—additions	2,936	0	0
Glen Innes Hospital—new ward	1,995	10	0
Goulburn Gaol—sewerage	4,848	13	4
Orange Police Station—additions, &c.	1,151	11	0
Murrumburrah-Harden Hospital—erection	8,991	19	5
Mundooran Police Station—erection	2,026	0	0

Engineering Division.

The total value of the works undertaken during the last financial year is as follows :—

	£	s.	d.
Works completed	36,702	10	1
Works in hand	72,435	17	11
Recommendations, reports and estimates in regard to engineering proposals	112,844	14	1

The increase in the two sections on the previous year is as follows :—

Electrical works, 40 per cent.
Mechanical works, 22 per cent.

Total increase of all engineering work during last financial year—32 per cent.

The increases mentioned are due almost entirely to :—

(*a*) The increasing application of electricity and fuel in State Hospitals and other similar institutions.

(*b*) A distinct and unmistakable disposition on the part of other Departments and Hospital Committees to avail themselves of the engineering advice and assistance of the Branch to an increasing extent.

The second factor mentioned above is due in no small measure to the work of the Fuel and Lighting Committee and the saving effected in a number of the State Hospitals during the last financial year.

R. M. SEYMOUR WELLS,
Government Architect.

Sydney Harbour Bridge Branch.

Report for the year ended 30th June, 1927.

I have the honor to submit the following report on the work of this Branch for the year ending 30th June, 1927 :—

1. Construction of the Northern Approach.

(a) Tunnels.

The double track tunnel for the Up and Down Shore tracks, which bifurcates near North Sydney Station, was excavated and lined with concrete with the exception of the side drains.

The single track tunnel from North Sydney for the Down Shore Local was completed, and the offtake for the Down Mosman flyover was excavated and the side walls concreted.

The portal near Bank-street for the pair of double track tunnels was completed, and a granite block dated " 1927 " placed in position.

During the year 13,941 cubic yards of rock were excavated, and 6,807 cubic yards of concrete placed in position.

The flyover section of the offtake for the Down Mosman tunnel was cleared to the roof of the Up and Down Shore Local tunnel and concrete, heavily reinforced, placed in position.

The construction to the Western End of North Sydney station is now practically complete.

(b) Open Cut Excavation.

Excavations in open cut were made from Miller-street to Fitzroy-street; the heaviest sections being the cutting from Walker-street to Little Walker street, deviation of Arthur-street, abutments for Arthur-street Arch, retaining walls near Arthur-street, and the retaining wall from McDougall-street to Burton-street.

The quantity of open cut excavation during the last twelve months amounted to 20,080 cubic yards.

(c) Concrete Work.

The retaining wall from McDougall-street to Burton-street, with the exception of one panel, has been completed, also the stairways near the site of Kirribilli Station. This wall is approximately a quarter of a mile long and its completion will enable a new road to be constructed from Broughton-street to Junction-street which it is anticipated will be opened for traffic in 1928. This road will then allow all the vehicular traffic from Jeffrey-street to be routed direct to Junction-street, and will permit of easier construction of the bridges to be built near Alfred-street.

The abutments of the Arthur-street Arch were partly concreted.

The total quantity of concrete placed in position, including incidental works such as sumps, drains, causeways, piers, &c., amounted to 4,269 cubic yards.

The total quantity of concrete placed in position for the Northern Approach, including the tunnels, during the year amounted to 11,076 cubic yards, requiring 33,687 bags of cement. The aggregate used for the greater proportion of this concrete was crushed selected sandstone from the tunnels; the sand being a mixture of crushed sandstone and Nepean sand.

(d) Alterations to Existing Services.

Water mains and gas mains were cut and capped at Willoughby, Arthur and Walker streets. Telephone lines were removed from Milson and Little Walker streets. Electric underground cables were removed from Arthur and Willoughby streets. Overhead power lines were removed from Willoughby-street to McDougall-street. Electric light poles were removed from Willoughby, Milson, Walker and McDougall streets, and where possible placed on their future alignments.

(e) Resumptions and Demolition of Property.

Properties to the number of 178 and also odd walls, racks, sheds, &c., were disposed of by auction, the gross receipts being £5,459 2s. 3d.

At the end of March Messrs. Dorman, Long & Co. were given possession of the remainder of the land required for the purposes of their contract at Milson's Point.

The total amount paid for land resumption, including the Southern Approach, together with compensation, is as under :—

	£	s.	d.
To 30th June, 1926	365,330	12	0
1st July, 1926, to 30th June, 1927	278,799	7	2
Total	£644,129	19	2

(f) General.

There were a large number of incidental works carried out in connection with the construction of the Northern Approach, such as storage bins for sand and crushed stone, construction of cement storage shed with unloading platforms and lorry dock, erection of office at Dorman, Long and Co.'s workshop for the steelwork inspectors, building carpenters' sheds and stores. Fixings for the electrification of the North Shore line to the Bank-street bridge, and in the tunnels, are now almost complete.

The average number of men employed was 160. Although a difficulty has been experienced in obtaining vacant possession of resumed property as required, satisfactory progress has been made with the construction of the Northern Approach.

2. Contract of Dorman, Long & Co.

(*a*) *Excavation, Concrete and Masonry.*

During the year the Approach Span Piers have been completed, with the exception of Piers Nos. 17 and 18 of the Northern Approach, and good progress made with the Southern abutment tower.

The coal strike in England delayed the arrival of steel plates, and the original programme for the construction of the Approach Span Piers had to be varied. The original intention was to build each pair of piers after the falsework had been erected up to the site of the piers, but as this would have ultimately delayed the erection of the steelwork whilst the Piers were being completed, Piers Nos. 5, 6, 7, and 8 on the Southern side and 15, 16, 17, and 18 on the Northern side were erected by using a special crane for each set of Piers.

The excavations for the skewbacks and the abutment tower at Dawes Point had been completed last year and a commencement made to place concrete in the skewbacks. This has now been completed and the walls of the tower built to R.L. + 54. The granite masonry of the walls commences at R.L. + 7·5 and up to R.L. + 27·5 the granite was set and the concrete placed behind. Above the latter level this method of construction was modified as Moruya Quarry could not supply the granite facing in sufficient quantities to keep pace with the concreting. The concrete walls of the tower are carried up as a shell 3 feet 6 inches thick with steel reinforcement. The masonry was set in position as it arrived, and the space between the masonry facing and the concrete shell walls filled with concrete. At the end of June, 1927, the masonry facing had been built to R.L. + 38. To protect the apron stones from damage they have been covered with sandbags which will remain in position until the completion of the abutment tower.

During the year one of the most critical phases of the construction of the Bridge was completed, viz., the erection and concreting in position of the two main bearings at Dawes Point. Each of these bearings weighs 296 tons. They were assembled in sections on specially built cradles. The erection of the south-east bearing commenced on 25th March, 1927, and the steelwork was completely erected on 23rd April with the placing of the upper saddle. The erection of the south-west main bearing was commenced on 9th May and was completed ready for concreting on 20th May.

All sections of the bearings had been most accurately machined and came together with a perfect fit. After erection, the bearing was supported by hydraulic jacks at the four corners and brought in to correct alignment to 1/64" by instruments mounted on a concrete tower, specially constructed for the purpose, at the intersection of the centre line of the Bridge and the centre line of the main arch pins. The next stage was to concrete under the bearing. Heavy reinforcement was placed in position, also special devices to prevent any movement of the bearing should the jack slip, the jacks being fitted with screw collars on the rams to lock them at any required position of the stroke. The concrete was placed in one continuous pour of fifteen hours for the first bearing and fourteen hours for the second. The quantity of special concrete under each bearing is 157 cubic yards, and is a mix of special cement supplied by the Kandos Cement Co., Nepean Riversand and graded crushed granite, the proportions being 1 cement, ¾ Nepean sand and 2¼ granite aggregate. Field tests of this concrete show a high crushing strength, at twenty-eight days varying from 5,700 to 7,000 lb. per square inch.

At Milson's Point owing to the scarcity of aggregate the only work done on the abutment tower was to concrete the walls at the south-west corner and the skewbacks to within a foot of the finished level.

The following quantities show the amount of Civil Engineering carried out during the year:—

	cub. yds.
Earth excavation	29
Rock excavation	3,189
No. 1 concrete	34,115
No. 2 concrete	4,324
Granite masonry	3,783

(*b*) *Fabrication of Steelwork.*

During the year there were 6,193 tons of carbon steel delivered to the workshops at Milson's Point, 3,643 tons coming from Middlesborough, England, and 2,550 tons from the Broken Hill Proprietary Co's. Works at Newcastle. The steel deliveries were considerably affected by the coal strike in England and fabrication was thereby delayed.

The rivets are being made by Messrs. McPherson's Pty. Ltd. of Melbourne, contracts having been placed by Messrs. Dorman, Long & Co. for 1,000 tons.

The first consignment of shop paint was delivered in June, 1926, and to the end of June, 1927, 2,315 gallons have been delivered. The paint is manufactured by Messrs. Lewis Berger Ltd., Rhodes, Sydney.

The total weight of material fabricated in the shops during the year was 4,914 tons, with 612 tons in February and in June of this year as the highest monthly output.

The graph herewith shows the quantities of material delivered, fabricated, erected in place and completely riveted in place since the first steel delivery.

The first shop rivet was driven on the 12th June, 1926.

(*c*) *Erection of Steelwork.*

Falsework for Spans Nos. 1 and 2 at Dawes Point and Span No. 6 at Milson's Point had been placed in position previous to July, 1926, but owing to non-delivery of plates from England it was not until 28th October, 1926, that the first steelwork was placed in position for Span No. 1.

On the 30th June, 1927, Spans Nos. 1 and 2 were completely erected with the exception of some of the light deck material and Span No. 3 was nearing completion. The erection of Span No. 6 on the Northern side was commenced on 16th June, 1927, one panel being completed as shown in the photograph.

The falsework has been removed from under Span No. 1; the fences removed from George-street North and York-street and the roadway and footpath surfaces repaired. The falsework from Span No. 1 was used for Span No. 3 and the falsework being removed from Span No. 2 is being re-erected for Span No. 4.

To place in position the light deck steelwork, an electric derrick crane previously used to construct the piers, has been erected on the roadway troughing of Span No. 2; a similar method will be adopted at Milson's Point.

To enable the final tint of the finishing coat of paint for the steelwork to be determined, six sheets of steel were painted with the shop paint and first field coat and then finishing coats tinted differently were applied to the various sheets. These were painted in August, 1926, and will remain exposed to the weather until it is necessary to make the selection of colour for the finishing coat. The paint will be as specified when tenders were called in 1923.

(d) Moruya Quarry.

During the year a new crusher has been installed to take blocks of granite 36 inches by 42 inches and this has considerably improved the output of concrete aggregate; two of the freighters, however, are still adequate to cope with the carriage of material from Moruya to Sydney.

In March, 1927, Sir Bertram Mackennal arranged for Dorman, Long & Co., to carry out the construction of the granite pedestal for the Anzac Memorial to be erected in Martin Place. At the request of Sir Bertram Mackennal, with the concurrence of the Minister for Works, I arranged for the stonework and supervised its erection. There are twenty-three stones in the granite pedestal and every care was taken to assure that any black and white markings in the granite would be inconspicuous.

(3) Construction of the Southern Approach.

The construction of the Southern Approach commenced on the 6th October, 1926. The major portion of the work has been confined to excavation between Grosvenor and Margaret streets, but up to date this has been slow on account of operations being hampered by the delay in deviating under-ground services and the time taken to demolish Scots Church and the St. Phillip's Church Schoolroom.

(a) Excavation.

The excavation so far is chiefly the open cut excavation between Grosvenor-street and Margaret-street; in addition there were trenches for water and gas mains, telephone and electric cables, deviation of Margaret-lane, foundations for compressors, &c. The total quantity of excavation from the commencement of operations in October, 1926, to 30th June, 1927, amounted to 13,113 cubic yards.

(b) Concrete Work.

The concreting for the Southern Approach has been as yet confined to minor works and amounts to only 100 cubic yards in all.

(c) Alterations to Existing Services.

A 12 inch water main was deviated from York-street and a 6 inch main from Margaret-lane.

Telephone cables were deviated in York-street and electric mains were deviated between Grosvenor-street and Margaret-street.

Other service removals include street lights, taxi-phone box and drinking fountain. In all the above cases the excavation and backfilling were carried out by this Branch.

(d) Resumption and Demolition of Property.

During the year 107 properties have been sold for demolition, the gross proceeds amounting to £1,605 12s. 6d. In December, 1926, the Scots Church, erected over one hundred years ago, was sold and has since been demolished.

(e) Tunnels.

The four single-track tunnels under Margaret-street from Wynyard Station have been carried out by the Metropolitan Railway Construction Branch and are now almost completed.

The Up Shore Local and the Down Shore Local were excavated and completely concreted for a length of 60 feet. The Up Shore and the Down Shore were excavated and are now almost completely concreted for a distance of approximately 180 feet.

The work as carried out comprised 5,581 cubic yards of excavation, 1,005 cubic yards of concrete lining and 87 lineal yards of roadbed.

(f) General.

As on the northern side of the Harbour difficulty has been experienced in obtaining possession of the properties when required, but vacation of property is now proceeding satisfactorily. The average number of men employed since the commencement of operations has been 50. In addition to the work mentioned above, there has been a considerable amount of preliminary work such as fencing (approximately 1,250 lineal feet), the building of compressor sheds and the installation of compressors, cooling towers, circulating pumps and air receivers, and the erection of a smith's shop and magazines.

(4) Financial Review.

(a) Land Tax.

To defray one third of the capital cost of the Land Resumptions and Construction of the Bridge and Approaches, a land tax of one half-penny in the pound has been imposed on the Unimproved Capital Value of all land situated within the city of Sydney, the Municipalities of North Sydney, Mosman, Manly, Lane Cove, and Willoughby, the Shires of Warringah and Ku-ring-gai and portion of the Shire of Hornsby.

The tax was first imposed in the year 1923; the rates due for the years 1923-27 are as shown in table below. Of this amount up to 30th June, 1927, £542,492 19s. 11d. was paid to the Special Deposit Fund, leaving a balance of £175,158 11s. 8d. to be paid before 31st December, 1927.

The table shows the details of the rates due since the tax was first imposed, the payments to 30th June, 1927, and the balance outstanding at 30th June, 1927.

(*b*) *Expenditure.*

The total expenditure up to 30th June, 1927, is shown in the following table. It is seen that on Dorman Long & Co's., contract for the main bridge and steel approach spans the wages variation to date is slightly less than 9 per cent. of the total amount paid for construction. The total cost of the Bridge and Approaches to date, including all expenditure prior to 1st July, 1923, is £1,852,240 18s. 2d.

RATE LEVY—Payments and Outstanding Amounts to 30th June, 1927.

	Rates Due.						Payments to 30th June, 1927.	Balance Outstanding at 30th June, 1927.
	1923.	1924.	1925.	1926.	1927.	Total.		
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
City Council	74,035 19 0	91,666 4 1	92,140 5 0	92,312 6 1	127,756 18 0	478,120 12 2	347,192 9 0	130,928 3 2
Hornsby Shire Council ...	3,072 18 6	3,203 11 0	3,326 17 9	3,348 5 6	3,872 0 7	16,823 13 4	14,214 16 9	2,608 16 7
Ku-ring-gai Shire Council ...	6,259 11 2	6,625 0 7	7,703 0 5	7,739 4 8	7,950 6 1	36,277 2 11	32,326 16 10	3,950 6 1
Lane Cove Municipal Council...	2,400 6 10	2,440 14 1	2,440 0 6	3,012 1 11	2,993 19 6	13,287 2 10	11,472 2 10	1,815 0 0
Manly Municipal Council ...	5,051 12 1	6,362 16 8	6,437 19 6	6,494 8 4	7,533 8 4	31,880 4 11	24,889 13 10	6,990 11 1
Mosman Municipal Council ...	5,357 7 6	5,854 17 3	5,850 3 4	5,900 4 0	6,764 4 2	29,726 16 3	25,437 12 10	4,289 3 5
North Sydney Municipal Council.	9,646 10 2	9,699 12 4	10,943 12 1	10,838 14 3	10,692 7 10	51,820 16 8	42,743 3 11	9,077 12 9
Warringah Shire Council ...	3,919 10 7	4,661 2 7	5,707 7 2	7,022 12 1	7,056 16 4	28,367 8 9	20,944 1 10	7,423 6 11
Willoughby Municipal Council	5,024 10 2	5,294 11 4	5,389 14 5	7,831 11 10	7,897 6 0	31,347 13 9	23,272 2 1	8,075 11 8
	114,768 6 0	135,808 9 11	139,948 0 2	144,699 8 8	182,427 6 10	717,051 11 7	542,492 19 11	175,158 11 8

EXPENDITURE to 30th June, 1927.

Work.	To 30th June, 1923.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Main Bridge—Salaries, &c.	*17,058 7 4	1,581 5 9	15,821 18 8	12,703 0 0	16,120 17 10	63,285 9 7
Dorman, Long & Co.'s Contract	.....	.....	6,769 4 2	100,029 14 6	450,265 2 1	557,064 0 9
Dorman, Long & Co.—Wages Variation.	.....	.....	.....	10,101 13 5	38,827 8 8	48,929 2 1
Northern Approach	.....	91,651 13 6	103,503 3 2	58,758 8 6	62,493 13 2	316,406 18 4
Southern Approach	.....	.....	.....	30,375 10 0	23,767 13 11	54,143 3 11
Resumptions	.....	46,195 0 6	73,753 8 7	245,382 3 5	278,799 7 2	644,129 19 2
Lavender Bay Station	.....	43,730 18 0	58,704 9 2	3,274 5 6	4,535 19 4	110,245 12 0
Interest on expenditure	.....	.....	.....	22,619 19 3	35,266 13 1	57,886 12 4
Road at Moruya.....	.....	.....	.....	150 0 0	.....	150 0 0
Totals	17,058 7 4	183,158 17 3	258,552 3 9	483,394 14 7	910,076 15 3	1,852,240 18 2

*This amount includes all costs involved from the inception of the work in 1900 to 30th June, 1923.

(5) CONCRETE TESTS.

Further long-date tests of concrete cubes for special granite concrete were carried out as under :—

Special Granite Concrete No. 2.

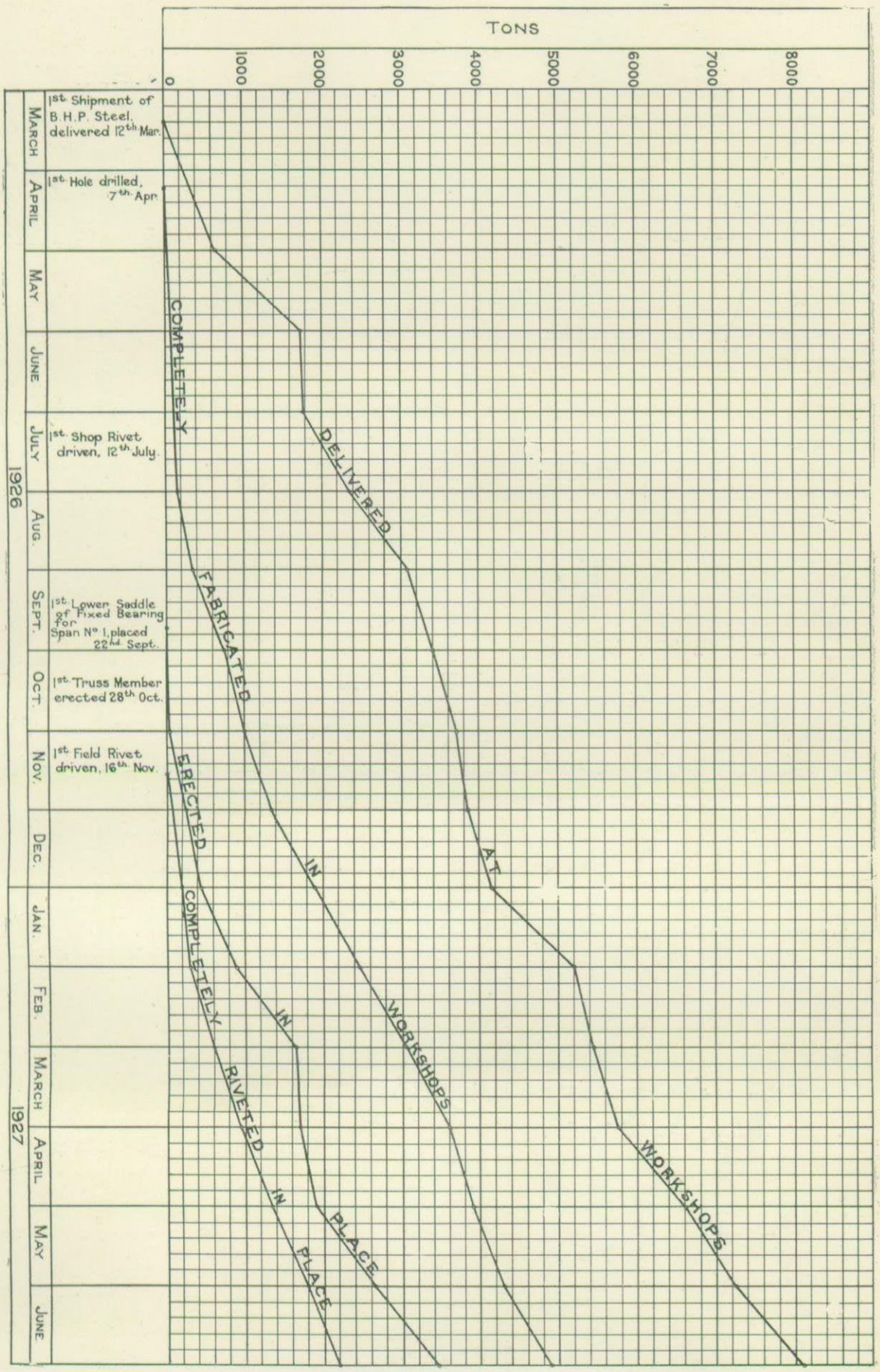
Mix.	Age.	Compression Strength.	
		Tons per sq. ft.	Lb. per sq. in.
1 : 1⅛ : 2½	13 days	302	4,700
1 : 1¼ : 2½	13 ,, ...	347	5,400
1 : 1⅜ : 2½	13 ,, ...	328	5,100
1 : 1¼ : 3	13 ,, ...	391	6,100
1 : 1½ : 3	13 ,, ...	308	4,800
1 : 1¾ : 3	13 ,, ...	281	4,400

As a result of the above tests it was decided to use the 1 : 1¼ : 3 mix for special concrete No. 2, forming the second layer of concrete beneath the main bearings, that is, below the special concrete No. 1.

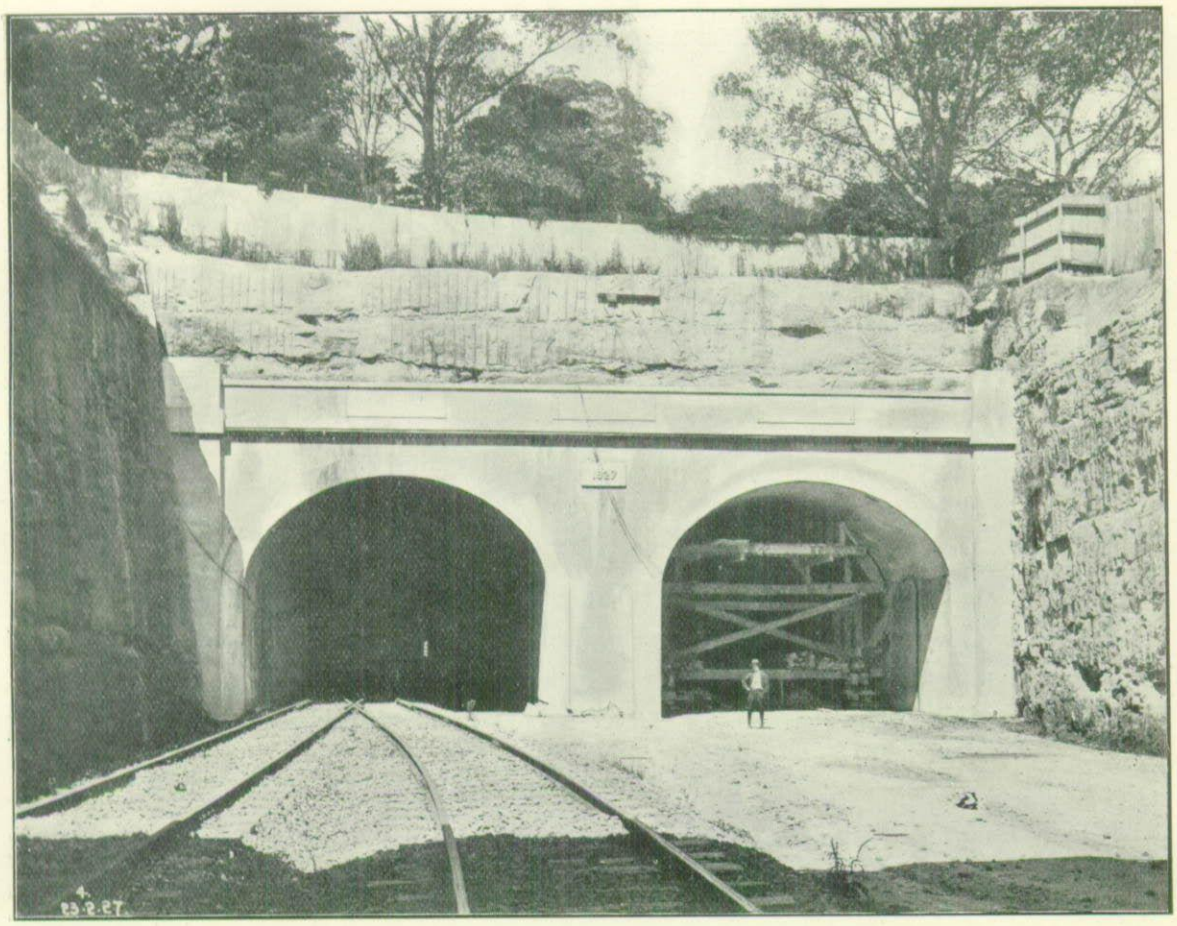
Special Concrete No. 1.

For the layer of concrete directly beneath the main bearings a further series of cubes of a rich mix were tested. The results of tests are as under :—

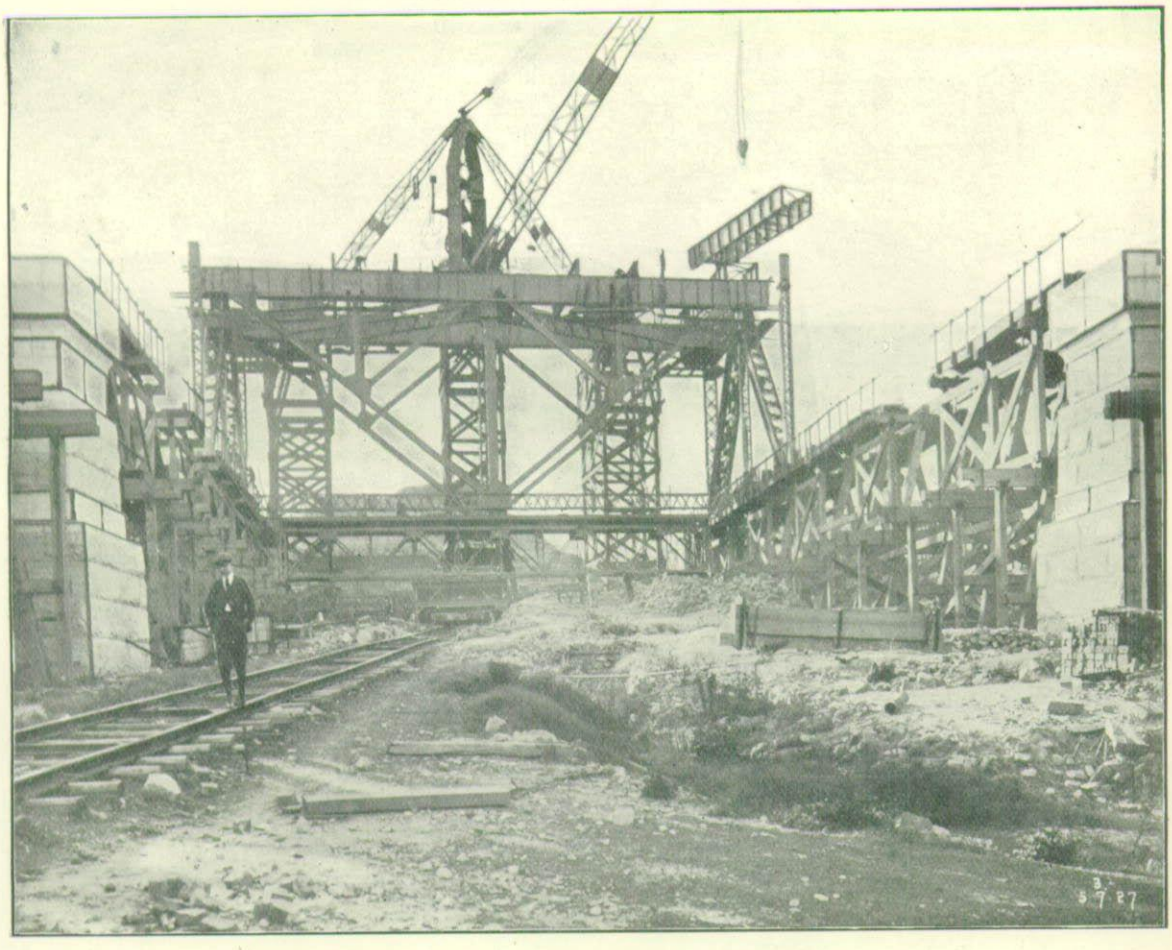
Mix.	Age.	Compression.	Strength.
		Tons per sq. ft.	Lb. per sq. in.
1 : ¾ : 2¼	28 days	436	6,800
	3 months	517	8,000
	6 ,, ...	545	8,500



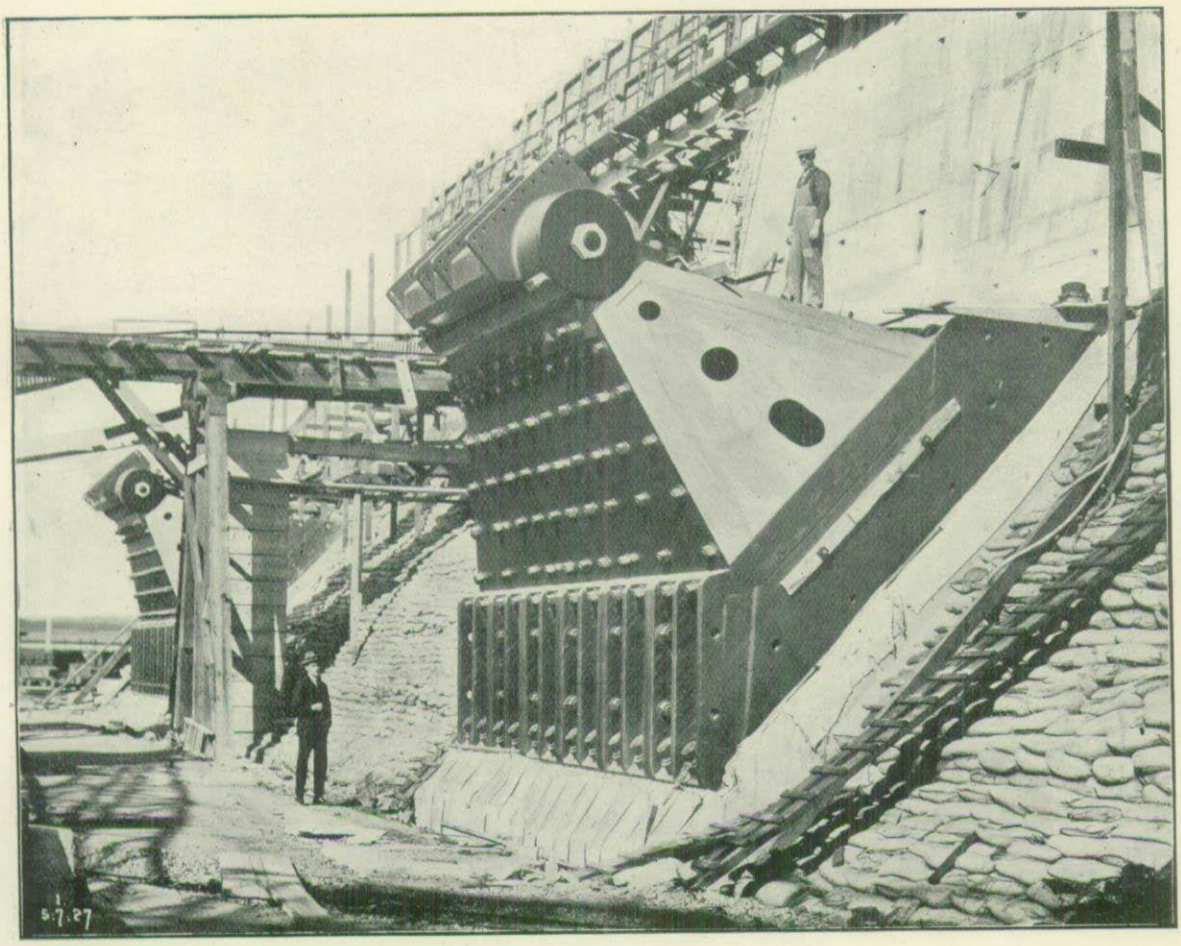
Graph, showing the quantities of Steelwork delivered, fabricated, erected in place, and completely riveted in place, since the first Steel Delivery.



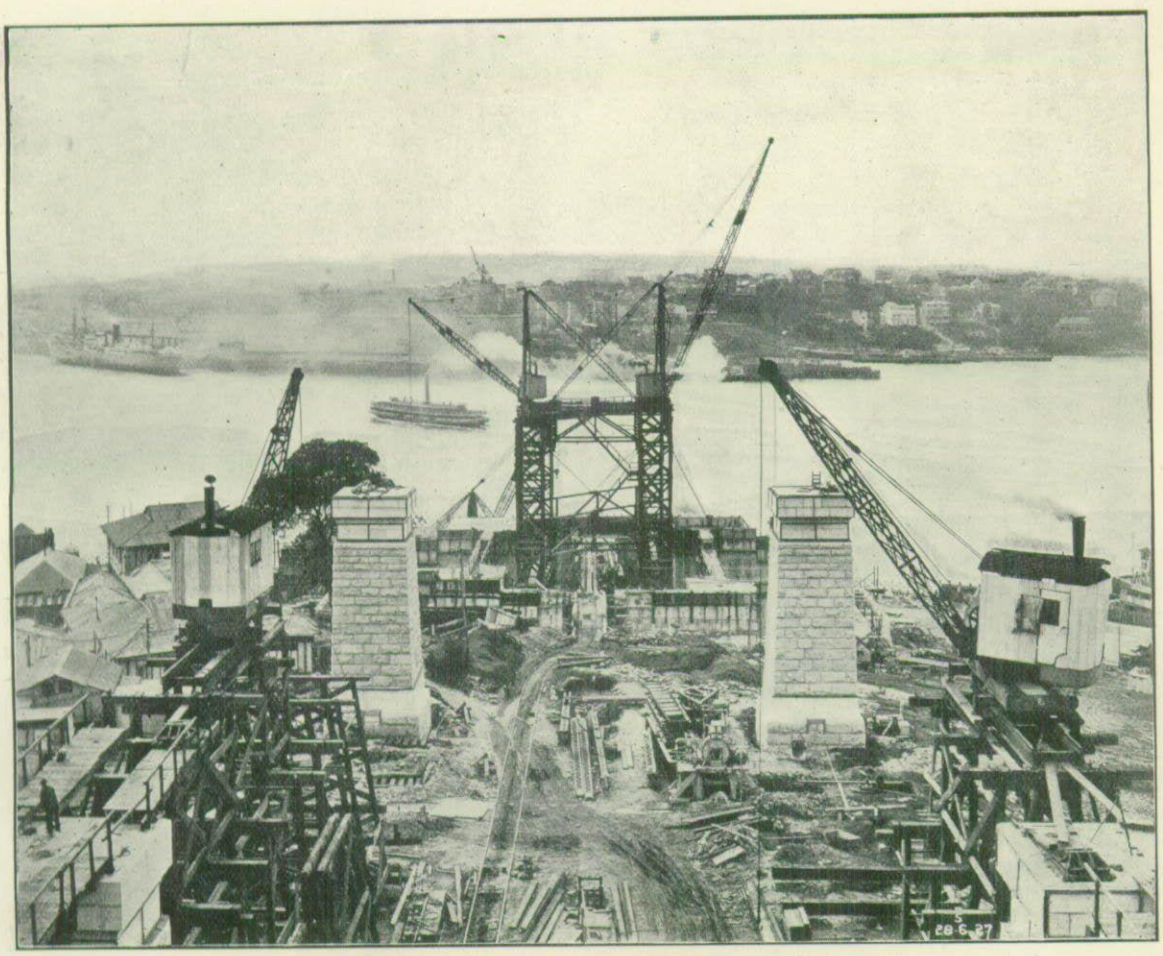
The portal near Bank-street for the Two Double Track Tunnels.



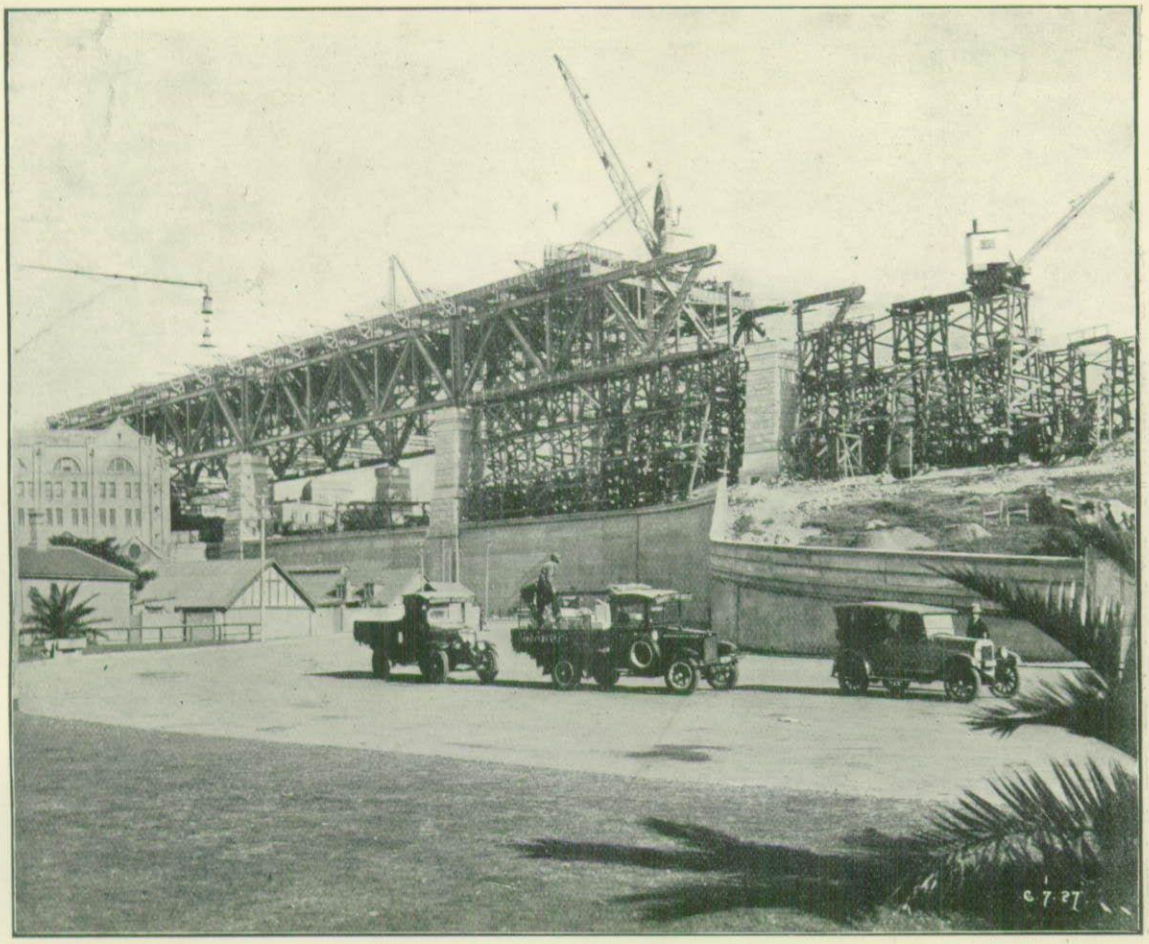
Span No. 6 of the Northern Approach at 30th June, 1927.



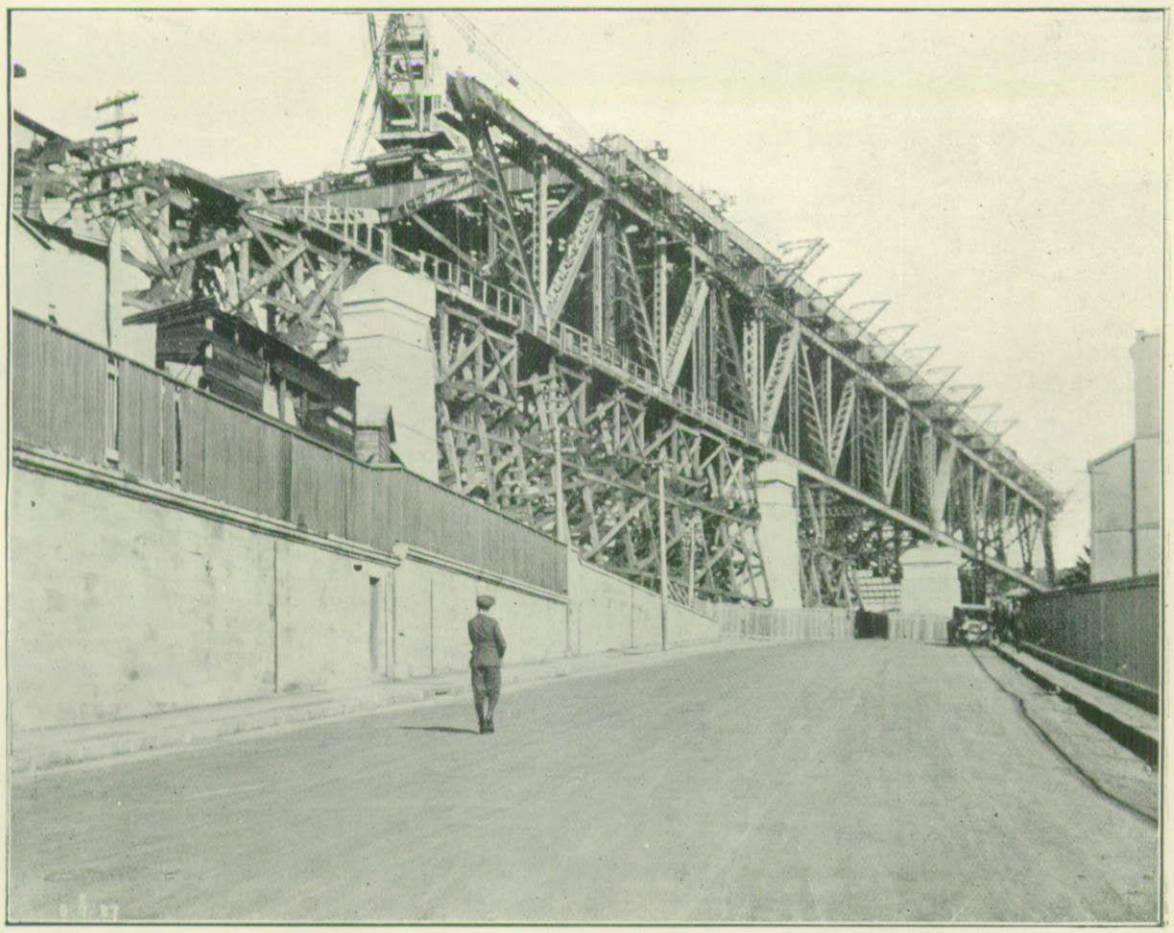
The Southern Main Bearings completely erected.



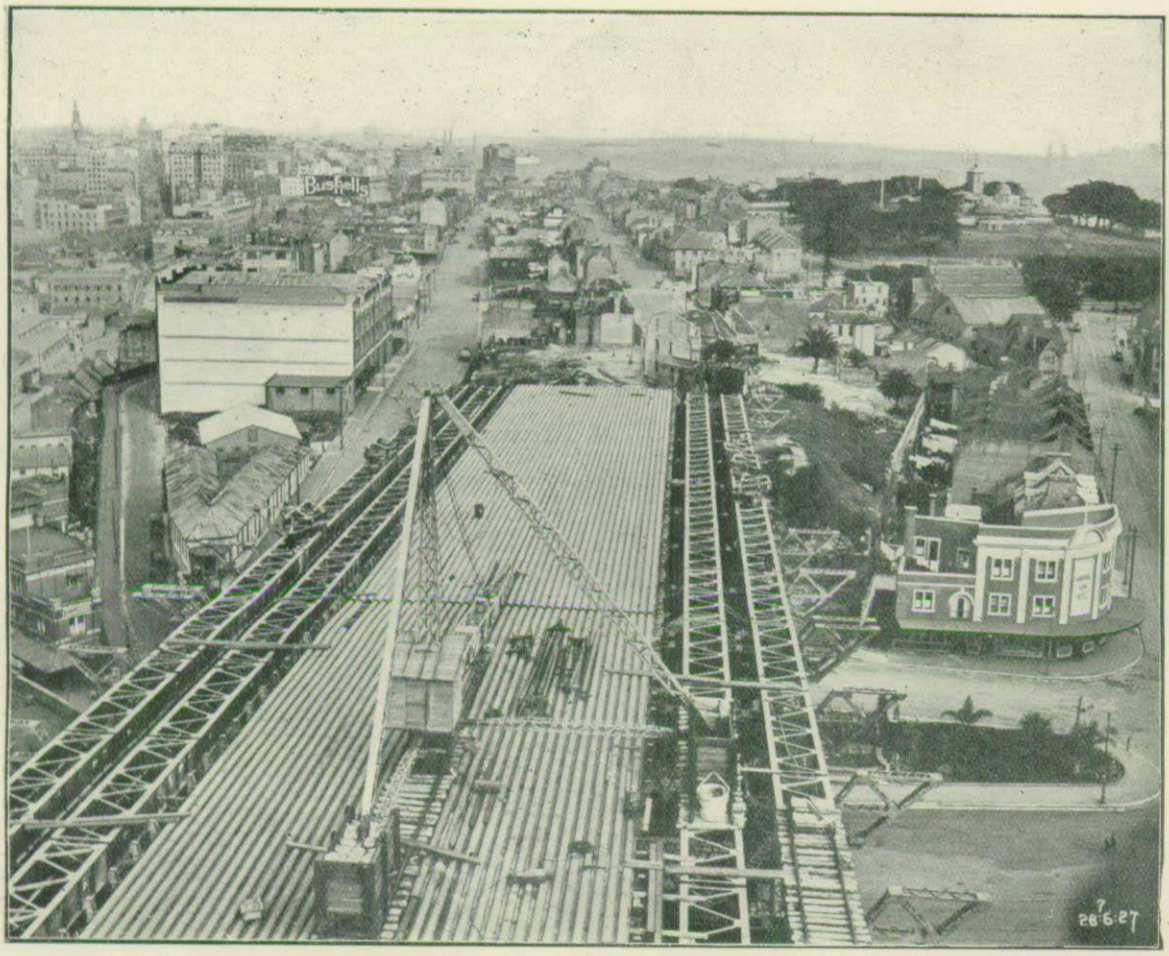
View from Steelwork looking towards Milson's Point.



The Southern Approach Spans from Hickson-road.



The Southern Approach Spans from the end of George-street North.



View of Steelwork and property to be demolished for the Southern Approaches, taken from the jib of the 25-ton erection crane.

This concrete was made with special high-strength cement, giving a compression strength in 3 : 1 mortar at twenty-eight days combined air and water hardening of over 7,000 lb. per square inch, and the high strength achieved ensures a factor of safety of at least ten against the thrust from the main arches applied at the bases of the bearings. Field cubes taken from the concrete poured to date on testing give practically the same results.

(6) Street Widenings and Extensions.

In May last at the request of the Premier I was authorised to report upon the practicability of extending Martin Place westward from George-street to York-street and the widening of York-street from Wynyard-street to Druitt-street; the widening of York-street from Grosvenor-street to Wynyard-street is being carried out under the Bridge Act.

Various schemes were investigated in detail from the point of view of traffic facilities and finance. I recommended the extension of Martin Place from George-street to York-street and the widening York-street from Wynyard-street to Druitt-street.

Subsequently Cabinet decided not to extend Martin Place but to widen York-street from Wynyard-street to Druitt-street to 81 feet, thus providing a widened York-street from the Bridge Crescent near Grosvenor-street to the Town Hall.

(7) Staff.

The number of men directly employed on the bridge and approaches as at 30th June, 1927, was approximately 1,250. Dorman, Long & Co. employed 250 at Moruya, while over 700 are employed at Sydney in the workshops, placing concrete and masonry and erecting steelwork. The Sydney Harbour Bridge Branch of the Public Works Department now has over 300 men on the approaches, and arrangements are being made to augment this number.

I desire to place on record my appreciation of the work of the staff during the past year.

J. J. C. BRADFIELD,
Chief Engineer, Sydney Harbour Bridge.

49051—E

Survey Drafting Branch.

I have the honor to submit herewith my report on the work carried out by this Branch during the financial year ended 30th June, 1927, and to state that general survey drafting, heliographing, plan mounting and recording have been carried out in connection with the following schemes:—

Murray River Waters Act.

No. 12 Lock and Weir.

Country Towns Water Supply.

Armidale, Ballina, Barellan, Bega, Berry, Blackheath, Brewarrina, Broken Hill, Cargellico, Cootamundra, Culcairn, Goulburn, Junee, Katoomba, Kyogle, Leura, Lithgow, Mathoura, Medlow Bath, Mittagong, Molong, Nowra, Orange, Singleton, South West Tablelands, Wallerawang, Walcha, Wauchope, Werris Creek, Wombeyan Caves, Woy Woy, and Yass.

Sewerage.

Albury, Balranald, Broughton Hall Mental Hospital, Canterbury-Bankstown, Cessnock, Dubbo, Forbes, Gosford Farm Homes, Gosford, Goulburn, Grafton, Hay, Katoomba, Lidcombe-Auburn and Granville, Lismore, Lithgow, Liverpool Court-house Extension, Maitland Hospital, Manilla Hospital, Narrandera, National Park Accommodation House, Newcastle Amplification, Northern Suburbs Ocean Outfall, Nyngan District Hospital, Parkes, Singleton, Tamworth, Taree Hospital, and Yanco Agricultural High School.

Stormwater Channels.

Adamstown, Lambton, Lidcombe, Narrandera, Newcastle, Rockdale, and Rookwood.

National Roads.

Woodenbong to Queensland Border, and Jenolan Caves to Wombeyan Caves.

Bridges.

Castlereagh River at Coonamble, Emigrant Creek near Ballina, Lachlan River at Collett's Crossing, Mortlake-Putney Punt Site, Murrumbidgee River at Taemas, Nepean River at Douglas Park, and Sydney Harbour Bridge.

Harbours and Rivers.

Bellingen River, Botany Bay, Bungawalbyn Creek (Richmond River), Coast Charts of New South Wales, Coff's Harbour, Cook's River, Hunter River, Newcastle Harbour, Port Kembla Harbour, Popran Creek, and river entrances of New South Wales.

Swamp Drainage.

Bolwarra Drainage Union.

Electric Schemes.

Apsley River, Barren Jack, Kiama to Nowra, Port Kembla to Kiama, and Yarrowitch River.

Public Watering-places.

Plans and descriptions have been prepared in connection with the establishment of fifteen watering-places, four others were wholly revoked and twenty-three partly revoked.

General.

Miscellaneous drawings, including plans, sections, diagrams, capacity curves and tables, totalling 214 have been prepared, together with 305 plans and descriptions for resumptions, easements, appropriations, &c., also thirty-eight detail sheets were drawn and tracings prepared.

Helios to the number of 42,016 were printed and 3,100 maps were mounted. This includes (as well as the work for this Department) heliographing work and plan mounting for the Railway and Tramway and City and Suburban Railway Construction Branches of the Railway Department, and for the Education, Valuer-General's and Fisheries Departments.

In the Plan Room 1,900 new plans and 476 field and level books were registered and 14,250 plans, &c., were issued by and returned.

The number of files of papers dealt with was 3,306.

D. R. ALDERTON,
Chief Survey Draftsman.

Under-Secretary.

Testing and Inspection Branch.

Annual Report, 1926–27.

The high pressure of work that was experienced during the previous two years' operations of the Testing Branch was greatly exceeded during the year closing 30th June, 1927, which was without doubt, from the point of the work carried out, the highest on record, the volume being almost as much as the two previous years combined. To enable this to be carried out the staff was kept at very high pressure during the whole of the period under review.

The work carried out may be classified under the following headings :—

(*a*) Materials sampled at the manufacturer's works or stores and tested at Head Office laboratory prior to despatch.

(*b*) Material tested and inspected during the course of manufacture at the works and sent forward.

(*c*) Samples forwarded to Head Office for testing by constructing authorities for public works and by the general public.

(*d*) Repairing departmental instruments in use by field officers and others.

The estimated value of the materials sampled, tested and inspected before being sent forward from the various manufacturing centres was £945,932—an increase of 62 per cent. over the previous year's figures.

Expenditure and Receipts.

The total expenditure for the year was £7,627 5s. 10d., of which £6,870 11s. 8d. represented salaries for an average staff of twenty-two, and £756 14s. 2d. for stores and general expenses. This is an increase of 22 per cent., principally for a slight increase in staff to meet the extra demands called for.

The fees to be collected for the work carried out amounted to £5,328—an increase of 56 per cent. Fees are not charged for Departmental work.

Cement Testing.

Two million four hundred and thirty-six thousand three hundred and forty (2,436,340) bags, of an estimated value of £730,902, were sampled and tested during the year. This is an increase of 1,079,740, or, approximately, 80 per cent. over the previous year's work. This is the highest number of bags ever handled by the Branch during one year, but by indications there appears a possibility of this record being exceeded during the coming year. Eight hundred and forty-two (842) certificates covering the testing of this cement were issued. Fees amounting to £4,910 were charged for the work carried out.

Steelwork Inspection.

Thirteen thousand nine hundred and eighty-one (13,981) tons—an increase of 31 per cent. of pig iron, structural steel and cast-iron pipes and castings, in addition to 3,294 valves and hydrants, the output of which increased 135 per cent., and 74 miscellaneous jobs, were tested and despatched from the manufacturers at Newcastle and Lithgow. Nineteen thousand four hundred and thirty-nine (19,439) cast-iron pipes and castings were accepted. No record is kept of material rejected. Three thousand one hundred and sixty-seven (3,167) tons of structural steel and rivet bars were forwarded for use in the Sydney Harbour Bridge; 929 consignments were sent forward. This is an increase of 44 per cent., each consignment being checked as to quantities and weight before despatch and certified to by the inspector for the information of the consignee. The estimated value for the whole of the material forwarded was £190,297, an increase of 22 per cent. over the previous year.

The bulk of the work carried out was for Departmental purposes, for which fees are not charged. Fees to be charged to other constructive authorities amounted to approximately £175.

Miscellaneous Investigations.

Nine hundred and fifty-six (956) reports, an increase of 42 per cent., covering the testing of concrete, iron and steel bars, road material, asphaltum, paints, &c., were carried out. The actual number of tests made and covered by these reports were 2,794, an increase of 64 per cent. Included among these investigations was the sampling of 678,400 gallons of asphaltum of an approximate value of £24,733. Sales of standardised testing sand realised £90. A considerable expansion in this item is forecasted for the coming year. Total fees charged for the work carried out amounted to £243 18s. 6d.

The instrument maker has been fully employed repairing the Departmental instruments and other duties. One hundred and thirty-eight (138) instruments, which is the general average, were overhauled and repaired.

It may be of interest to note that in carrying out the work of the Branch, in preparing the reports, certificates, and despatch advices, approximately 20,000 copies were prepared and supplied for the information of those interested in the tests and inspections carried out.

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Summarised details of the work of the Branch is given in the following statement :—

Particulars of Service.	Unit.	Quantity.	Reports.	Tests.	Estimated Value.	Fees.
					£	£ s. d.
Cement Testing	Bags	2,436,340	842	842	730,902	4,910 0 0
Steelwork Inspection—						
Pig iron	Tons	5,604	.....	.....	39,227	
C.I. pipes and castings	,,	3,137	.....	.....	56,459	
Structural steel	,,	5,240	.....	.....	74,111	175 0 0
Valves and hydrants	No.	3,294	.....	.....	15,500	
Miscellaneous tests	,,	74	.....	.....	5,000	
Miscellaneous Investigations—						
Concrete	.....	.....	257	967	.....	
Sand	.....	.....	22	28	.....	
Stone	.....	.....	14	19	.....	
Road material	.....	.....	39	42	.....	
Asphaltum	Gallons	678,400	169	424	24,733	
Iron and steel	.....	.....	271	1,045	.....	
Paints, oils	.....	.....	27	40	.....	
Coal	.....	.....	22	26	.....	
Miscellaneous	.....	.....	135	203	.....	153 13 6
Standard sand	Cwt.	45	.....	.....	.....	90 0 0
Instrument repairs	No.	138	.....	.....	.....	
Total	.....	.....	.....	.....	945,932	5,328 13 6

R. S. LITTLEJOHN.

Under-Secretary. Acting Superintendent of Testing and Inspection.

Government Dockyard, Newcastle, N.S.W.

Annual Report for 1926–27.

In the Annual Report submitted for the year ended June, 1926, it was anticipated that a very large amount of work would be carried out during the year ended June, 1927, but, owing to the fact that labour disturbances took place in Great Britain, and material could not be obtained from that country, the anticipated output has not been realised.

During the latter part of 1926 and the beginning of 1927 considerable reduction took place in the number of men employed, due to the non-arrival of material, and this position did not improve until the month of May, and by the end of June the number of men employed had increased to 1,250.

The supply of material is slowly coming to hand and it is expected that early in the year 1927–28 the greater portion of material will have arrived, and it is anticipated that year will be one of the busiest in the history of the Dockyard, due to the large orders for all-steel carriages for the Railway Department, and the construction of the floating dock.

The establishment is primarily utilised for Governmental work, and during the period under review 95 per cent. of the output from the Dockyard was for Governmental and semi-Governmental institutions. The total turnover for the year was £538,000.

Owing to the decision of the Government to proceed with the building of the proposed floating dock, in connection with which Parliamentary authority was obtained during the year, the Minister instructed the General Manager, Mr. A. C. Waters, M.I.N.A., to visit Great Britain with a view of arranging, in consultation with the Admiralty and the leading consulting engineers in dock construction, the details of the dock. Mr. Waters left New South Wales in September last, and, in addition to his duties in connection with the dock itself, he carried instructions to familiarise himself as far as possible with engineering works' organisation, both in Europe and America. No doubt the visit of the General Manager will result advantageously inasmuch as the Dockyard will benefit from the experience obtained as to the up-to-date methods in use overseas.

During the absence of Mr. Waters the management was in the hands of a committee comprising Mr. C. W. Tye (Under-Secretary for Public Works) as Chairman; Mr. W. I. Kidd, Works Manager; and Mr. T. H. Tennant, Secretary. Mr. Kidd was in local control of the establishment, and Mr. A. Pratt, Chief Draftsman, took over the position of Works Manager.

During the year ended June, 1927, two (2) oil barges for the British Imperial Oil Company were completed, also 32 all-steel carriages for the Railway Department; a bridge for Cook's River; 50 per cent. of the castings in connection with the Bunnerong Power Station for the Sydney Municipal Council, and a crane for the Mount Pleasant Coke Company.

The quantity of cast-iron pipes equals the output of the previous year of 8,000 tons. This branch of the works has had various improvements carried out during the year.

In addition to the above jobs completed there were in hand at the 30th June, a new pilot steamer for the Navigation Department, which work was then well forward; large steel pipes for the Hume Reservoir; pumping plant for Taree–Wingham Water Supply; a number of bridges in connection with the Kyogle–Richmond Gap Railway; bridge over the Paterson River at Gostwyck; a new ferry for George's River; also a small sand pump for Cook's River.

During this year the Dockyard was successful in obtaining orders from the Railway Department for additional 150 all-steel carriages. In connection with this additional work it was proposed to materially add to the Car Assembling and Painting Department so that the output could be doubled, and it was anticipated that this extension would be started almost immediately.

The building of all-steel carriages is a new industry in Australia. Previously these carriages were imported in sections and assembled in this country. Practically the whole of this work is now manufactured in Australia, although some lines which it is impossible at the present time to manufacture here have still to be imported. This industry will be of great importance to the Dockyard.

A large amount of work was carried out in connection with the Transmission Lines at Barrenjack and the usual repair work for the Dredge Service fully employed a section of this establishment.

The plant, both fixed and floating, was maintained in an efficient condition.

Minor improvements have been made in various departments for more economical working.

W. KIDD,
Acting Manager.

Under-Secretary.

[12 plates.]

Sydney: Alfred James Kent, Government Printer—1928.