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Hydro-Electric Development at Ranney's Falls

Two 5,000-H.P. Units to Operate Under 47-Ft. Net Head Between Upper and Lower Reaches of Trent Canal near Campbellford — Conditions Almost Ideal — Another Generating Station for Hydro-Electric Power Commission's Central Ontario System

PLANS and specifications have been prepared by the Hydro-Electric Power Commission of Ontario for the construction of another water power development on the Trent Canal. At present the commission operates eight plants on the Trent Canal system, six of which are on the Trent division of the canal and are supplied with water from the Trent River, and two of which are on the Severn division and are supplied from the Severn River. The proposed ninth plant is to be on the Trent division, at Ranney's Falls, between the present Campbellford and Frankford plants, or about one mile below the town of Campbellford and about two miles above lock No. 11.

When the Trent Canal was constructed by the Dominion government, a dam was built a short distance above Ranney's Falls to maintain the level in the upper reach, and an artificial waterway was constructed through a part of the town of Campbellford, terminating in locks numbers 11 and 12, by means of which the boats obtain access to the lower reach of the canal. (The lower end of this portion of the canal and these two locks are shown on p. 458.) It was then planned to take advantage at some future time of the difference in level between the two reaches which is available at this point, and as a part of the wall on the river side of the canal there was installed a reinforced concrete sluiceway with five overflow sections, each 20 ft. long. The concrete deck of the sluiceway serves as a bridge to carry a main highway across the proposed forebay.

SITE OF RANNEY'S FALLS DEVELOPMENT, LOOKING FROM LOWER END OF TAILRACE TOWARD INTAKE SLUICEWAY IN BACKGROUND

The total length of the sluiceway, including the four piers, is 116 ft. and the height is 15 ft., the deck being at elevation 480 and the foundation at elevation 465. The regulated water level in the upper reach of the canal is at elevation 477.2, and in the lower level of the canal, 429.2, so that the difference in elevation, or gross head, is 48 ft. Allowing 1 ft. for losses through the plant, the net head on the plant will be about 47 ft.

The plant has been tentatively designed for a flow of approximately 2,300 cu. ft. per second, which in this particular section of the canal means a velocity of about 1½ ft. per second. In winter the water level in the lower reach of the canal is generally dropped about 7 ft. in order to avoid damage by flooding in case of ice-jams, so the head will then be approximately 54 ft. and the capacity of the plant thereby increased. The draft tubes will be carried low enough to be sealed at the lower elevation of the tail water. Under normal conditions, with 47 ft. head, the capacity will be about 9,000 k.v.a. at 80% power factor, current lagging.

From the outside walls of the sluiceway, gravity retaining walls, approximately 120 ft. long and averaging 20 ft. in height, will extend to the gate-house, which will house the racks and head gates and which will adjoin the power-house proper. The gate-house and power-house will be of reinforced concrete construction. Provision will be made in the head works for an ice chute for handling any ice which may find its way into the forebay. The power-house floor will be at elevation 455 and the generator coupling about 4 ft. lower.

There will be two units, and for each unit there will be provided two head gates of the Stoney sluice type, from which the water will be carried to the turbine casings through reinforced concrete supply pipes approximately 53 ft. long. The turbine casings will be of the scroll type, molded in concrete. The hydraulic turbines will be of the single runner vertical type, direct connected to generators. The turbines will have a capacity of 5,000 b.h.p. under 47 ft. net head when operating at 120 r.p.m. The generators will be 3-phase, 60-cycle, 6,600 volts, each of 4,500 k.v.a. capacity at 80% power factor, capable of operating continuously at an overload of 5,300 k.v.a. The maximum efficiency of the turbines will be at approximately 90% full load, and they will normally operate between 70% and 90% of full load. The scroll cases will be about 30 ft. in inside diameter, as the physical dimen-