masonry. Beneath pier No. 6 ninety-eight piles were driven, and beneath No. 7 seventy-three.

The site of pier No. 5 was protected behind a sand bar, and was therefore shielded from the action of a sweeping current, unless, indeed, the banks of the river should greatly alter their contour. It was, therefore, considered unnecessary that the underside of the pier should take its bearing direct upon the rock. A caisson similar to those employed for Nos. 1 and 3 was made and placed in position by February 13th, 1868, but the temporary piles were driven inside instead of outside the caisson to protect them from the approaching floods.

Three steam dredges were mounted within the caisson, and the work of excavation proceeded until the 10th of September, when a depth of 30 ft. in the sand had been attained, and a thickness of 35 ft. intervened between the bottom of the caisson and the rock. Piles were then driven to the number of one hundred and forty, each pile occupying one day to drive. It was hoped that they could be lowered cheaply and expeditiously by means of a water jet forced under pressure through a cast-iron shoe in the bottom of the pile, but it was found that although by this means a depth of about 15 ft. was reached very quickly, the jet beyond that distance was almost useless, and driving by piling engines was resorted to. From six to eight hundred blows were generally sufficient to get each pile into position. So soon as all were driven the heads were cut off to a level of about 10 ft. below the water, the caisson was pumped out, and the whole space filled with concrete, upon which the masonry was commenced on the 14th of January, and finished on the 9th of March, 1869.

Pier No. 2, the one upon which the swing span turned, was left until the last, in order that the navigable channel should be interfered with as little as possible while the other piers were in progress. This pier is circular, 29 ft. in diameter, and the caisson within which it was built was 40 ft. across, formed of oak staves 4 in. thick, and stiffened with timber ends. It was built on shore, and fitted with a false bottom folding inwards, and well straitened against the sides. It was launched on the 23rd of September, 1868, and was easily lowered into position. In order to keep it in place the group of piles which above and below the pier form the end rests for the swing span when opened, were put in place, and to this the circular caisson was secured as well as to the adjacent piers. A stone wall was built upon the timber rings within the caisson to ballot it. A ring of boiler plate 2 ft. in depth was placed around the bottom, and projecting from it, in order that its cutting edge might facilitate the operation of sinking it through the 8 ft. of sand which overlaid the rock at the site of the pier. The caisson being placed in position, water was admitted until it sunk and rested on the sand, cutting its way in three days through to the rock. This done, the folding wedges which kept the false bottom in position were struck, the bottom removed, and the rock entirely cleared of sand. The original design had provided for 18 ft. of concrete laid within the caisson, at which height above the bed the masonry would be commenced. It was, however, deemed possible to make a water-tight joint around the bottom of the caisson on the outside, and commence the stonework direct upon the rock. This, however, it was soon found to be impracticable, as not only did the joints fail, but water entered the caisson in quantities through fissures in the rocks. The engineer, therefore, returned to the first plan; concrete was employed, the first stone of the pier was laid on the 20th February, 1869, and it was completed on the 21st of April. The end rests of the swing span are placed up and down the stream, and consist of timber structures, the upper one designed as an ice-breaker. A platform on the top of each is on the same level as the underside of the swing.

The whole of the masonry is of limestone, the facing being in ashlar work, the backing of rubble. The top of the piers is 11 ft. higher than the level of the highest registered flood, and 48 ft. above the lowest water line. The total height of No. 4 pier from rock to coping is 89 ft., and the whole of the piers, except that for the draw span, have a batter of 8ths, the ice-breakers being built with a rake of two to one. The superstructure is composed of wood and iron, the 60 ft. land span and the 362 ft. swing being of wrought iron, and the three openings of timber trusses strengthened with iron tie rods. The swing span is a lattice truss, a modification of the Pratt truss, and known in the States as the Linnville and Pipper patent. It weighs 850 tons, and is based upon one of Sellars's pivots, consisting of a live pin revolving upon conical rollers. This span was raised immediately after the completion of the circular pier, upon temporary works placed up and down the river, in order that the navigation should not be impeded. The girder was hardly in position before a freshet swept away a portion of the temporary work, without, however, doing any damage to the structure. The placing of the 200 ft. span—a timber and iron truss—in position was attended with considerable anxiety and risk. It will be remembered that pier No. 4, upon which one end of the span took its bearing, was built in a novel and somewhat daring manner. The construction of the truss was also rather singular. During the winter of 1868 a sandbank some 30 ft. thick had been deposited upon the rock between Nos. 3 and 4. Into this sand piles were driven in groups 37 ft. apart, well stayed, and cribs were framed to be built around them, and secure them at the base; before these could be placed in position, however, a break-up of the ice took place, and swept away cribs,