An objection may perhaps be raised to the circular pier of Victoria bridge being built of concrete, on the ground that the piers of the Petite Rivière bridge have already exhibited symptoms of failure owing to the action of sea water. It must, however, be admitted that this failure is but one contrasted with many that have proved successful, and, moreover, that within the limits of those phenominal fluctuations characteristic of the Bay of Fundy, concrete has, so far as it has yet been employed, given satisfaction. On the other hand, the author is not aware of any one instance where an ashlar masonry structure, erected within the same tidal influence, is not more or less a failure. The railway bridge that carries the Windsor and Annapolis Railway over the Avon River at Windsor is an instance. The bridge is supported by eight piers and two abutments of freestone ashlar masonry, and consists of nine spans of lattice truss, six of which are 160 ft. each, the other three, or shore spans, being smaller. There is very little water—not more than from two to three feet—in the stream at low water. Neap tides rise about 24 feet, ordinary springs four or five feet higher. The piers of this bridge have been a source of annoyance and expense to the Railway Company. The water penetrates the body of the masonry at high tide, and not being able to escape as fast as the tide recedes, or to escape altogether, a severe frost operating upon it adds at every successive reflux its expansive influence to the already tottering face stones. The result is, that notwithstanding repeated repairs, the piers will have to be altogether taken down and reconstructed. In view of such a tendency to displacement as shewn in this instance, as well as in another similar instance no less prominent, experience would lead one to select the concrete as most advisable to adopt in this particular locality. Owing to its homogenous character it will be more impermeable to water, less susceptible to displacement by frost, and, in this case, more coherent and endurable as a support.

But it may be asked, what is the justification for the employment of concrete at all above ground in lieu of stone. Why, the fact that walls and bridges are produced which perform the service expected of them at a much less expense than masonry, that by the utilization of materials otherwise inoperative, such as the shingle of the beaches and streams, and the boulders encumbering the surface, permanent bridges can be readily built with the assistance of ordinary labor; that by the employment of concrete limited means will yield more desirable results, that evidence exists that such adoption would secure at low cost works of great efficiency, is sufficient to justify the use of concrete as well as the introduction of the subject here. Local conditions largely modify local architecture and requirements. Down here by the sea the Trenton limestone of Montreal cannot be had in adjacent quarries, neither will the necessity of its adoption warrant its introduction. Materials at home must suffice to supply the needs at home. If stone cannot be had, or if it is of too refractory a nature to be made available, brick must take its place, and for the same reason concrete may in many situations be introduced as a substitute for stone as well as brick.

Although the history of rubble concrete dates as far back as the history of architecture, the introduction of Portland cement to the admixture of concrete may be said to be the history of our own times. In England, George Semple in 1774, Dr. Higgins in 1775 to 1779, Smeaton in 1756, and Parker in 1796, by their respective investigations, reduced the practice of concreting gravel with lime to a system. Semple having studied the works of Alberte, who explained the system used by the ancient Romans in building walls in coffer-dams or cases of small materials grouted, proposed to follow the same plan in foundations of bridges. Dr. Higgins' book on mortars gives the effect of earth and metallic oxides on bones and chalk limes, and on concreting gravel with lime for surfaces of roads, etc. Smeaton's work on the Eddystone Lighthouse taught the properties of English limestones and compared them with pozzuolana and tarras, and Parker took out a patent for making cements obtained from certain stones or argillaceous productions or nodules of clay. This stone was termed Sheppystone, from being found near that island. The stones were burnt in kilns and afterwards ground to powder. It was called Roman cement, and was used in preference to Aberthaw, Halling, or Dorking hydraulic limes or cements. This Roman cement was used almost universally until eclipsed by the Portland cement of Messrs. Bazley, White & Co. In France and in Holland the application of béton seems to have been contemporaneous with England, and has been much more extensively practised in the erection of monolethic structures during the present century. The report of the Jury of the Paris International Exhibition of 1855 awarded M. Vicat, a distinguished French Engineer, a "Medal of Honor," and observed that he had devoted himself entirely to the study of the theory of the action of limes with silicious materials, and had successfully demonstrated that France possessed all the elements of the pozzuolanas, and by the simple admixture of calcined or raw clays with lime, artificial cements could be obtained for hydraulic pur-