for that period the thirst of greater Winnipeg up to a population of 850,000 with an average daily consumption of 100 gallons per individual could be supplied by Shoal Lake.

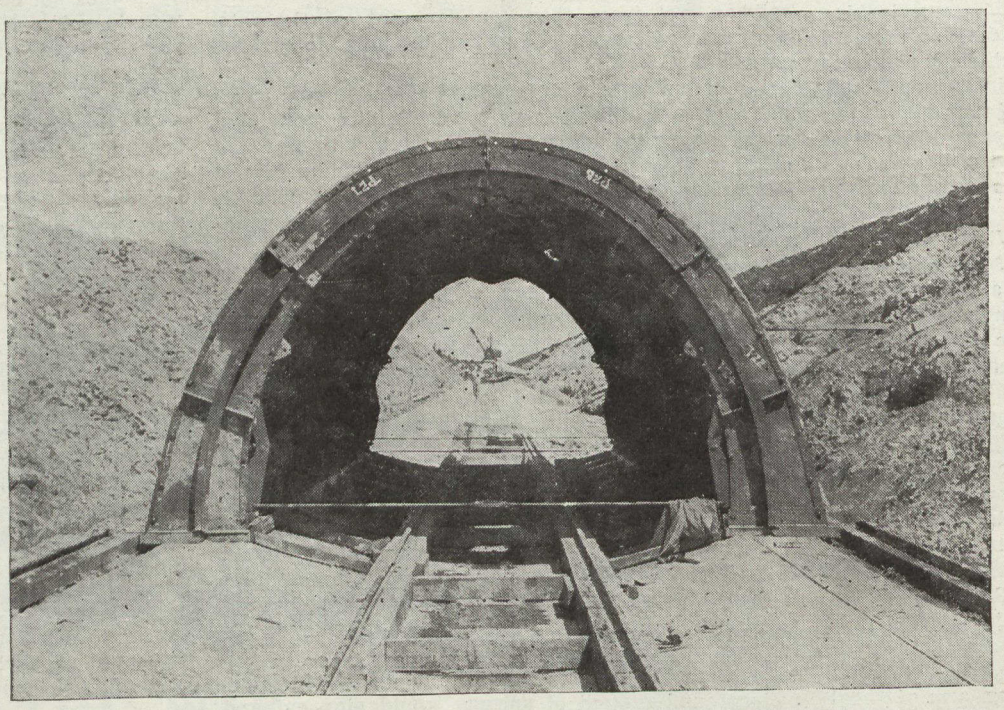
These two obstacles overcome, the next was gravity. There was a height of land known as the summit between Shoal Lake and the gradient leading down to Winnipeg. This could be overcome by two methods: either by natural gravity or by pumping. If by gravity, it would be necessary to tunnel deeper under the summit. If by pumping, that lower depth could be avoided. Gravity was recommended—and adopted. It is a basic principle in that part of the world that most things gravitate towards Winnipeg anyway. Why not water?

THE engineers' report occupies several pages. We can ignore most of them. The main fact is that within three years of the time when the first test was made of Shoal Lake water, Winnipeg has within at most two years of completion the greatest underground river-way in Canada. The work of survey was begun almost immediately. The first problem was to get right of way over Dominion Crown lands, of which there is a vast domain on the eastern edge of Manitoba. These lands, beginning sixty miles or so from Winnipeg, were as wild as any hinterland in the far north. Vast tracts of jackpine and stunted cedars and untractable muskegs stretched between the head of water and the farm country near the city. The surveyors found scores of caribou and moose, many of them almost incredibly tame. One of the engineers paused under a tree thinking he heard one of his party smashing through the wildwood. The smash came from a bull caribou who, without noticing the man, came up and locked his horns into the very tree on which the engineer was leaning, then as he got the man-smell he turned and plunged off into the wilderness.

To comprehend and conquer this muskeg-haunted wilderness for purposes of a cement waterway was one of the most interesting exploits ever undertaken by engineers in this country. The report recommended one great essential—the building of a complete line of broad gauge railway that could be used for carrying in all the material used in construction: iron, steel, copper, cement, crushed stone, gravel, sand and camp supplies. To build the 100 miles or less of road cost $1,300,000. That was an enormous item when a switchback might have done. But there was a shrewd economy latent in the Winnipeg brain. That railroad might become an asset. How?

GOVERNMENT land was the idea. Nearly half the road would run through these reserves. Much of the land, probably fifty per cent. of it, was good, arable soil, capable with drainage of raising magnificent crops. Sample garden plots were tested out along the route. They flourished. With such land adjacent to a railway which was twenty-two miles at least from the Grand Trunk Pacific and the C. P. R. to the north and sixty miles from the C. N. R. to the south, why should not this new railway become a permanent common carrier? All it needed was settlers; some of the then surplus population of Winnipeg drafted off to take up 40-acre farms which by more or less intensive cultivation could be made to give fat returns. The revenue from the traffic created by this road would be enough to carry the investment and the operating expenses, and with an ultimate profit; meanwhile the road was needed to carry in supplies. It became immediately economic in carrying out farm freight to Winnipeg produced by farmers already settled within fifty miles of Winnipeg. Whether the road will be retained by the Aqueduct Commissioners on behalf of the various municipalities and operated as a revenue producer to pay interest on aqueduct bonds, or whether it may be sold outright to one of the common carrier roads at what it cost to build after earning interest as an aqueduct carrier, is yet to be decided. But the novelty of building a real revenue-producing railway as an adjunct to a waterworks is one of those things that occur most easily to the elastic imagination of the West. Here again the average Toronto vision would be sadly in arrears.

Telephone lines were installed. Contracts were let. Camps were run up. The big work began. For two years it went on, this silent but curious invasion of the wilderness by an industrial machine; railway and waterway surveyors, engineers, railway builders, telephone constructors, contractors, gangs of navvies in many languages, the concrete mixer and the ordinary steam shovel and the giant drag-line excavator that stands buoyed up on a platform on roller feet that propel it over the muskeg, stands there in the midst of a manless, even cattle-deserted land and gouges up the humus a cubic yard at a time. This giant wild-hog of the wilderness did the excavating through what is known as the big muskeg where the trench is from 16 to 23 feet deep. Any big game hunter walking through there a year ago would sink in the ground almost every step between the knees and the hips. In order that machinery capable of handling the work could be used, it was necessary first to drain the surface water off. This was accomplished by using a light gasoline dredge that put a six mile ditch through as the line of the aqueduct. During the past summer this big drag-line, weighing 145 tons, with a 100-foot boom, has been in commission excavating the waterways trench.



Winnipeg Water will come for 100 miles through an aqueduct of which this is a section. This is the new underground riverway that will provide future greater Winnipeg with a maximum of 88,000,000 gallons a day. The aqueduct railway runs along the bank to the right.

It was a strange, energizing business. The moose and caribou drew off to the undisturbed places to think it over. Month by month the canal lengthened and the work of building the aqueduct began; built according to a model, not a cylinder, but an arch with a concave floor, finished in sections, first the floor on the foundation sand, then the wooden forms that act as moulds for the arches, which in sections were filled in with cement, set solid and formed the beginning of the great hundred-mile tube.

In ordinary construction such work has been done many times before; under circumstances so unusual never before in this country for that purpose. To the question—How do you guarantee that the foundation will not settle and crack your tube? the answer comes, "Well, you see, the entire weight of any section of the aqueduct, even filled with water up to the 85,000,000 gallon a day mark, is not equal to the original weight of the material excavated and that gave the sub-sand its solid pack."

You never can catch one of these engineers napping. On a recent trip of inspection, when the writer was kindly invited to go along, the best part of a hundred men representing six municipalities did their best to pick flaws in the project. Most of the attempts were genially met by scientific explanation. At every few miles the waterworks train with its cold-lunch picnic party on board stopped to let the shirtsleeves gang walk through sections of the cold tunnel, average temperature winter and summer, 45 degrees. One of these tunnel walks was two thousand yards done by means of flaring torches; a mysterious aboriginal sort of procession that seemed like a cross between a pilgrims' chorus and a parade of the cave-men. The whole day, from nine a.m. until near midnight, was spent on the excursion, including a supper at the beautiful Indian Bay camp, the chief beverage of which was Indian Bay water, ice-cold and delicious. The guiding genius of the party outside of Engineer Chace was Mayor James Waugh, chief commissioner. It was a hopeful, enthusiastic journey through a country that in places seemed to be a thousand miles from nowhere, instead of fifty miles or so from a big modern city.

AT present the big trouble with the aqueduct is lack of labour. But in due time the greatest well in Canada will be finished; and when it is, the water that leaves Indian Head Bay this morning will arrive at the Winnipeg reservoir just four full days later. The rate of flow is figured by gravity at a mile an hour. The aqueduct will be all filled in behind and overhead to prevent frost. When the water arrives at the end of the aqueduct proper it will be carried by a special tube under the streets to the Red River; from there by a six-foot steel tunnel under the river into the reservoir, from which it is to be pumped into the mains of the six municipalities comprising greater Winnipeg.

And when the first head of water starts from the huge reservoir at Shoal Lake down the 100-mile tunnel to Winnipeg the guardian angel of Chief Commissioner Waugh will be seen coming along the top of the tunnel carrying a banner inscribed,

"When Winnipeg wanted water as good as God ever made she had to have it."

The first delivery of 1918 water in Winnipeg may be accompanied by an orgy previously unknown in Canada. By that time Winnipeg will have become so enthusiastic over water and no whisky that it may be necessary to stage up a water pageant with Aqua Pura, Undine, Neptune, river-gods, water-sprites, nymphs and naiads—anything but Bacchanalians—as chief characters to celebrate the year that Winnipeg first tasted water from a well that with the well-hook, not including the water-main bucket, cost $13,500,000.

There is one very classic parallel to the Winnipeg aqueduct. That is the waterway leading from Loch Lomond to Glasgow. The Scotch city had the same trouble with hard water that Winnipeg has. Loch Lomond, far up in the Highlands, was a reservoir of perfect water, celebrated in picture, prose and song. The practical Glasgowian in his Lowlands decided to strengthen the bond of union between the Highlands and the Low by condescending to drink and bathe in Loch Lomond water. What the cost of this scheme was is not known here. But it has been a huge success. The difference in the case of Winnipeg was that it was not the present, but the future, for which the Commissioners had to build. Greater Glasgow was a pretty definite size, Greater Winnipeg is an unknown quantity. The present population of 225,000 for the municipalities in Greater Winnipeg is only a fraction of the great city expected to rise at the junction of the Red and the Assiniboine. The growth of that city is measurable by the water it consumes quite as easily as by any other method. Here are the figures of growth for the period 1902-1912, as contained in the engineers' report, based mainly upon water:

Year.	Population.	Water Supplied per Day. Gallons.	Per Inhabitant.
1902	48,411	1,550,000	32
1903	56,741	1,860,000	33
1904	67,262	2,340,000	35
1905	79,975	3,280,000	41
1906	101,057	3,500,000	35
1907	111,729	4,580,000	41
1908	118,252	4,880,000	41
1909	122,390	5,820,000	48
1910	132,720	5,930,000	45
1911	151,958	6,510,000	43
1912	166,553	7,750,000	47

THIS is for Winnipeg alone, not including the extra municipalities which some day may be absorbed in Greater Winnipeg. It shows that the thirst for water has been steadily on the increase, from 32 gallons per head daily in 1902, to 47 gallons in 1912. Was it any wonder that prohibition had to come in 1916? The engineers estimate that even 47 gallons a day is too little. They allow 85 gallons a day for every person, so that the aqueduct now being built is big enough for a Greater Winnipeg of 1,000,000.