

## SCHEMES UNDER CONSTRUCTION.

*Rangitata Diversion Race.*—This forty-two-mile diversion canal, which has a capacity of 1,150 cusecs and which will be capable of diverting almost the entire winter flow of the Rangitata River, has been designed to irrigate nearly a quarter of a million acres of the mid-Canterbury district. When not required for irrigation purposes the entire flow will be utilized by the Highbank Hydro-electric Station for the development of 36,000 horse-power.

The project will involve the excavation of nearly four and a quarter million cubic yards and the erection of a considerable number of reinforced-concrete structures. These include road bridges, drainage culverts, radial gate controls, and syphonic spillways. To enable the water to be passed under the Ashburton and Hinds Rivers and their tributaries, concrete conduits are required. Some of these will be constructed of precast concrete pipes having an internal diameter of 11 ft. On one difficult section of country a reinforced-concrete conduit is required and will extend for nearly  $1\frac{3}{4}$  miles. This structure is being constructed of precast pipes which have an internal diameter of 12 ft. To date 400 ft. of this high-pressure syphon has been laid. The intake structure itself is nearing completion, and it is expected that towards the end of May the concrete caissons, which weigh approximately 700 tons each, will be floated out into the Rangitata River.

During the year another fifty-nine structures have been erected, the total number to date being eighty-five.

Excavation work is now spread over 40 miles of race, the total yardage to date being 3,222,000 cubic yards, and the yardage for this year being 939,000. The excavation work on this race is being carried out by thirty-six high-powered Diesel machines.

*Surrey Hills Pipe-factory.*—The establishment of this modern factory for the manufacture of large concrete pipes is now complete, and it will shortly be possible to produce five pipes daily. To date the factory has turned out forty-one pipes, which have an internal diameter of 12 ft., and weigh 28 tons. The modern methods employed in the manufacture, placing, and finally the steam-curing of the concrete enables the pipes to be handled forty-eight hours after pouring.

Eventually these pipes will be used on three large jobs—namely, the Surrey Hills high-pressure syphon, North and South Branch Ashburton River crossings, and on the upper portion of the penstock line for the Highbank Power-station. These structures will in each case be able to accommodate the entire flow of the Rangitata Diversion Race.

*Ashburton-Lyndhurst Scheme.*—This scheme, which is situated between the North Ashburton River and the Rakaia Methven railway-line, has been designed to irrigate 34,000 acres, involving the formation of 132 miles of race containing 534,000 cubic yards of excavation.

Work for the year has been the excavation of 27 miles of race containing 60,000 cubic yards of excavation, bringing the total race formation to date to 124 miles and the race excavation to 502,000 cubic yards. The percentage of this work completed is 94.

Five hundred reinforced-concrete structures have been built during the year, making a grand total of 1,588. This figure represents 88 per cent. of the structures necessary to regulate the flow of water.

On this scheme an area which was prepared for demonstration purposes still possesses the best pasture in the district. One return issued by the Department of Agriculture showed that the area carried an average of 9.96 sheep per acre and averaged as high as 14.1 sheep per acre during the irrigation season.

All excavation work for the year has been carried out by Diesel-powered excavation plant.

*Mayfield-Hinds Scheme.*—This scheme is situated between the Rangitata and Hinds Rivers and is designed to irrigate 54,000 acres.

The race excavation will amount to 1,000,000 cubic yards and will require the formation of 210 miles of race. Approximately two thousand reinforced-concrete structures will be required to regulate the flow of water on this scheme.

Although progress has been considerably retarded as a result of war conditions, excavation by Diesel-powered plant has been pushed ahead. During the year 40 miles of race has been formed, containing 162,600 cubic yards, and 12 miles of fencing and 148 reinforced-concrete structures have been erected.

During the past few months carpenters on these works have been concentrated on erection of portable accommodation, and several units have been supplied in accordance with the Temporary Farm Workers' Accommodation Scheme.

## CANTERBURY IRRIGATION INVESTIGATIONS.

*Stream Gauging:* Continuous records were obtained from eight automatic water-level recorders on major rivers. Discharge records during low flow periods were checked.

*Soil Moisture and Rainfall:* Observations and records of soil moisture and rainfall were continued at forty-four stations in Canterbury and Marlborough.

*Evaporation:* Continuous records of evaporation, wind-mileage, humidity, and temperature in the same districts were obtained from six stations.

*Rainfall Run-off:* Continuous records of rainfall were obtained from six high-level automatic rain-gauges in the North Ashburton River catchment area, and outfall from the catchment was measured continuously at the North Ashburton River automatic recorder.

*Soil Survey:* Soil acidity and fertility studies in the Ashburton County continued.