

# The Canadian Engineer

A Weekly Paper for Civil Engineers and Contractors

## Hydro-Electric Power Development at High Falls

Net Head of 80 ft. Utilized at Power Site on the Mississippi River by the Hydro-Electric Power Commission of Ontario—Details of Dam, Intake, Gate House, Pipe Line and Power House—Surface Area Method of Proportioning Materials Shows Excellent Results in Construction of Concrete Dam

AT HIGH FALLS, on the Mississippi river, in the southern part of Lanark county, Ont., about 25 miles northeast of Perth and  $\frac{1}{2}$  mile above Dalhousie lake, the Hydro-Electric Power Commission of Ontario is developing a power site and installing hydro-electric machinery with total capacity of 3,600 h.p. This plant will be the fifteenth generating station to be owned by the "Hydro" Commission, and two others are also under construction, the Nipigon plant (see *The Canadian Engineer*, June 12th, 1919, issue) and the great Queenston undertaking (see the following issues of *The Canadian Engineer*: August 28th, 1919; November 21st, 1918; September 26th, 1918; and June 20th, 1918). The fourteen other plants owned by the "Hydro" are the following:—

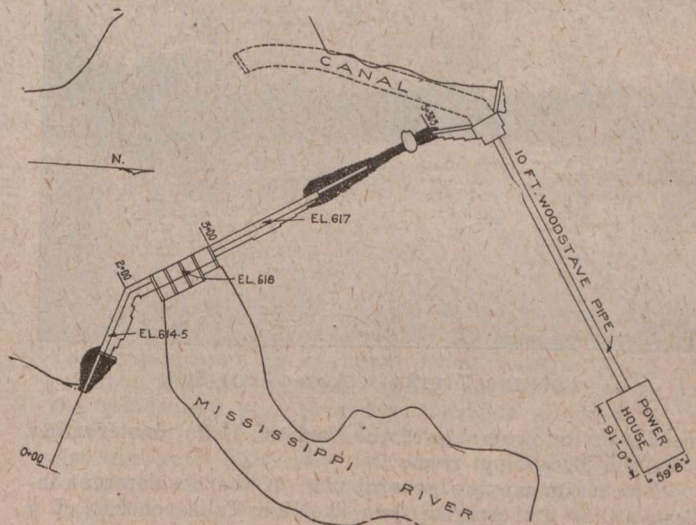
Wasdell's Falls, Eugenia Falls, Nipissing Power Co., Erindale Power Co., Trenton, Campbellford, Frankford, Auburn, Fenelon Falls, Carleton Place, Ontario Power Co., Big Chute, Healy Falls and South Falls.

The first two mentioned—Wasdell's Falls and Eugenia Falls—were constructed by the "Hydro," but all of the others were purchased from the former private owners, although in the case of the four last-mentioned plants, the "Hydro" has built extensive additions.

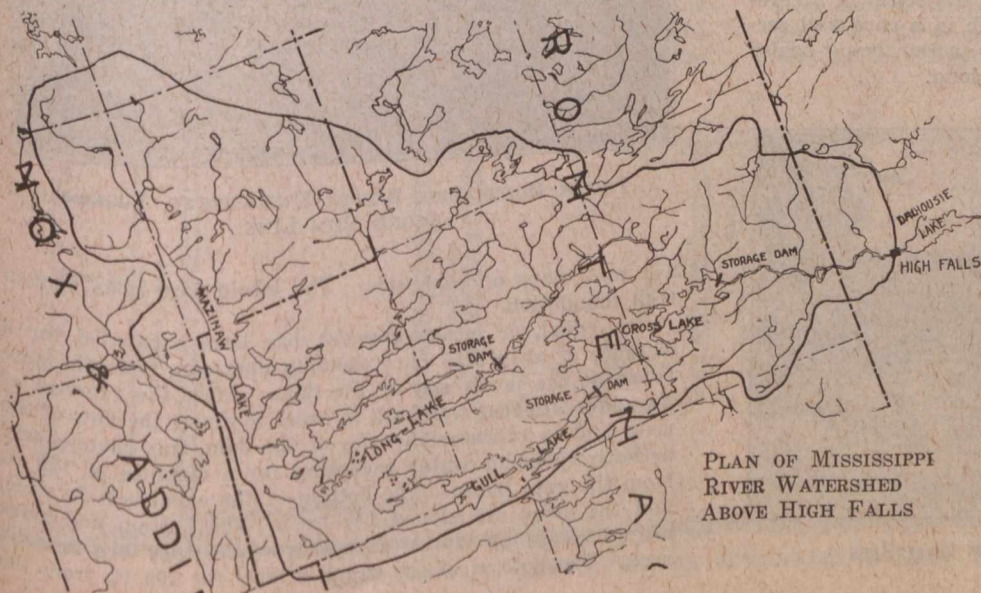
The drainage area of the Mississippi river above High Falls is approximately 450 square miles. The first complete year for which run-off records were obtained by the "Hydro" was November, 1915, to November, 1916, for which twelve months the maximum run-off was 2,940 c.f.s., and the minimum 214 c.f.s., with a mean of 776 c.f.s., or a run-off depth of about 23 inches on the drainage area. For the following year, the maximum run-off was 2,060 c.f.s., the minimum 72 c.f.s., and the mean 426 c.f.s., or a run-off depth of about 12.8 inches on the drainage area. For the year November, 1917, to November, 1918, the maximum run-off was 2,530

c.f.s., the minimum 186 c.f.s., and the mean 499 c.f.s., or a run-off depth of about 15 inches on the drainage area. The watershed is still fairly well forested. The average run-off for the three years recorded was 567 c.f.s.

The plant that is being installed requires 540 c.f.s. when operated at maximum capacity. The water is used under 80 ft. net head. There are three horizontal, double-runner double-discharge hydraulic turbines; one of them is connected to a single generator, but each of the other two turbines drives a generator at each end of its shaft. This is not a matter of present design, but is due to the fact that



GENERAL PLAN OF HIGH FALLS DEVELOPMENT



PLAN OF MISSISSIPPI RIVER WATERSHED ABOVE HIGH FALLS

practically all of the hydraulic and electrical machinery for this plant was purchased at a low price, as used equipment, from the Hannawa Falls Power Co., of Potsdam, N.Y.

There is ample storage area above High Falls, as the Mississippi river flows through a chain of many lakes of various sizes, including Cross, Gull, Long, Mazinaw, Mud, Mississagagon, Kashwakamak, Buckshot and Grindstone lakes. The required storage dams on these lakes are already built and are owned and operated by the Mississippi Improvement Co., a private company that was organized by the power users who have developed other sites further down the river. The expenses of the Improvement Co. are met by assessments on all of the power users on the river, in