23 feet 8 inches from the base of rail of the Canadian Pacific Railway tracks which pass underneath the bridge at an angle of 80 degrees 30 minutes. These spans are supported on reinforced concrete piers supported on two pedestals 15 feet square at the base with reinforced concrete arch connections. The three piers contain 790 cubic yards of concrete, while 2,660 lineal feet of piling were used in the foundations. Both spans are fixed at the southern end, and have the expansion free end to the north. The two spans contain 428 tons of steel. Both spans have a clearance of 30 feet on the roadway horizontally, and a clearance from the crown of the road of 19.4 feet.

The same type of flooring and paving is provided on the steel as on the wooden approaches. The floor is carried on 8″ x 16′ stringers resting on floor beams with 40″ x 3″ web. The panels of the small span are 17 feet 2 inches wide. Those of the larger are 17 feet 10¾ inches. The sidewalk is carried on the east side of the structure outside the main truss, and has a clearance of 6 feet. It is supported on two 4″ x 3⅓″ x ⅜″ angles supporting ⅜-inch plate, and has specially designed 5½-foot circular posts which carry 2½-inch tubing spaced 10 inches apart vertically.

The loading for the bridge is 5,000 lbs. per foot on the street railway, with impact of 50 per cent. of live load, and on the roadway 100 lbs. to the square foot. The sidewalk is figured at 80 lbs. per square foot. The total cost of this structure was approximately $87,000, which was distributed by the Railway Commission as follows: $5,000 from the Railway Crossing fund. Twenty-five per cent of the remainder to be borne by the city of Moose Jaw, and 75 per cent. by the Canadian Pacific Railway Company.

Messrs. Carter, Hall, Aldinger, of Winnipeg, were the contractors for the concrete work, timber approaches and decking, while the Hamilton Bridge Company were responsible for the steel construction. The whole structure was designed by the Canadian Pacific Railway Company's engineer, per C. D. McIntosh, divisional engineer, of Moose Jaw, while the interests of the city are looked after by Geo. D. Mackie, engineer-commissioner.

## GROUND WATER SUPPLIES.

While ground waters have always been used for domestic water supply purposes, their general use in connection with public supplies is of comparatively recent origin. In America it is the smaller places which are so supplied. In Germany, though, a large proportion of the municipalities derive their water supply from such sources.

Ground water is derived chiefly from that portion of the rainfall which is absorbed by the soil, but also to some extent from the surface water sources, water from which finds its way into the surrounding ground. Ground water sources may be roughly divided into springs, deep wells (sometimes called artesian wells), shallow wells and filter galleries. Of these the filter galleries are those which are, probably, the least commonplace. These filter basins derive most of their supply by filtration from some adjacent surface source. Usually they are not far beneath the surface of the ground. The proportion of the water obtained from the surface source varies greatly, in some cases being nearly the entire supply. In a few cases the yield of wells or filter basins has been increased by discharging water on the surface of the ground in the vicinity, thus creating what might be termed an artificial ground water.

The quality of a ground water supply is almost sure to be good if it does not receive drainage from a considerable population located near the source of supply or if it is not hard and does not contain iron or manganese. The iron is due to the passage of the water through organic matter which uses up the dissolved oxygen which the water may contain, and leaves it with carbonic acid in solution. The iron in the sand is readily dissolved by this solution. Then, as the water penetrates sand containing free oxygen, the iron is precipitated again and largely remains with the sand.

The relative merits of driven wells, dug wells or filter galleries are dealt with in a practical and concise manner by Mr. W. S. Johnson, who recently read a paper before the Boston Society of Civil Engineers on the whole subject of ground water supplies. Mr. Johnson claims that beyond question the dug well is the most satisfactory, provided the conditions are favorable and if the expense is not too large. Where water is obtained from some neighboring water source and the depth of porous material is small a filter gallery parallel to the shore of the surface source may be desirable. Where the water-bearing soil is at some considerable depth it is almost invariably much cheaper to obtain water by means of tubular wells.

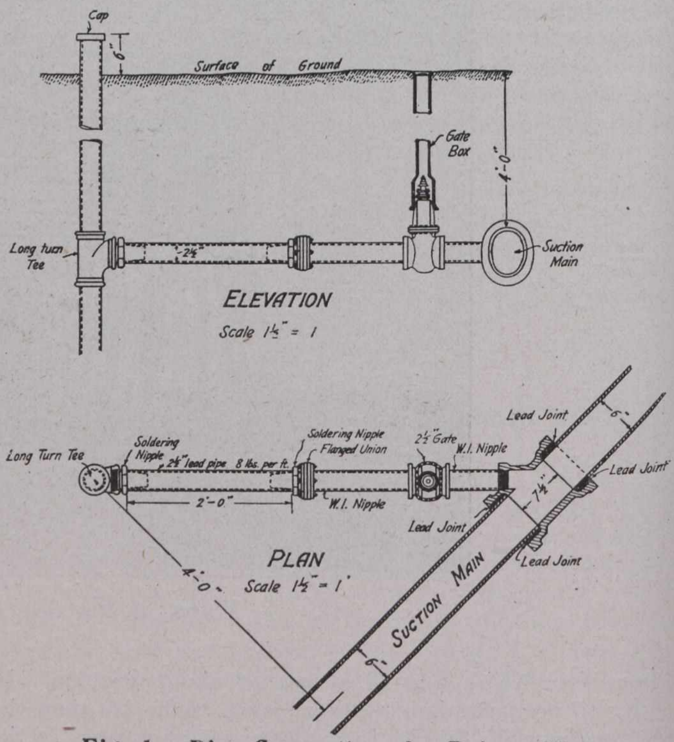


**Fig. 1.—Pipe Connections for Driven Well.**

Between these two extremes the best method to adopt must be determined by local considerations. One of the advantages of the dug well is that there is a large body of water in store from which to draw while the pumps are being run, and when this is exhausted the well has the time until the pumps are next operated to recover. This means that pumps of larger capacity can be used than with the driven well plant. Furthermore, under these conditions the average suction is likely to be less, as in the case of driven wells the ground water level at the wells