

*Additional Transmission-lines.*

The following line was completed during the year: Bombay-Waikino, 50 kv.; put in service on the 10th July.

Completion of the steel structures at Penrose and Henderson Substations enabled the second circuit of the Penrose-Takapuna 50 kv. line to be put in service in November.

The Tamaki-Penrose portion of the 110 kv. pole line was altered, a new line being erected on the Department's 2-chain right-of-way, and the line on the old route removed. The new section was put in service on the 3rd July, 1927. It crosses the Tamaki River on two special steel towers 107 ft. high, the same as for the Arapuni-Penrose tower line.

*Arapuni-Penrose 110 kv. Double-circuit Tower Line.*—This line was completed in October, but no part of it has yet been put in service.

*Ngongotaha-Waiotahi 50 kv. Pole Line.*—The survey for this line showed the best route obtainable was from Ngongotaha, round the north of Lake Rotorua, south of Rotoiti and Rotoehu, and north of Rotoma, through the Manawahe district, to Edgcombe, on the Rangitaiki Plains, and thence in a fairly direct line to Waiotahi. The route is in very rough country through the Manawahe district, and also across the hills between Taneatua and Kutarere. Cartage of poles commenced about the end of October, fitting and erection of poles at the beginning of December, and at the end of the year, of 704 total number of supports on the line, 563 were erected and 500 wired. The line was practically complete by the end of May.

*Hamilton-Huntly 50 kv. Line.*—This line follows a fairly direct route across the fairly level country between Hamilton and Taupiri, and over the hills to the east of Huntly to a substation on the edge of the town. Construction on it was started in February, and of a total number of about 220 supports twenty-nine were erected and twenty-two wired by the end of March.

*Substations.*

*Penrose (110/22 kv. and 22/50 kv.).*—Construction work has continued throughout the year. Inside the substation building the 22 kv. switch-gear battery and 10,000 kv.a. synchronous condenser have been erected. On the outside work three 5,000 kv.a. transformers (110/22 kv.) have been dried out, assembled, and placed in position; 110 kv. oxide-film lightning-arresters have been erected; three 1,667 kv.a. transformers (22/50 kv.) have been dried out, assembled, and placed in position; three 3,333 kv.a. 22/6.6 kv. transformers for the synchronous condensers are being dried out; two 110 kv. oil-switches have been erected, and also the steelwork for the 110 kv. transformer structure and for the Penrose-Takapuna 50 kv. line, and the 50 kv. oil-switches controlling that line.

*Diesel Plant, Penrose.*—From January onwards work at Penrose was concentrated on completion of the Diesel plant. The date set for completion of this was the 1st June, and the principal factor determining the time of completion was the obtaining of information to enable the foundations for both engines and generators and the rest of the building to be designed. The site was marked out and the ground cleared about the 12th October, and excavations started. The main excavations on the site were finished by the end of November. Two of the engines arrived in Auckland about the 12th November, and the third about three weeks later; the erecting engineer from England arrived at the beginning of December.

Concrete work on the building was started about the 10th December, and in the meantime the engine parts were being cleaned and got ready for erection. Placing concrete on the engine-foundations started about the 12th January, and the first engine and generator foundation was completed about the 24th January, the second about the 28th January, and practically all foundation work was completed by the 4th February. The crane-columns, water-cooling tower, and fuel-oil tanks were commenced about the 8th February, and the first parts of the engines and generators to be erected were taken to the building about the same time. Meanwhile the walls of the building were pushed on, and one crane was erected by about the 23rd February, and the other two (one for each engine) by the end of February. The bed-plates of two engines were placed in position by the 3rd March, and that of the third by the 10th March. By the 31st March the main part of the erection works was completed, except for the valve gear, and the engines had been finally levelled up and bolted down, and the generator rotors were in position. The framework of the cooling-tower was up to its full height, and the fuel-oil storage tanks in position. Since the 31st March, the erection work was completed, the principal additional items being the oil and water piping, exhaust-pipe and silencers, the auxiliary air-compressor, lubricating-oil pumps and cooling-water pumps, and the switchboard to control the three units and the local service power-supply.

The three sets were given a trial run of a few minutes each on 17th and 18th May, and the necessary cables, which had previously been put in position to connect to the bus-bars, were connected in ready to supply. The engines were run for fifty hours on the 22nd, 23rd, and 24th May to dry out the generators on short circuit, and the engines were run without any trouble in parallel with Horahora and King's Wharf station. Their performance on the fuel oil available has, however, not so far been altogether satisfactory.

*Bombay (110/50 kv. and 50/11 kv.).*—Temporary 50 kv. switch-gear was installed to supply the Bombay-Waikino line from the Horahora-Penrose wood-pole line. The substation building was practically completed during the year, and a start made on the erection of 11 kv. switch-gear. A second house at the substation was built. Bombay, along with Arapuni, Hamilton, and Penrose, will be points of supply to the 50 kv. lines from the Arapuni 110 kv. lines, and the main feature of Bombay is the 110 kv. structure with switches for sectionalizing lines and supplying the 110/50 kv., and the 50/11 kv. transformers. Work on this structure was started in September, on concrete foundations for the steel columns. Owing to the ground-slope, some of these have to be built up a good deal, and a considerable amount of concrete is required. Work on this structure and switch-gear erection has