Editorial

ACCELERATED PAVEMENT TESTS.

Accelerated pavement tests are receiving the attention of a great many highway engineers and chemists, and it is quite likely that in a few years some method will be invented which will enable the engineer to ascertain to a greater degree of certainty, before be builds a pavement, just how long that pavement will last.

In a recent lecture at Columbia University, C. N. Forrest, chief chemist of the Barber Asphalt Paving Co., said that a series of tests which could be applied to the pavement in place would be more satisfying to the engineer than the type of tests now employed.

Admittedly this is true; but the suggestion seemed so far in advance of any practical methods that are available at the present time, that *The Canadian Engineer* inquired of Mr. Forrest whether he had any idea as to how such a series of tests could be made.

Mr. Forrest replies that he cannot figure out any test such as he suggests would be desirable if someone could kindly invent it. An interesting point in Mr. Forrest's reply, however, is that the design of physical tests, for laboratory use, upon the equivalent of the pavement in place, *i.e.*, compressed test specimens of the composition or mixture as a whole, is now fairly well worked out for sand and fine stone aggregates.

These tests, applied at extremes of temperature, indicate the relative value of different proportions of raw materials, so that the best combination thereof can be adopted as a standard for the entire work in which they are to be used. They also indicate the relative value of various proportions of any asphalt when considered in connection with the mineral aggregate that is available.

It is possible to determine the degree of plasticity of the mixture, *i.e.*, its capacity to resist pushing and its resistance to wear by attrition. Having selected the materials for the work, and the best proportions, the chief consideration in this test scheme, in getting the mixture in place in the street, is proper compression. A measure of compression is the specific gravity of a sample taken from the pavement after compression.

Chemical analysis of the mixture, penetration of the asphalt cement, etc., will serve for plant control, says Mr. Forrest. If such a plan of operation is sufficient for the purpose, then any failure in the street later on would probably be due to workmanship or to engineering details such as drainage or strength of concrete base.

SEWAGE DISPOSAL PLANTS NEEDED.

The city of Lethbridge, which has been suffering from an epidemic of typhoid fever this spring, has presented a memorial to the premier of Alberta asking that the government compel towns to construct sewage disposal systems. According to Dr. Jamieson, the provincial bacteriologist, who has been investigating conditions at Lethbridge, the cause of the epidemic there is due to a polluted water supply. The city of Lethbridge procures its water from the Old Man River, and it is chlorinated. It would seem, however, that the degree of chlorination has not been sufficient to prevent the present epidemic. Doubtless under normal conditions the amount of chlorine used would have been ample, but under conditions such as are alleged to have existed, it was insufficient.

Dr. Jamieson carefully examined all probable sources of infection. The milk supply naturally was among the first of the city's organizations to come under suspicion; but here no fault could be found. All the dairies serving the city were found to be free from bacteria. The water supply was the sole source of trouble. Water samples which had been sent to Edmonton several weeks before the epidemic broke out had been pronounced potable. Evidently, then, the water had been polluted in the interim. Old Man River and its tributary watershed were investigated. It was found that the town of Macleod had had an epidemic of typhoid during the months of October and November last year, and that they were dumping raw sewage into the river. Spring freshets washed downstream all the impurities that had been deposited during the winter.

It is only fair that all towns discharging sewage into streams that are used as sources of water supply should treat their sewage before doing so. If a town will not take precaution to safeguard the health of its neighbors by looking after its own disposal of sewage, then such measures as are suggested in the memorial prepared by the city of Lethbridge, are most certainly needed.

LETTER TO THE EDITOR.

Stresses in Concrete Arch Dams.

Sir,—Mr. W. Gore's remarks in *The Canadian Engineer* of March 30th, 1916, regarding the desirability of relying upon "initial stress" to assist the stability of a concrete arch dam have been carefully read. The writer takes pleasure in attempting to answer the questions, especially because it is evident that Mr. Gore has given the subject considerable study.

Suppose the "initial stress" does not assist the stability of such an arch dam, and this it does not in arch dams carelessly constructed, then more load would be thrown on the cantilever, some more load taken up by shear action in the lower portion of the dam along the foundation, and some additional load thrown on the arch towards the crest. On a high, slender section this condition may cause higher cantilever stresses than desired; that is, high compression at the toe.

Fortunately, however, full load is not thrown on such structures in an instant, but weeks or perhaps months are generally required to fill up the reservoir. During this interval the modulus of elasticity of the concrete has had time to adjust itself according to the different amount of stress thrown on different portions. Due to the action of the time factor (for concrete only), parts highly stressed such as the toe, deforms much more than in proportion to the load carried, and, of course, as the concrete yields, more load is transferred to some other place of lower stress, thereby relieving the most highly stressed part. That is one reason why Formula 8, page 321, is empirical. For the benefit of anyone interested in the action of the