WORLD is indebted for much of the information contained in this article.

## THE NEW BRIDGE.

The masonry of the piers is being extended on the upstream side, to meet the requirements of the enlarged superstructure, but this addition is only above the water table of the cutwaters of the piers, as the present foundations are ample for the new work. The extension varies from 21 to 25 ft. On the downstream side the piers are being extended upward in line with the old masonry so as to give the additional width required for the new bridge. The masonry is of limestone ashlar, & the contractor for the extension of the piers is

Wm. Gibson, M.P., of Beamsville, Ont., who has done a great deal of bridge & culvert work for the G.T.R., as well as the approaches to the Sarnia tunnel. A part of the walls and portals of the abutments of the bridge had to be taken down, & the upper portions of the piers (at their south ends) are also being taken down to such an extent as to admit of lengthening the piers as above described. Examination of the masonry showed that the material removed would be unsuitable for use for the external masonry, & it was thought it might be employed for the backing, but when it was removed it was found to be quite unsuitable, as it crumbled under slight pres-Each course of the new sure. masonry is to be of the same depth as the course of the old masonry of which it becomes an extension, & all the masonry will be built of

dimension stone, all faces being pick or hammer dressed. The vertical joints in each course must overlap those in the course below by at least 12 ins. The backing will be of squared or dimension stone, of the same thickness as the face stones. Following is an abstract from the specifications for the masonry work :

The face of the stones forming the ice breakers shall have a 2-in. margin draft all round, & shall be dressed off between to a uniform surface with a point or pick. All these face stones are to be clamped together, both vertically & horizontally, with iron. The horizontal clamps to be  $2\frac{1}{2}$  ins. wide,  $\frac{1}{2}$ -in. thick, 24 ins. long; these are to be turned down  $2\frac{1}{2}$  ins. at each end, & embedded their whole length and thickness in the stone. The vertical bolts are all to be + in, diameter, & to pass through the horizontal clamps & the vertical joints of the stones, to be let into the course below at least 9 ins, and to be secured thereto by fox-tail wedging.

Coping stones of piers & bridge-seats of abutments shall not be less than 5 ft. in length, nor less than 30 ins. in width. The top & face of each stone to have a 2-in. tooled margin draft, & to be neatly bush-hammered between. String courses & pedestals to be dressed in the same way as coping's. The sides and ends shall be dressed so that vertical joints shall not exceed  $\frac{1}{2}$ -in, in width. The mortar must be composed of the best Portland cement, & clean, sharp, coarse & properly screened sand, thoroughly mixed in approved proportions; these will be generally 2 parts of sand to 1 of cement, but they may be varied at the option of the engineer, according to the quality of the material. The cement & sand must be well mixed in a dry state; then enough water must be added to make mortar of a consistency that can be properly handled by a trowel. Mortar must be made in small quantities & only as required. Re-tempering of mortar that has partly set will not be permitted.

The face joints of the masonry must be raked out to a depth of 1 1-2 ins. & pointed with pure cement mortar.

Mr. Gibson is allowed the use of the company's rails on the top of the bridge covering, on which a repair car had formerly been run, & as a consequence the work is being carried on in a manner astonishing in its simplicity.

astonishing in its simplicity. The stone is reduced to its proper dimensions at Mr. Gibson's quarry at Crookston, near Madoc, Hastings County, & is transported on flat cars to the Point St. Charles end of the bridge, where a powerful steam derrick picks it up block by block & places it upon the car on top of the bridge covering. The car is moved by steam power to a point directly over the pier upon which the masons are at work. Here a travelling derrick takes the stone from the car & lowers it over the side of the bridge to the position that it is destined to occupy in the masonry,

& its adjustment follows. One unacquainted with the method that has been adopted night picture to himself a huge pile of false work & scaffolding or a flotilla of barges as the necessary accessories of an undertaking so great. To the visitor the absence of anything of the kind is as much of a surprise as the simplicity of the plan that has been adopted. The bridge is supported by 24 piers & 2 abutments. The piers vary in height from 30 feet at the ends of the bridge to 60 feet on either side of the central span, the increased altitude being necessary to allow of the passage of vessels up & down the river.

THE SUPERSTRUCTURE

will consist of 24 spans of pin-connected,



FIG. 2.-END SPANS, VICTORIA TUBULAR BRILGE.

The ends will be fastened together, on top, by clamps 12 ins. long, 2 ins. wide &  $\frac{3}{4}$ -in. thick, let 3 ins. into each stone, two to a joint, & to be placed where directed, the whole of these stones to be set in full Portland cement mortar, made in the proportion of 1 part cement to 1 of sand.

Every stone of the masonry must be set in a full bed of mortar & beaten with a heavy wooden maul until a solid bearing has been secured, the vertical joints must be fully flushed and filled up, using for the purpose "swords" or rammers, & where necessary to insure perfect filling, grouting must be resorted to. Each course must be properly levelled throughout its whole extent.

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