Editorial

THE HENRY VEHICLE LOADING BILL.

One of the bills introduced at the recent session of the Ontario Legislature and allowed to stand until the session of 1916, is an "Act to regulate the Load of Vehicles operated on Highways." The bill was introduced by Geo. S. Henry, member for East York, and the wonder is that such a measure had not been introduced before.

Ontario has been spending millions in roads and bridges and each year the manufacturer has been supplying engines and motors of greater and greater tonnage until the loading on pavements, highways and bridges is far in excess of their capacity. Yet, the province has been remarkably lax in the matter of taking precautions to protect its investments in county road systems, or the pavements on the town and city streets.

Perhaps the fact that Mr. Henry is secretary of the Ontario Good Roads Association and a member of the York Highway Commission, caused him to give this matter some attention. At any rate, legislation of this nature is much needed.

In view of the fact that it passed its first and second readings at the recent session and was then consigned to a committee for further investigation and debate, to be brought up again next year, the measure should be carefully analyzed and studied by road engineers and superintendents in order that the benefits of their knowledge and experience may be applied to it. Ample opportunity for a full discussion of its several clauses now exists and some useful information on highway loadings that may have a bearing on the final wording of the bill should be forthcoming.

The operative sections of the bill and those that are of particular interest to the highway and city engineer are published elsewhere in this issue of *The Canadian Engineer*.

It will be seen from a study of the clauses that in some respects the bill is similar to the Act now in force in Massachusetts, "relative to the operation of motors and engines."

In Massachusetts they allow a total load of fourteen tons per vehicle and a load per inch of tire of eight hundred pounds. Mr. Henry, in his bill, has limited the total load to twelve and a half tons, with a further proviso that not more than four tons on any wheel nor more than six hundred pounds per inch of tire be permitted. It would, therefore, appear that the Henry bill is much more restrictive in character than best practice has yet approved, and it remains to be seen whether such restrictive measures are warranted.

The specifications for bridge design within Ontario have been figured in the past for loads of fifteen tons, of which two-thirds may be on the rear axle; *i.e.*, ten tons per axle or five tons per wheel. As far as total loads are concerned, it would appear that the purpose of the bill is to make them less. We are not sure that this is wise. Roads and bridges in the past have been designed for heavier loads than the bill allows. This has cost money and, if the measure is enacted, the people will not be allowed to make full use of their investment.

It is no answer to say that with time both bridge and pavement weaken. They are designed with a factor of safety of 5 or more and so are amply protected.

The clause allowing a load of only six hundred pounds per inch of tire may also require some modification as the loading to-day is in excess of this amount.

However, with the principle of the bill we are in full accord; *i.e.*, fixing the limits to which a road may be loaded and thus make it possible for engineers to design their pavements to meet requirements common to all municipalities in the province.

EFFECT OF VARYING AMOUNT OF WATER IN CONCRETE MIXING.

In a paper read before the Connecticut Society of Engineers recently, results are given of a series of careful tests made to determine the effect of varying the percentage of water in concrete. Summarized, the conclusions drawn are as follow:—

The percentage of water has a direct bearing upon the strength of concrete. Nevertheless, it is the exception rather than the rule that the engineer concerns himself with the question of mixing beyond seeing that the proper proportions of sand, stone and cement are used. Careful tests are made of the cement and steel, both standard articles put out by firms which have reputations to maintain; on rare occasions the water is analyzed, but no attempt is made to control the mixing. On some pieces of work the contractor is furnished the cement, so that there will be no temptation to skimp on materials. He is then given the liberty to mix these materials as he sees fit. He may aim to get the maximum strength out of them, but it is probable that he will strive rather to keep the cost of mixing and placing at a minimum.

Of course, it must be admitted that the strongest mixture is not always the most desirable or economical. In preparing the specimens for these tests it was found necessary, when making mixtures containing more than 27.5 per cent. of water, to increase the proportions 10 per cent. in order to fill the moulds. This indicates an increase in density which was obtained at a loss of strength. However, in some cases this is highly desirable. Often bulk and impermeability are the two requisite features. In reinforced-concrete structures a moderately wet mixture is far more practical than a dry one; but it must not be forgotten that the use of wet mixtures increases the cost of materials. An increase in density means a corresponding increase in raw materials. The additional water weakens the concrete, and therefore a richer mixture or lower unit stresses must be used. The former is preferable, for the beams and columns in concrete building are always heavier than the corresponding members of steel or wooden structures.

If a wet mixture is used, the engineer should be cautious in permitting the removal of the forms at an early date. In some of the tests the wet mixtures were very slow to develop their strength. The use of such consistencies in practice would necessitate extreme care.