it was an impracticable intrusion and would not suit its intended purpose, and although it could not be said to be an experiment, because it had been used so largely in other countries, still it was commented upon with disfavor. Nevertheless, concrete piers have been erected in the most exposed positions, in the midst of strong currents, without any external coating of wood or stone, where they are exposed to ice-floes, to blows from timber-drives, and in some instances, to undermining by scour, with comparatively favorable results. Exposure to sudden alternations of temperature has so far produced no visible damaging effect. Violent blows strike more impotently than upon masonry, and it is not so liable to fragmentary slips or segregations because of its monolithic character.

Out of forty-four iron bridges, with spans varying from 50 to 160 feet, supported by concrete piers thus exposed, there are three piers showing marks of abrasion, but not to such extent as to need repair. Two of these defects are traceable to faulty workmanship and poor material. The third one, however, exhibits unmistakable symptoms of disintegration, and requires special notice. It will be referred to further on.

The abutments and piers were erected within a skeleton frame work closely boarded against the face as the work proceeded upwards. They were built of Portland cement rubble concrete faced with Portland cement fine concrete. The facing of fine concrete was generally six inches in thickness, but varied to a width of nine inches in rapid currents or where liable to more severity than is due to ordinary exposure. The Portland cement rubble concrete was composed of one part of gravel or small stones not exceeding one inch in diameter, five parts of large stones, weighing 20 lbs. and upwards, two parts of sand, and one part of Portland cement. In mixing the concrete, the gravel, sand, and cement were turned over three times whilst dry. Water was then added and the material again turned over at least three times and well agglomerated before being placed in the work. The gravel, sand, and Portland cement for the fine concrete were first mixed to form a matrix or body of concrete, and the large stones of the rubble concrete were placed therein by hand. These stones were placed end upwards, two inches apart, and the spaces between them grouted up solid with the matrix to form a compact mass, and any holes or cavities in the work were run full and flush with Portland cement compo, consisting of two parts of sand and one of cement. The fine concrete facing was kept at least six inches higher than the rubble concrete, and united with it so as to form one homogenous mass. In every instance the top of the pier or abutment was finished with fine concrete for a depth of one foot six inches, and the shoes of the iron truss posts were laid thereon without the usual bridge seats of stone.

The width of piers at top finish varied from three feet to four feet six inches, according to the superincumbent weight they had to bear. In piers of twenty feet in height the hardening or "set" was sufficiently rapid to allow six laborers working on each pier to proceed to completion without intermission, the progress being from two to three cubic yards per man per day.

The concrete work for the last three years has been executed by the Government's own engineers and workmen, without the intervention of contractors, a system which, however inapplicable in some countries, has been found to answer well in Nova Scotia. Upon the proper composition and incorporation of the ingredients which enter into the concrete, and which are mixed up and set with the rubble stone in the work, will depend the requisite adhesion and stability, and although reliable contractors were always available, still it was considered more advisable to carry out the work by men working by the day and trained under proper supervision until they become sufficiently skilful and as interested as the engineer in the success of the undertaking.

A 160 feet span, 15 feet roadway, loaded 80 lbs. per square foot, $\frac{1}{4}$ weight of bridge and load =76000 lbs. Taking this weight distributed over an area of three feet square by the bed plates, and the cohesion of the cement itself, we should have a weight supported equal to about 51 pounds to the square inch, or quite within the margin of safety even for comparatively freshly set concrete. Since an abutment, to fail only by reason of a direct pressure from the weight of the bridge, could only do so by the crushing of the particles of cement together, and since this crushing could not take place without first rupturing the face of abutment at its point of least resistance, we may take this point as a measure of our bearing capacity, that is, take the distance from centre of pressure to nearest face of abutment as one half of our available width and this width squared as our bearing area. For a bridge of this size the width thus found would not be less than four feet, and the distributed weight would be 34 lbs. per square inch on the walls, which are battered 1 in 6 or 1 in 8.

The use of concrete for over ground work in Nova Scotia commenced with the filling in of the voids in crib-work abutments constructed of