

circular groove in the top of the cradle, which collects the water percolating through the upper portion of the conduit.

On the left side between the outer face of the cradle and the wall of the trench, is a space of 10 inches filled with loose rock; the lower end of this loose rock drain rests on a concrete floor and is connected to the collecting gallery by a series of transversal grooves 4 inches wide and 3.14 inches deep running across the concrete floor and spaced 4 feet apart. This concrete floor slopes towards the collecting gallery and has a thickness varying from about 7 inches at the collecting gallery to about 8½ inches at the foot of the loose rock drain. To keep the grooves opened when building the cradle, each groove was covered with a metal plate 5-16 of an inch thick.

To drain the upper half of the conduit, it is covered with an 8-inch layer of broken rock.

The concrete cradle was made of very porous concrete, so that the water percolating through the lower half of the

of two halves butt-joined together with six rivets. The reinforcing steel has an ultimate strength of 57,000 pounds per square inch, and its working strength was assumed at 14,200 pounds per square inch.

The concrete used for the conduit was a mixture of about 1 part Portland cement to 1.28 parts of sand, 2.56 parts of gravel under 1¼ inches, and .53 to 1.00 part of water, all by volume. The interior lining was made of equal parts of cement and coarse sand.

Method of Construction of Conduit.

The interior forms were made in collapsible sections and in several parts so designed that a section could be taken apart and passed through the interior of the erected forms ahead.

Plate 1 gives an idea of the size of the pipe and shows the reinforcement and the interior forms in the distance.

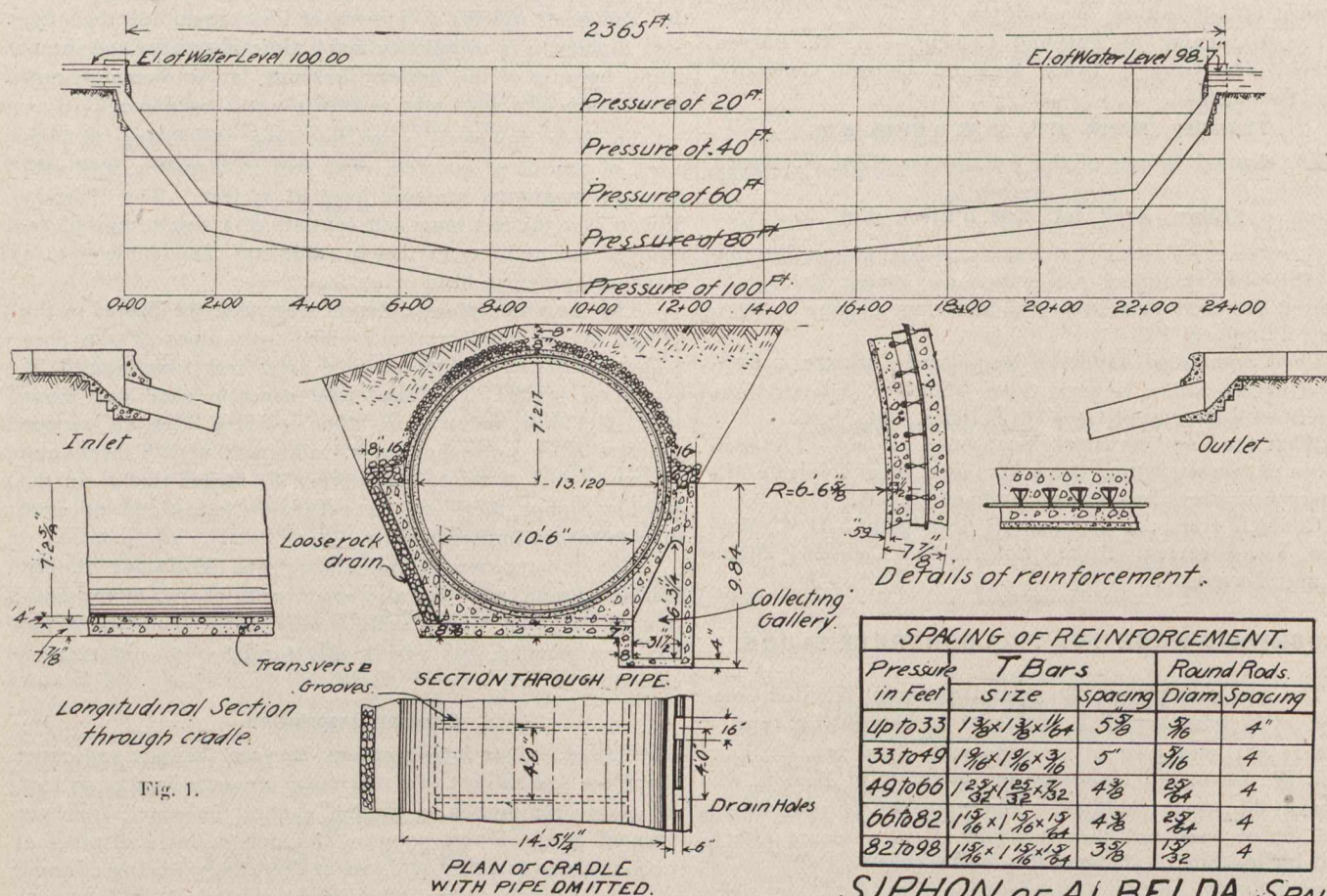


Fig. 1.

conduit would find an easy passage into the drains. The concrete used consisted of about 1 part of cement to 4¼ of sand and 8½ parts of gravel passed through a 2¼-inch screen.

To examine the main collecting gallery, tubular openings were provided each 197 feet.

Description of Pipe.

The shell of the pipe is made up of 7.28 inches of concrete in which the reinforcement is imbedded, and of an inside plaster lining of cement mortar .59 inch thick, giving a total of 7.87 inches.

The reinforcement consists of 124 longitudinal round rods placed about 4 inches apart, and of circumferential bars made of T shapes and tied at their intersection to the longitudinal rods with wire about 1-16-inch diameter. Each circumferential T bar has an exterior diameter of 13.04 feet, and is composed

SIPHON OF ALBELDA, SPAIN.

When completed, the upper half of the conduit was surrounded with loose rock and covered with an earth fill.

The concrete work commenced on the 26th of November, 1908, and the main part of the siphon was completed on the 6th of March. The interior lining and all accessory works were completed on the 4th of April. The water was turned into the siphon and the conduit was tested on the 24th, 25th, and 26th of May. The specifications required that the loss should be not greater than 1.32 gallons per second diminishing to .79 gallons per second at the end of two months.

The tests showed that the total seepage loss under the full head was only .105 gallons per second, or about one-twelfth of the expected loss, and this diminished to one-twenty-fourth the following days, and continued diminishing.

The official inauguration was held on July 8th, in the presence of the Minister of Public Works.