Canadian as its sister corporation was on the United States side of the river. The power house has a capacity of 110,000 h.p., and the whole of this immense power will be provided for at once, except 10,000 h.p., which will be held as a spare unit. The work progresses smoothly and rapidly under the skillful direction of Cecil B. Smith, C.E., the resident engineer. The wheel pit is now excavated, and a considerable part of it is lined. It is 165 feet deep, 18 feet wide inside of the brick lining, and is 570 feet long. The power house, the steel frame of which is erected by the Hamilton Bridge Works Co., is similar in design to the power house No. 2 of the company on the United States side. It is of Queenston limestone, with colored tile roofing, and will be lined with mottled buff brick, the base being of enamelled brick. Two 50-ton cranes were designed and erected for handling the heavy material for this structure, and these are operated by current taken from a transformer station on, the hill above the park. This station is supplied by current taken from the power house on the United States side, from which not only these, but the other works in progress take current to the extent of about 4,000 h.p. The hoistsand rock drills are chiefly operated by steam and compressed air. Of the eleven mouths for as many turbines, nine will be placed in position now, and six of these are having wheel pits cut and bricked up ready to attach the machinery, which will be ready for delivering power about De-cember next. The turbines, each of a capacity of 12,500 horsepower, were designed by Escher, Wyss & Company, of Zurich, Switzerland, and are of the twin Francis vertical type, inward discharge, two draft tubes to each unit," discharging into the open tailrace below. Three of these units are being manufactured and installed by this firm, and two units on the same design by I. P. Morris Co., Philadelphia. The generators, each of 10,000 horse-power, are of the internal revolving field type, and will generate alternating 3-phase current, 25-cycles, at 12,000 volts. Five of these are being installed by the General Electric Company. The generator and turbine are direct connected by a vertical shaft, and will revolve at 250 R.P.M. The auxiliary machinery, consisting of exciter turbines, exciters, water pumps, oil pumps and oil tanks, etc., are located in three chambers built into the side of the wheel-pit 100 feet beneath the surface. This machinery will all be operated by an independent water service drawn from the canal above. From the portions of machinery now on the ground and in



Toronto and Niagara Power Co.-View in tunnel.

the power house one can form a fair idea of their immense power. The first dynamo is being put together, after having been erected and tested at the works in Schenectady, and then taken apart for transportation to Canada. There are 50,000 laminations in this machine, the largest in existence at the present day, its actual net capacity being 10,250 h.p., and its diameter 18 feet. The turbine to which it will be connected will exert 12,500 h.p., the weight of all the revolving parts being 187,000 lbs. The shaft on which this immense machine revolves is forty inches in diameter, of steel, and hollow except for the bearing part, which is fourteen inches in diameter, and of solid nickel steel. The steel castings forming the lower elbow of the penstock are in two sections, each half weighing 75 tons. There appears to be only one place in the world—Pilsen, Germany—where steel castings of such a size and shape can be made. The transformer station, equipped with water-cooled transformers, has a present capacity of 25,000 horse-power. It will be supplied with water for cooling purposes from pumps located in the chambers of the wheel-pit. There will also be a standpipe 116 feet high and 30 feet in diameter carrying



Map of Niagara Peninsula, showing transmission lines of Toronto and Niagara Power Co., and of Hamilton Cataract Power, Light and Traction Co. (the latter starting from De Cew Falls.)

one day's supply of water, to be drawn upon in case of any accident to this pumping system. This would supply 50,000 h.p. for the day. This station is now about completed. The tunnel tailrace, just completed, is 2,200 feet long and of a horseshoe form, 25 feet high and 19 feet wide, lined with 17 ins. of concrete, with vitrified brick facing. The grade of this tunnel is seven feet per thousand, which will give a speed of water when plant is in full operation of about 27 feet per second. The head canal has a clear waterway 15 feet deep and 250 feet wide, and is crossed by a five-span stone arch bridge, now finished, which carries the tracks of the Niagara Falls Park and River Railway, a carriage way and sidewalk. This canal widens into a forebay 600 feet wide, extending the whole length of the power house. The underground conduits are now being laid. The main one runs from the power house down to the Upper Arch Bridge, on which it will be carried across to the United States side for transmitting such current as is required in New York State. This conduit, which is half finished, and is 11/2 miles long, will have 32 holes, with a transmission capacity of 75,000 h.p. The other series of conduits is carried to the transformer station on the hill, half a mile distant, and will contain 24 ducts, with a capacity of 50,000 h.p.

THE RIVER ICE PROBLEM.

The plan adopted by the Canadian Niagara Power Co. for keeping the power-house clear of ice has already been described in this paper. The retaining wall forming the forebay is two feet lower at its point of junction with the walls than at the upper end. As the heavy floating ice is carried down the forebay, the narrowing of the water area and the