

# The Canadian Engineer

A Weekly Paper for Civil Engineers and Contractors

## Progress of Queenston-Chippawa Power Canal

Nearly Five Million Cubic Yards of Earth and Rock Removed—Huge Shovel Establishes Record in Loading 8,500 Cubic Yards on Cars in 20 Hours—Extensive Construction Railway Handling 200 Trains Daily—Payroll Only 1,000 Men Per Shift—Construction Equipment Worth Several Million Dollars

WITH several million dollars' worth of equipment on the job, and a pay roll of 2,000 men, the Hydro-Electric Power Commission of Ontario is making rapid progress on the Queenston-Chippawa power development. The construction organization has been perfected, any probable difficulties in excavation have been adequately met, the overburden has been stripped from nearly half the length of the canal, considerable rock has been taken out, the forebay is nearing completion, the power house site has been cleared, the construction railway into the power house site is being graded, the hydraulic turbines and the generators are under construction; in brief, it is now almost solely a matter of digging, channeling, drilling and blasting to complete what will probably be the largest and one of the most efficient hydro-electric plants in the world, developing at least 300,000 h.p. under 305 ft. average net head.

In the June 20th, 1918, issue of *The Canadian Engineer*, pages 545 to 550 inclusive, appeared an article which dealt with the economics and design of this development. In the September 26th and November 21st, 1918, issues respectively appeared brief descriptions of the proposed turbines and generators. The present article is intended primarily to deal with the methods of construction and the progress that has been made to date.

Referring to the accompanying profile, it will be noted that the canal is entirely in rock excepting from about Sta. 335 to Sta. 350, near the Whirlpool, and from Sta. 0 to Sta. 40, adjacent to the Welland river.

From Sta. 273 (Niagara, St. Catharines & Thorold Railway) to Sta. 460 (the forebay) the canal section has been entirely stripped to rock with the exception of a small amount of work remaining to be done near the Whirlpool gully. Three electrically-driven shovels are at work removing the overburden between Sta. 100 and Sta. 273. With the exception of pilot cuts, practically no earth has been moved between the Welland river and Sta. 200. Rapid progress is being made with the Welland river section of the work, which is being handled by a dredge and a cableway excavator.

A large quantity of rock has been removed at the forebay and between the forebay and Sta. 273.

There are ten power shovels at work on the canal, all manufactured by the Bucyrus Co. The three largest are electrically-driven, each being equipped with an 8 cu. yd. bucket for excavation in earth, and each weighing 400 tons. There are also three electrically-driven shovels each equipped with buckets of 4½ cu. yds. capacity, and one electrically-driven shovel (with caterpillar traction) equipped with a ⅞-yd. bucket. There are three steam shovels, one having a bucket of 2 yds. capacity, one 1-yd. and one ⅞-yd., the latter two having caterpillar traction.

An 8-yd. shovel is at work at the forebay removing the rock to a depth of about 45 ft. The first lift of rock has

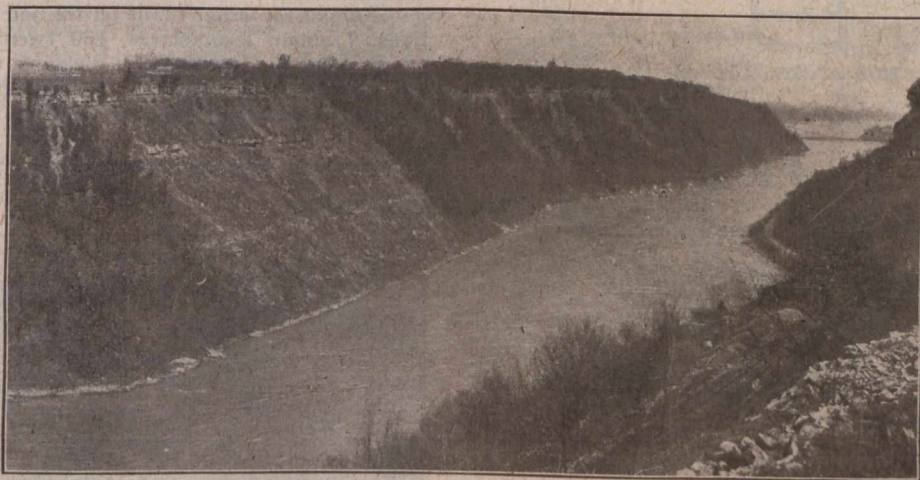
been entirely removed to a width of 300 ft. at the gate house and the remainder of the rock to the necessary depth has been drilled and blasted to a total width of 500 ft. at the gatehouse and is now being loaded by the shovel. Tracks have been laid on top of the blasted rock, at an elevation about 30 ft. above the shovel's tracks, and the electrically-hauled trains of dump cars are run over the rock directly to the shovel.

Between the forebay and Sta. 273, two other shovels are working in rock, one 8-yd. and one 4½-yd. capacity. It should be stated that these capacities, as well as those mentioned above, are the capacities of these shovels in earth. The capacities in rock are, of course, proportionately smaller. For example, each 8-yd. shovel has a capacity of 5½ cu. yds. in rock.

The two shovels that are working in rock between the forebay and Sta. 273, started at Station 295 and are going in opposite directions, the big one working toward the Welland river and the 4½-yd. shovel going toward the forebay, both working on the first lift of rock.

Channeling, drilling and blasting proceeds almost incessantly, day and night, ahead of the shovels. The shovels are being operated by two shifts of ten hours each, an adequate equipment of flood lamps providing plenty of illumination for carrying on the work at night.

A 4½-yd. shovel is at work at the Whirlpool cleaning up the bottom preparatory to the riprap construction.



POWER-HOUSE SITE CLEARED—VIEW FROM THE UNITED STATES BANK OF THE NIAGARA RIVER—LEWISTON BRIDGE, ABOUT A MILE DOWNSTREAM, CAN BE SEEN AT EXTREME RIGHT OF PHOTO