

PROFILE SHOWING DIFFERENT SECTIONS OF CANAL, AND MATERIALS ENCOUNTERED IN EACH

dam work in the Niagara River, are among the structures required.

The dredged river channel, with a gradient of 0.63 ft. to the mile and a mean velocity of 2.0 ft. per second, and the canal, with a gradient of 1.1 ft. to the mile and an estimated velocity of 6 to 7 ft. per second, will pass 10,000 sec.-ft. of water. The power house will contain six 52,500-hp. units, and the site itself, as well as the scheme as a whole, is capable of being expanded, by the provision of additional waterways and power-house space, to take the entire quantity of water that can be diverted under the present treaty on the Canadian side, amounting to slightly more than 1,000,000 hp. capacity.

Drawing water from Grass Island pool after a slight fall from Lake Erie, and delivering it back into the Niagara River below the last rapids at a point where the fall to Lake Ontario is but little more than a foot, the general scheme of development is thought to be by far the most favorable of any yet conceived, and will cost, complete, about \$25,000,000. The time of completion is conditioned by the excavation, on account of the heavy yardage involved, and the opening up of the work and the method of attack with large shovels was dictated by the character of the overburden, which could not be depended upon to support heavy, concentrated loads. The nature of the soil, which contains a considerable quantity of ground water and is so fine in places as to have the appearance of clay, made the

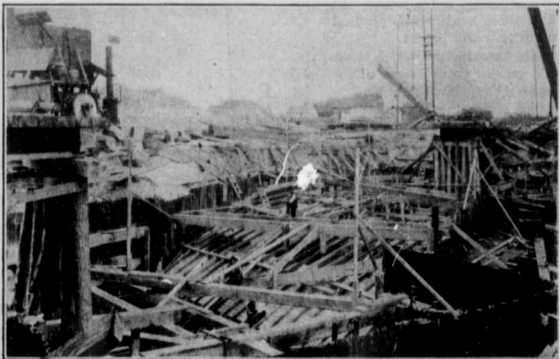
use of large draglines, operating from the tops of the slopes, out of the question. For the same reason it was desirable to carry the heavy excavating equipment right through on the rock surface, to avoid the continuous trouble with soft ground. This required shovels with a great reach, cars on a track 64 ft. above the rock surface having to be loaded at several points. Very large revolving shovels were therefore selected for the work. One has a 90-ft. boom set at 53 deg., with a 58-ft. dipper stick and a 5-yd. dipper. Another has an 80-ft. boom set at 45 deg., a 54-ft. dipper stick and an 8-yd. dipper. A third shovel,

similar to the second, will soon be installed. After the earth is stripped and the three shovels are put on the rock excavation, all will be equipped with 5-yd. dippers.

The cut is made by starting a pilot near one side of the canal prism with a railroad shovel, loading cars on the ground surface. In this cut are run the loading tracks for the big shovel, which follows the pilot cut on the rock surface. The loading tracks connect with the main line at both ends, giving the shovels run-around service. With 20-yd. air-dump cars in eight- and ten-car trains, the big shovels have been able to load 4000 yd. in an eight-hour day.

The entire line of the canal is to be paralleled by a double-track standard-gage electric trolley railroad 175 ft. west of its center line. Near the middle of the work is a Y from which a double-track railroad runs two miles to the main dump, which is capable of taking 20,000,000 yd. The hauling equipment consists of one hundred and fifty 20-yd. air-dump cars, twelve 600-volt direct-current 50-ton electric locomotives, and seven steam locomotives. The maximum grade on the construction railroad, which, when complete, will contain 40 miles of single track, is 1%, and the haulage equipment is capable of making 10 miles loaded and 20 miles light with 10-car trains at any point on the line.

The trolley wires are offset 7 ft. from the center line of the tracks to permit the loading of dump cars, and in order to pass locomotive cranes, of which there are three 40-ton and two 15-ton machines on the work.



THE BRIDGES WERE BELOW THE ORIGINAL GROUND SURFACE,