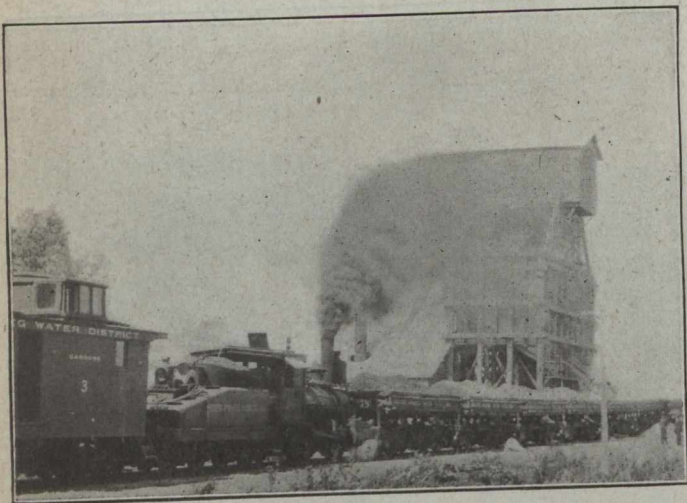


When the concreting has been completed for a distance and has hardened, backfilling is begun. This is done in two stages. Material is first tamped into place along the base of the arch to a depth of 4 feet and to an outer slope of 2:1. The remainder of the backfill is then done, usually by machinery. During the second stage instructions are given to bring the earth up evenly along both sides and thus furnish lateral support to the arch, care also is taken not to drop earth directly on the crown



Loading Crushed Stone

of the arch and thereby cause sudden and unnecessary stresses.

The depth of the finished backfill is 4 ft. over the crown of the arch, and the width usually about 8 ft. with a $1\frac{3}{4}:1$ slope to the ground line. When this has weathered for 12 months, and all settlement has been repleted, the top and slopes are seeded.

The district operates two gravel pits, a screening plant and a rock crushing plant. The screening plant is located at McCorkell Pit, mile 31, where the district owns 160 acres. In the pit a locomotive crane and a dragline excavator are employed for digging the gravel, which is then delivered to the plant in dump cars drawn by a dinky locomotive. The material is run through a series of revolving screens which separate it into four sizes and distribute the separated material into three bins, returning all oversize pieces to a crusher. It is drawn from these bins and mechanically mixed in the proper proportions necessary to make the densest and most watertight concrete. This graded aggregate is loaded into dump cars and hauled along the railroad to the various points on the construction work as it is required. During the screening and mixing operations, the material is continuously sampled and analyzed, and the plant equipment is adjusted to ensure a uniform output. The plant is laid out for an output of 6,000 cu. yds. per 10-hour day. A small electric lighting plant has been installed so that night operations may be carried on when necessary.

The "Government Pit," the rights to which were granted to the district by the Federal Government, is located about three miles north of the line of the aqueduct, at mile 80; 126,000 yards were taken from this pit to ballast the east end of the railroad. The material from the pit is used with that from the rock crushing plant to augment the supply from the McCorkell Pit. The mixture is made on the contractor's platforms and the proportions are always under the control of the district's chief engineer. The dust necessary for watertightness is supplied from a convenient excavation of loam.

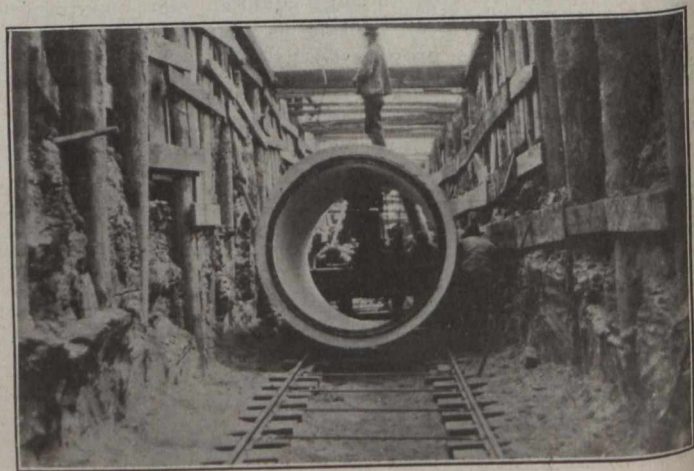
The "Rock Plant" at mile 95 is steam-driven and is equipped with two crushers and screens for grading the rock, which is a trap variety and very hard. It is quarried from an outcrop near the rear of the plant and drawn to the plant in horse-operated skip cars. From the crushed rock the fines are removed for purposes of uniformity; the stone is stored in bins and hauled away in dump cars.

Deacon, which is located on the line of the aqueduct, 12 miles from Winnipeg, is the railroad operating headquarters, and the office of the division engineer for Contract 30 is also located there. At this point the district constructed a 3-stall round house, a cement storage warehouse, a station building and houses for the engineering and railroad staff. There is a machine shop in connection with the round house, and all minor repairs to rolling stock and plant are done there.

The railroad equipment consists of one 65-ton locomotive; four 52-ton locomotives (Mogul type), one 40-ton locomotive, one 18-ton dinky locomotive, forty 20-yard air dump cars, twenty-five 16-yard air dump cars; twenty flat cars, ten box cars, four cabooses and four coaches. Fifty Hart convertible cars are leased from the city of Winnipeg.

In December, 1916, Contract 55 was let to the Winnipeg Aqueduct Construction Co., the amount of the tender being \$1,308,753. This calls for the construction of 9.4 miles of reinforced concrete pressure pipe, 5 ft. 6 ins. diameter, the contract extending from Deacon to the Red River. The pipe is being made in 8-foot lengths, under the "Lock-Joint" patents, at yards established in the town of Transcona, and is cured by steam. The finished lengths are shipped to the line, where they are set, jointed and backfilled. Contract 55 includes the construction of the Seine River crossing. The aqueduct will be carried under the river in the form of an inverted syphon, carried on a reinforced concrete mattress, supported by piles driven to the rock.

Two important contracts remain to be let, viz., the crossing under the Red River, and a pipe line from the



"Carrying" Concrete Pipe Into Place in Trench
Photo, June 22nd, 1917

Red River to the McPhillips Street reservoir in Winnipeg. The Red River job will include the sinking of shafts on either bank and the driving of a tunnel through the rock under the river.

The pipe line through the city of Winnipeg is 2.3 miles in length and 4 ft. in diameter and will probably be cast iron throughout.

(Concluded on page 126.)