

Papatowai to Long Beach Creek (Clutha County).—2 m. 44 ch. road formed and 68 ch. metalled.
Pembroke to Mount Aspiring (Lake County).—1 m. 58 ch. of road has been formed and 3 m. 54½ ch. metalled.

Kingston-Queenstown Road (Lake County).—The Department has surveyed 18 m., formed 7 m. 12 ch. of dray-road, and gravelled 25 ch. One culvert, 40 ft. long, has been placed.

Hagen Road (Southland County).—3 m. 24 ch. of road has been formed, and twenty-five culverts placed, totalling 758 lin. ft.

Tokanui-Haldane (Southland County).—1 m. formation completed and 100 lin. ft. culverts placed.

Trail Road (Wallace County).—2 m. formation completed, one 30 ft.-span bridge erected, and twenty-six pipe culverts, aggregating 728 lin. ft., placed.

Pahia Loan Block Road (Wallace County).—Relief work. Culverts totalling 540 ft. placed.

HYDRO-ELECTRIC WORKS.

ARAPUNI POWER DEVELOPMENT.

During the year under review Messrs. Sir W. G. Armstrong, Whitworth, and Co.'s sole connection with the works was the concluding of the maintenance period of twelve months in respect to works carried out on No. 1 section of contract, which period expired on the 31st December, 1928. The firm's connection with the works ceased from that date.

The whole construction work for the year was carried out by the Department, and was generally run on shifts, with practically no interruptions, and progress has been good. At the beginning of the period the position at the power-house was that the coffer-dam has been successfully sealed, the foundations for the four turbine and generator units poured, and parts of No. 3 turbine transported to site. At the end of the period the power-house structure was sufficiently advanced as to provide cover for No. 3 unit, which was completely erected and put into service, supplying power in the first instance on the 3rd June, 1929.

Power-house.—Details of work carried out are as follows: The excavation for the foundations of the switch-gear annexe was finished early in the period. The quantity excavated was 1,851 cub. yd., making a total of 9,918 cub. yd. since the Department commenced operations.

Good progress was made with the concreting of the power-house structure, which work was carried out continuously on three shifts. Early in the period the foundations of Nos. 1 and 2 units were poured to such a level as would permit the erection of the turbine-casings. As the casings were erected and aligned the concreting of the foundations was completed, but preference was given to the south end of the structure, so as to provide for putting of No. 3 unit in service at the earliest possible date. With this in view, the steel frame of the generator-room was commenced from the same end, and subsequent to its completion the walls and roof were concreted over and around No. 3 unit. Later on in the period the walls and roof were extended over No. 2 unit. Foundations for No. 1 machine are well advanced, the turbine and lower machine floors being poured.

Subsequent to the completion of the excavation under the switch-gear annexe and air ventilating-shafts, concreting was commenced there, and has been completed, with the exception of the roof of the upper switch-gear room. The remaining concreting-work to be completed comprises the roof of the switch-gear annexe, the generator-room floor, walls, and roof around No. 1 unit, and the workshop and unloading-bay, together with the low annexe structure. 8,083 cub. yd. of concrete and 114.6 tons of reinforcing-steel were placed in the structure during the period.

The erection of the steel frame of the generator-room was commenced early in the period, and has been completed for some months. A contract was let for the laying of the ruberoid roofing, a section over Nos. 3 and 4 units having been completed. Towards the end of the period a start was made with the cleaning-down and painting of that portion of the structure completed.

Penstocks.—The erection, riveting, and caulking of the penstocks between the tunnels and the Johnson-Larner valve casings were commenced and completed for the three units, with the exception of the jointer-ring of No. 1. The bituminous painting and enamelling of these sections, together with the completion of that in the tunnels, has been finished for Nos. 2 and 3 units.

Turbine and Valves.—The erection of No. 3 turbine and valve, which was commenced early in the period, was completed, and the unit later put into service. Difficulty was experienced with the aligning of the outlet casing of the valve, and before the cover could be got into position concrete had to be cut from around the lower portion of the outlet section and flanges eased by cutting out rivets. No. 3 valve was put into service with hand-control apparatus, pending a thorough trial and test of the automatic equipment fitted. Difficulties are being experienced with the governor of this unit, which is apparently sluggish, the speed of the unit due to suddenly throwing off load being in excess of the makers' guarantees.

The casing of No. 2 turbine has been erected, aligned, and grouted in, the runner and guide vanes erected, and the main valve completed except for the control gear. The erection of the governor, which is on site, and turbine details, comprising the lubricating, compressed-air and oil-pressure system, have yet to be done.

No. 1 turbine casing and outside casing of the valve have been erected, aligned, and grouted.

Tail-race.—At the beginning of the period the work of clearing the tail-race of spoil dumped by the late contractors into the river from the power-house excavation and of enlarging and straightening the channel itself was put on three shifts. A sand-bar across the old river-bed, at a point approximately