

## HYDRO-ELECTRIC DEVELOPMENT : CONSTRUCTION WORKS

*Waikaremoana Upper Development.*—Construction continues as speedily as conditions will permit, March, 1947, being the target date set for the completion of this work.

The first turbine for installation in the recently completed power-house is due to arrive in New Zealand in July, the second following three months later.

By December, 1946, it is anticipated that the 10-ft.-diameter pressure tunnel between the headgates shaft and the intake structure will be completed. The latter has not been commenced, but no great difficulties are anticipated in construction.

Of the 6,000 ft. of 7-ft.-diameter welded pipe required for the pipe-line, none has yet been manufactured; but the contractor's installations are almost ready.

For grouting and investigations, 90,219 lineal feet of boring has been completed and 4,850 cubic yards of grout, requiring 4,490 tons of cement, were injected during the year.

Work has been completed on the twin tunnels from the portals to the headgate shafts, a total length of 806.5 ft. having been excavated and concrete lined during the year. To expedite construction, tunnelling operations have been carried on continuously since November, 1945—twenty-four hours a day, seven days a week—No. 1 tunnel reaching completion by 16th January and No. 2 tunnel by 17th February, 1946.

The twin 8-ft.-diameter tunnels will be merged into a single 10-ft.-diameter tunnel near the intake at a point some 90 ft. on the lake side of headgates shafts, and since February, 1946, the excavation and lining of this length of No. 1 tunnel only has been pushed ahead continuously. No. 1 headgate shaft was sunk to the required level—1,945.8 ft.—by 17th July, 1945, and No. 2 headgate shaft completed under difficulties by 12th February, all being in readiness for concrete-pouring by the end of March.

Concrete placed per lineal foot of tunnel averaged 2.13 cubic yards in each tunnel, and grouting behind the tunnel lining utilized 1,800 cubic yards of grout for 1,306 lineal feet of tunnel and 40,711 ft. of boring, of which 16,289 ft. was reborings. The maximum flow of water in tunnels while under construction was 16 cusecs. Six standard penstock pedestals were concreted and the penstock "raft" section excavation and that for all anchor blocks was completed.

In the construction of the tailrace 990 cubic yards of concrete were placed. Concreting of the power-house building was completed in February, 1946, and the 60-ton overhead crane has been erected and is now in use.

Considerable progress has been made with the outdoor substation structures, 724 cubic yards of concrete being placed.

Work on the Kaitawa weir and canal widening is proceeding satisfactorily, and water was turned through the 500-ft.-long fluming in February, 1946.

To increase the quantity of water available for the existing Tuai and Piripaua Stations, three 4-ft.-diameter steel siphons have been installed at the outlet to the lake, and these have operated most satisfactorily. The necessity for difficult coffer-dam work was eliminated by the unusually low lake-levels.

Investigating work for future leak-sealing in the outlet barrier consisted of driving eight test bores in the vicinity of the outlet and forming access roads for boring machinery over the whole outlet leakage area.

*Karapiro Development.*—The major part of the excavation has been completed including an additional extension to the gravity extension at the right abutment, the excavation of the core walls at both abutments, and the foundations of the draught-tube extension, where it was necessary to cut 10 ft. below sea-level in certain parts to obtain solid. Up to 31st March, 1946, 575,000 cubic yards of spoil have been excavated and 191,930 cubic yards of concrete placed, 60 per cent. of which was included in the main structures.