

three of sand and two of cement, a slightly larger proportion of cement being used in the first few feet. It was found, however, that so large a measure of sand was not favorable to the rapid setting which is important when the beton is exposed to the water from the very first, and in the subsequent foundations this proportion was changed; the beton used at Pier No. 4, consisted of eight parts of stone to two of sand and three of cement; that used at Pier No. 2 had nearly the same constitution. In laying beton under water considerable inconvenience was found from the *laitance* which formed in large quantities, especially if the mortar had been mixed too thin, or if the water was very cold; it was sometimes necessary to suspend the work for a day or two, and pump out the *laitance*, but it was generally found sufficient to pump for a few hours every night, though when working in this manner care had to be taken to avoid washing the beton before it had set.

Both masonry and beton were laid in extremely cold weather, the use of hot sand and water being found to make this perfectly practicable. The sand was heated in large sheet-iron braziers, and the water warmed in cast-iron kettles, one of each being found sufficient to supply the force working on a pier. The heat, which was thus artificially given to the mortar, hastened its setting, causing this to take place before the mass had cooled enough to make freezing possible.

The form of pier adopted is somewhat unique, and was selected from the advantages it was thought to offer in combining a roomy bridge-seat with a slender and graceful pier. The accompanying lithograph, representing Pier No. 1, and taken soon after its completion, shows the general form of the oblong piers.* These piers are built with a side batter of three-quarters of an inch to a foot, or 1 in 16, and the same on the starling; the ice-breakers have a batter of six inches in a foot, or one in two, giving to the cutting edge of the nose a retreat of eight inches and a-half in each vertical foot. The angle made by the two faces of the starling, measured on a horizontal plane, is a right angle. The ice-breakers finish at an elevation of 116, this being considered the greatest height at which the ice will ever move in the river; the height at

* The full plans of the several pieces of masonry are given on Plate VII.