The Water Supply of Kyneton, Vic.

By T. Ewing, M.C.E., M.I.E.Aust.*

The Kyneton Waterworks Trust, which was constituted in 1882, stands out among the water trusts of Victoria in that it occupies the unique and unusual position of having liquidated practically the whole of its liability in regard to the loans advanced by the government for the construction and improvement of its works.

The amount originally advanced to the trust was £26,000; some few years later a further loan of £1,500 was obtained and, again in 1908, an additional loan of £4,600, bringing the total capital expenditure on the trust's works to £31,345. In addition to making the annual payment of 4½ per cent interest and redemption

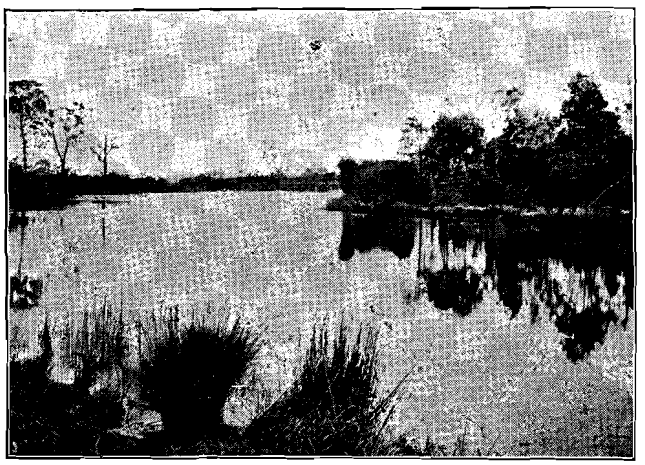

Fig. 1. Kyneton Water Supply Reservoir, Tylden

required by the water act, its revenue has been so buoyant, the cost of maintenance so low and the administration of its finances generally so conservative that it has been able to make substantial repayments in excess of those required by law, the result being that, at the present time, its liability in this respect is only a matter of £347.

During the whole period of its existence, the water rate imposed by the trust has been 1/- in the £ on the value of rateable property with the exception of the years 1923 and 1924, when the rating was reduced to 6d. and 9d. in the £ respectively. Where water is used for other than domestic purposes, as, for instance, for watering gardens, the services are metered, and a charge of 1/- a 1,000 gal. is made for water in excess of the quantity covered by the general rate. The trust is fortunate in that the railway department has always been a large consumer, as Kyneton is one of the principal watering stations for locomotives on the northern railway. The department up till the beginning of this year paid at the rate of 1/- a 1,000 gal. when the price was reduced to 11d. a 1,000 gal. A revenue of £650 per annum is received from this source, and the total revenue of the trust from all sources is now about £2,700 per annum, while the cost of administration and maintenance is only about £500 per annum.

While this very satisfactory position is largely attributable to favorable natural conditions, the economical design of the works and ease of maintenance together with consistently careful management must be recognised as having been material contributing factors.

The late Stuart Murray, formerly chief engineer for water supply, was responsible for the design and construction of the original works; the first secretary was Mr. R. Harper, succeeded in 1890 by his son, Mr. H. Harper, who retained the position for the long period of 30 years, when he retired and when the office was filled by the appointment of the present occupant, Mr. G. Swanson. That these officers have displayed great foresight and ability in conducting its affairs is evidenced by the excellent position of the trust to-day.

The head-works are situated on the Little Coliban river near the township of Tylden, the distance from Kyneton being about eight miles. This stream is perennial, but, at periods of low discharge, its flow falls below requirements and storage is therefore necessary. The reservoir consists of an earthen bank about 500 ft. long and 40 ft. maximum height with puddle clay core, at an elevation of about 260 ft. above the town, the capacity being originally 28,000,000 gal. which has since been increased to 32,000,000 gal. by raising the embankment, the area of catchment being about four square miles.

Access to the outlet valves from the reservoir was originally provided by a timber gangway, but, after 30 years' service, the timbers had so decayed as to become unsafe and it was decided to replace the old structure by a new one in reinforced concrete.

Unfortunately, the reservoir catchment is all alienated land, chiefly red volcanic soil largely used for potato growing. When heavy rains occur in spring time, the run-off is necessarily highly discolored and, to mitigate this condition to some extent, a valve-tower was erected, having sluices at varying levels to permit of the clearest water being obtained by drawing off a few feet below the surface. Neat in appearance, the concrete valve-tower and gangway are in harmony

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with their surroundings and contribute to the picturesque effect of the small lake formed by the reservoir.

From the reservoir, a pipe line of 10 in. diameter, reduced to 7 in. about a mile from the reservoir, led to a service basin of 600,000 gal. at six miles down. This pipe line answered for a number of years, but, with the growth of the town and diminution of discharge due to incrustation, ultimately proved insufficient, and, in 1908, the pipe line was remodelled. The 10 in. diameter pipe was extended to a length of over three miles, the lifted 7-in. pipes, which were found to be in excellent order, being relaid to duplicate the remainder of the line to the service basin. This work cost about £4,500, and, since its completion, the supply has always been sufficient and Kyneton has never experienced any shortage of water even during the driest years. The present population is about 3,500, and the capacity of the compound mains about 500,000 gal. per day.

The service basin consists of a rectangular basin, partly in excavation and partly in bank, lined with brickwork, having a capacity of 600,000 gal. at an elevation of about 120 ft. above the centre of the town. Provision is made for by-passing the basin for cleaning purposes or in emergency, and a floating arm outlet is fitted to again draw off the clearer water and secure the use of the basin for settlement of suspended matter. Analyses show that, with the exception of occasional excess of vegetable matter and soil in suspension, the water is of a high standard of potable quality.

In balancing maximum demand with average flow of the pipe line, the service basin completely fulfils its purpose.

Thence to the town the main is of 9 in. diameter, leading into a complete system of reticulation. Some of the little occupied streets were served with galvanised piping of small diameter, but, as population increased, these have been replaced with cast iron mains as necessity arose. In this work, and other improvements, some £3,000 has been expended, the whole of which has been provided from revenue. With the exception of a few streets still served by the small pipes, the whole of the piping in the trust's system is cast iron, which material is only slowly affected by the Coliban water as is shown by the generally good condition of pipes after 43 years' service. The total length of piping in the system is about 26 miles.

While the reticulation as a whole gives satisfactory service, the eastern end of the town at a higher level has suffered from a poor supply at times of maximum demand and, to remedy this condition, an independent main of 6-in. diameter is now being laid from the service basin at a cost of about £5,000. The affected area will be cut off to form a high level zone which will be served by the new main.

The trust has not confined its attention solely to water supply, but recognising the importance to the health and prosperity of Kyneton of a

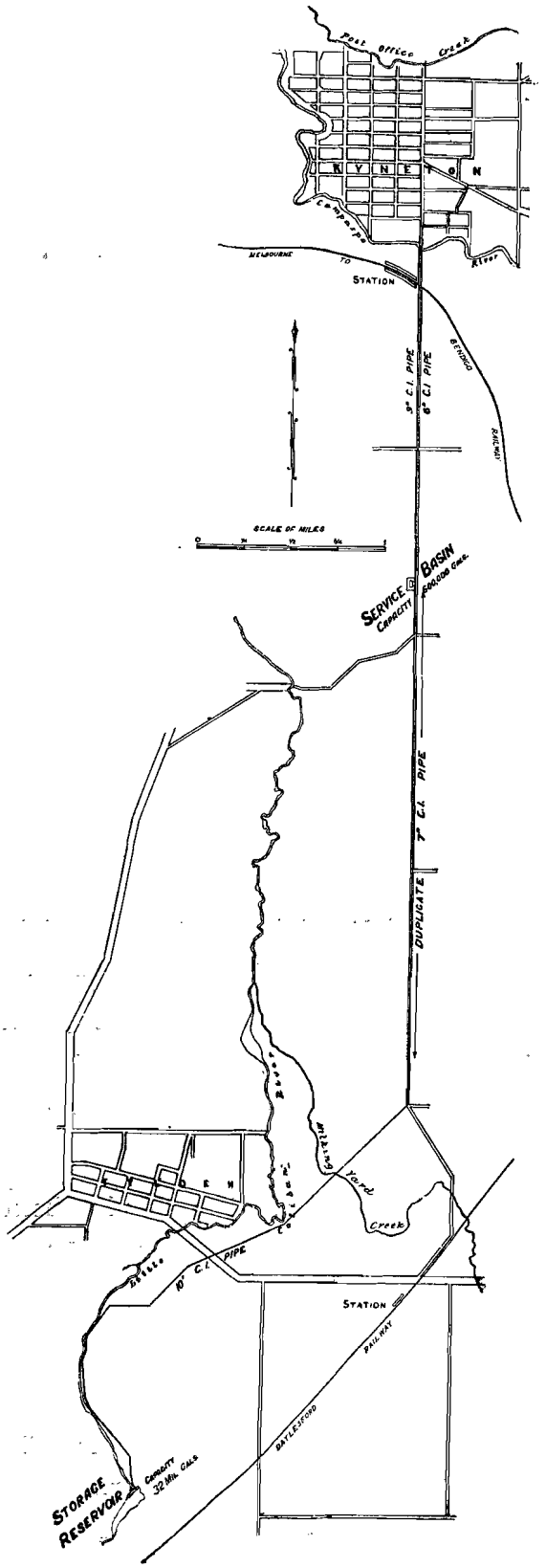


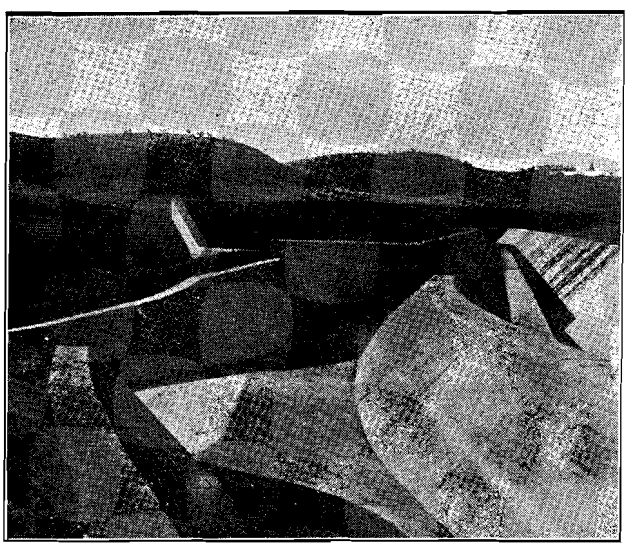
Fig. 2. General Plan of Kyneton Water Supply

modern system of sewage disposal, it has had a contour survey made, and preliminary plans and estimates for sewering the town prepared. Owing to the high estimated cost, the matter is at present in abeyance, but it is certain that financial difficulties will shortly be overcome and this very necessary work undertaken.

In view of this probability and of the continued steady growth of the town, attention has been given to the question of supplementing the present water supply. A suitable site for a supplementary reservoir has been located on a tributary (Jones' creek) of the Little Coliban some two miles west of the present reservoir and plans for bringing in this source of additional supply are in course of preparation. When this work has been completed, the town will have a system of water supply which should be ample to meet all the demands of a sewered and growing town till such time as the expenditure incurred in carrying it out has been liquidated and Kyneton will once more possess an efficient water supply free of debt.

South Australian Water and Sewerage Schemes

The water supplies and sewerage schemes of the state of South Australia, together with the revenue department for same, and the supervision of the Glanville ironworks, are under the control of the hydraulic engineer, Mr. Herbert E. Bellamy, M.Am.Soc.C.E., M.I.E.Aust. South Australia is situated between 26 deg. and 37 deg. south latitude and 129 deg. and 141 deg. east longitude, the total area being 380,070 square miles.



Fif. 1. Diversion Weir on Bundaleer Creek, South Australia

The capital cost of waterworks to date is £10,411,310. The total length of mains laid is 5,100 miles. The area supplied with water for domestic and stock purposes is approximately 20,000 square miles and forms the largest distributing scheme in the world.

The total number of employees under the hydraulic engineer on June 30 last was 2,388, which includes 208 salaried officers. The total amount paid in wages and salaries for the past year was £443,690.

There are 24 impounding reservoirs in the state, with a total storage capacity of 16,796,906,000 gal., 45 service reservoirs, 7 pumping stations on the river Murray, 1 at the Blue Lake, Mount Gambier, 1 at Burra, 1 at Hansborough, 1 at Palmer, 1 at Kensington, 1 at Tod river, while no fewer than 106 towns are supplied with water including the metropolitan area of Adelaide. The principal country water districts are the Beetaloo, Barossa, Warren, Bundaleer, and Tod river.

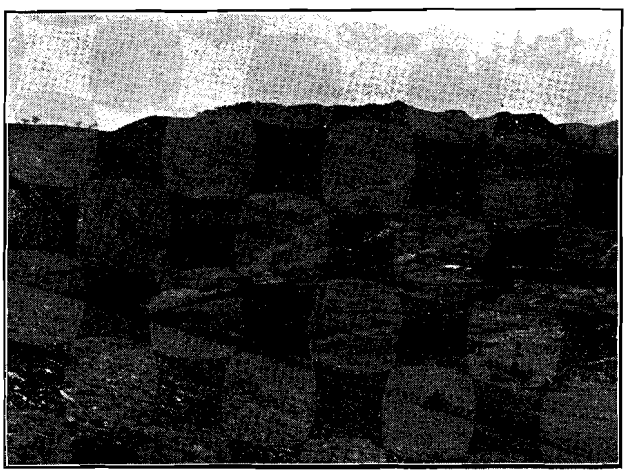


Fig. 2. Baroota Reservoir Basin

Some five miles of cast iron pipes are manufactured weekly at the Glanville ironworks, and pipe laying exceeds one mile per day in the state. 86,000 water meters are in use representing a capital of £500,000.

Reinforced concrete structures are in general use and several towers have been, and are being, constructed. The Woolpunda tower is 122 ft. high, and Loxton tower is 111 ft. high.

The estimated cost of works in hand and projected at the present time exceeds £5,000,000. The largest work in hand is the Tod river water scheme, the expenditure to date being £1,500,000. The length of the main trunk pipe line alone will be 240 miles. Fig. 3 shows details of one of the 5,000,000-gal. reinforced concrete reservoirs under construction at Minnipa.

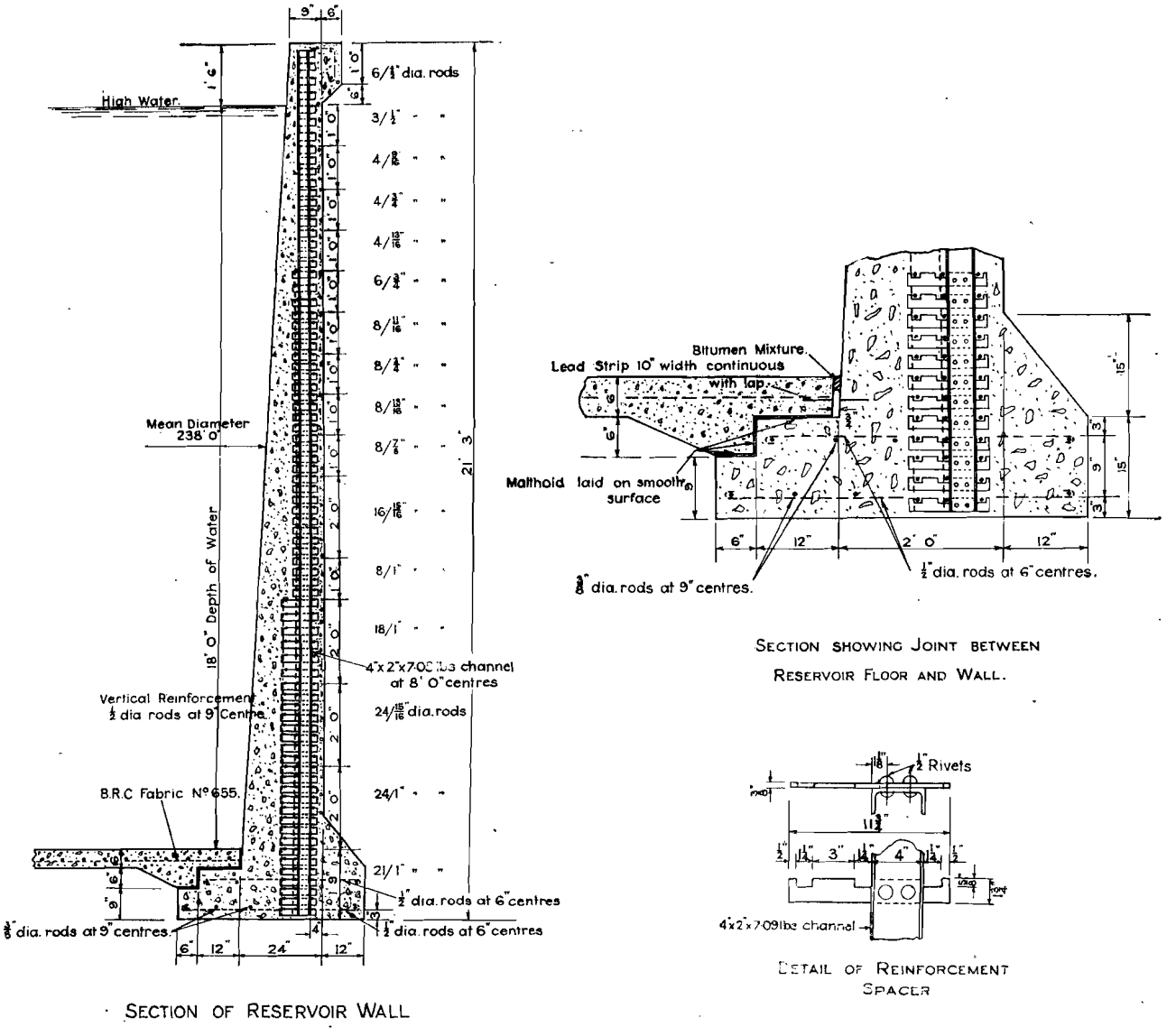


Fig. 3. Details of 5,000,000-gal. Service Reservoir, South Australia

The Hume Steel Co. are supplying 57 miles of 16-in. steel cement-lined pipes manufactured at Thevenard, and the same company have supplied 15 miles of 8-in. similar class of pipe.

The capital expenditure on sewerage works to date is £1,669,876. In March last the government approved of a comprehensive scheme for the Adelaide area designed by Mr. H. E. Bellamy, estimated to cost £1,400,000, and construction work is being actively pushed forward.

Statement by the Commissioner

The commissioner of public works (Hon. L. L. Hill), speaking on the address in reply in the South Australian assembly early last month, outlined the new works which had been approved by the government. He said that when the government assumed office, the reorganisation of the waterworks department had to be undertaken. The death of Messrs. C. A. Bayer (hydraulic engineer), and R. Gunner (waterworks superintendent), and the resignation of the deputy hydraulic engineer (Mr. T. A. Hicks) added to the many difficulties which had to be surmounted. With the appointment of Mr. H. E. Bellamy, as hydraulic engineer, the working of the department had had close attention. The state had been divided into three districts, and a district engineer appointed for each. Previous

speakers had lent a word of praise in connection with the admirable work performed by Mr. Bellamy, and he desired to reiterate that approbation. The government were exceedingly pleased with Mr. Bellamy's capabilities in the many activities to which he had applied himself.

The Tod river reservoir was commenced in 1918, and completed in 1922. When the government took office in April, 1924, they found that the whole thing was in a hopeless bungle. Only 26 miles of trunk main had been laid, the main reservoir was leaking at the rate of over 1,000,000 gal. per day, the Knott's Hill service reservoir was leaking, and no provision had been made for reticulation. No pipes were available at the Glanville workshops, and no surveys had been made of any of the lands adjoining the trunk main. The water leaking from Knott's Hill had to be pumped from the Tod river reservoir at a cost of 5d. per 1,000 gal.

The government completed the balance of the contract (43½ miles), carried the trunk main another 60 miles to Minnipa, and had now let a contract to Hume Steel Ltd. amounting to £189,000 for a further 57 miles of trunk main from Minnipa to Pimbaacla. Works were now established at Thevenard by that company, and later about 100 men would be employed in the manufacture of pipes. During last financial year the government undertook seven schemes of reticulation involving 90 miles of pipes. Approval had been given for the reticulation of Port Lincoln, and a service tank was in course of construction for that town. A service tank of 5,000,000 gal. capacity was also being constructed at Minnipa. The government had approved of the lining with concrete of the Knott's Hill reservoir up to a capacity of 5,000,000 gal., the total capacity of that reservoir being 10,000,000 gal. Cresco Fertilisers Ltd. had, on the assurance of the government that water was to be reticulated to Port Lincoln, decided to establish fertiliser works at that port. That would mean a great benefit to settlers on the peninsula, resulting in the saving of freight and the quick delivery of orders for super.

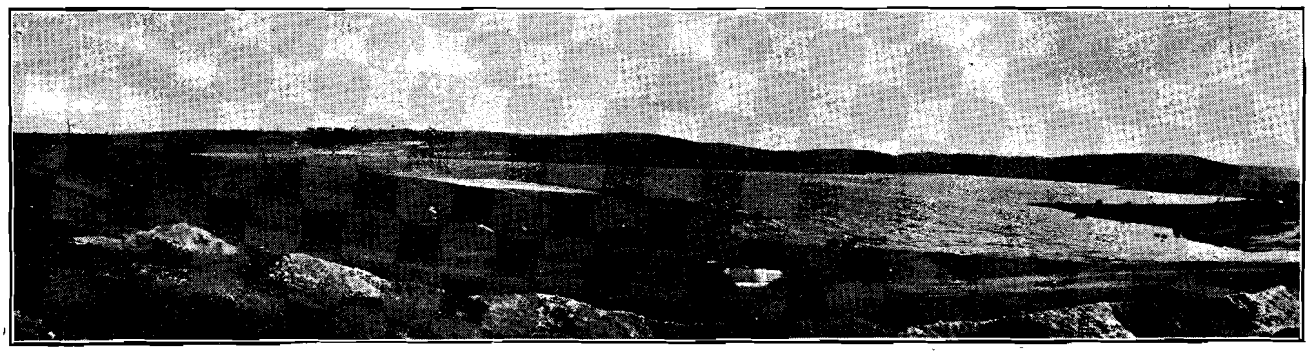


Fig. 4. Tod River Reservoir

SYDNEY UNIVERSITY ENGINEERING CLUB

The fourth annual general meeting of the Sydney University Engineering Club was held on July 29, 1926. The president, Sir Henry Barraclough, was in the chair, and there was a large attendance of members. Reports by the hon. secretary and the hon. treasurer for the year 1925-26 were submitted and approved. The following officers were elected for the year 1926-27:—President, Mr. A. J. Gibson; vice-presidents, Professor J. P. V. Madsen, Messrs. H. H. Dare, J. Vicars; committee, Messrs. C. F. Assheton, H. G. Carter, A. D. J. Forster, L. J. Reynolds; undergraduate members of committee, Messrs. J. J. Budge, B. S. Croft, K. W. King, E. H. Pratten; hon. treasurer, Mr. E. W. Marriott; asst. treasurer, Mr. V. R. Webb; hon. secretary, Mr. H. W. Flashman; asst. secretary, Mr. A. P. Blake.

In handing over the office of president to Mr. Gibson, the retiring president, Sir Henry Barraclough, said that he looked forward to the continued growth of the engineering club, and believed that it would contribute very valuable service to the university and the community. He suggested to the incoming committee that they might now consider the advisability of holding more than one meeting in each term.

Mr. A. J. Gibson said that he valued his connection with the engineering club because of the opportunity it afforded for renewing associations with the university and its graduate and undergraduate members.

Dr. J. J. C. Bradfield gave a very interesting lecture, illustrated with lantern slides, showing the present stage in the construction of the Sydney harbor bridge. Dr. Bradfield extended an invitation to the members to inspect the work associated with the construction of the bridge, and also the city railway, at some convenient date to be arranged.

New Queensland Locomotive

The new B18½ type locomotive recently constructed at the Ipswich workshops of the Queensland railway department has undergone satisfactory trials. This locomotive has been designed by Mr. R. J. Chalmers, chief mechanical engineer, to meet local conditions, particularly with regard to the 3 ft. 6 in. gauge and its restrictions on dimensions and weights.

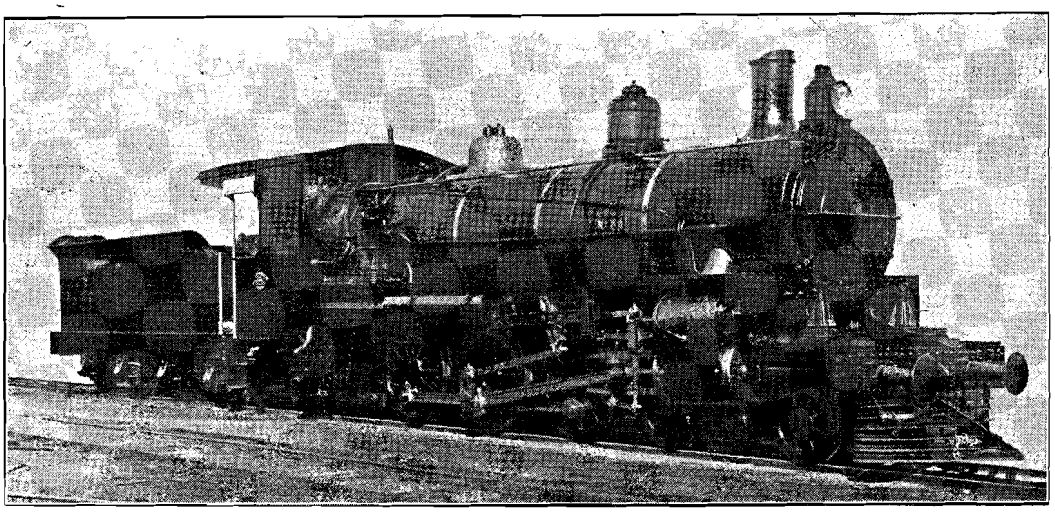


Fig. 1. Type B 18½ Locomotive, Queensland Railways

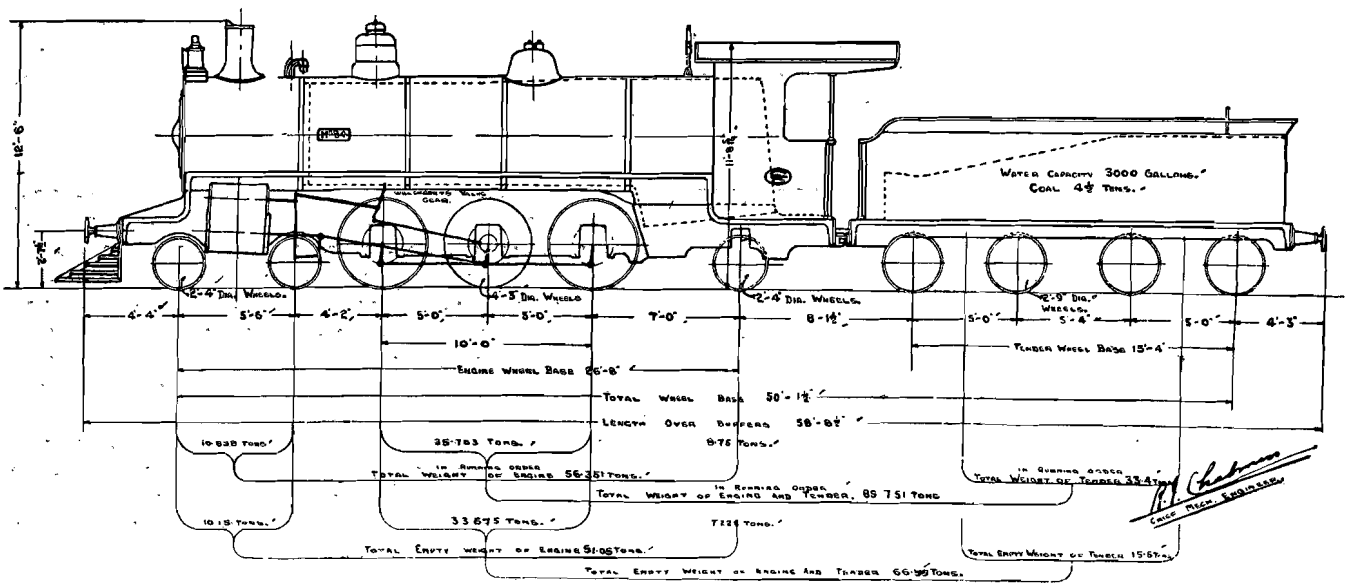


Fig. 2. Elevation with Dimensions of Type B 18½. Locomotive, Queensland Railways

The boiler is of the wide firebox design, having sloping back and throat plates, and conical barrel fitted with copper firebox and copper-coated steel tubes 2 in. in diameter. The boiler is fitted with three 3-in. safety valves, set at a working pressure of 160 lb. per sq. in. It is equipped with a Robinson 21-element superheater, and inside admission piston valves. The valve motion of the Walschaert type is designed to afford maximum accessibility and convenience in repairs. The cylinders are fitted with 8-in. piston valves, which are the standard on these railways, and interchangeable with other piston valves now running. Top feed from the injectors (Sellor's) has been introduced for the first time.

The Westinghouse air brake is provided, with a 10 x 10⅝ in. air compressor and ample reservoir capacity, in order that the locomotive may work