

who is expected to know it all, and is thought to be too expensive even at that, finds himself compelled to get along as best he can alone in order to hold his livelihood. The result is a brave attempt at a specification that is taken in chunks from standard and other specifications; and through which, when it comes to a law suit, the contractor and his attorneys can drive a team of horses at most any point. It is all that could have been expected from the engineer under the circumstances. Family doctors are not expected to perform appendix operations; and those who require it of them must expect to suffer in the process of cutting.

Engineer to Guarantee; Not the Contractor.—As paving engineers, why do we ask a contractor to guarantee the work that we design, direct and inspect? We tell the contractor what to do, how to do it, and when. If the pavement goes wrong,—barring absolute fraud, of course,—why should the contractor pay the penalty? Fair play demands that the engineer guarantee his own road. I do not mean to actually suggest that he be asked to give a bond and make good the loss, but that the contractor should not be required to make good a failure if it is in no way his fault. The engineer's reputation should suffer; not the contractor's pocket, and through him, the public's. If this rule held true, engineers would be much more careful in the paving work that they specified and constructed. I have noticed that the contracts which leave the contractor with the least to say about how the work shall be actually done, also frequently bind him the tightest with a guarantee of the result. This is an element of chance that is forced upon the contractor; and, as with everything else, he of course figures on it in his bid.

Mr. E. M. Perdue, of Kansas City, has remarked that the guarantee is a two-edged sword which cuts the taxpayer both ways. Mr. J. W. Howard, of New York City, opines that what we want are good pavements on our streets, not guarantees on paper. I agree with them both. The practice of requiring a five or ten-year guarantee on paving work has done much harm in the past, and will probably live enough longer to do more harm in the future. It has been the excuse offered by innumerable city officials for not bothering about good inspection and careful testing of materials; and it has been productive of more expensive law suits between city and county governments and contractors than any other one item. We have already remarked that all law costs find their way to the ultimate consumer, who is always the public. Verily, he gets it both coming and going, especially if the engineer has shirked his responsibility upon a guarantee company and permitted the laying of a poor pavement.

Testing and Inspection a Sound Investment.—If the money paid for guarantees to contractors, and, through them, to the bonding companies, should be put into the actual road work in the form of careful testing and inspection, the yield from the investment would on the whole be much greater and far more satisfying. Why be content with the five-year guarantee of a pavement on a street where that type of pavement should last twenty-five years; and on heavy traffic roads and streets, why force the contractor into the position of a gambler? Is it reasonable that he will be able to make any better guess than the engineer on the probable life of the pavement that the engineer has himself designed, the construction of which he has supervised, and the materials for which he has or should have tested and approved? No one takes a business risk these days without a sufficient premium, and the overhead costs and profit expected from such risks is

easily one-hundred per cent. That is the figure for fire insurance, when the totals of losses paid is one-half the amount of the gross premium receipts.

Now, it sometimes happens that good construction of some type costs no more than the poor constructions that are permitted where there is no sufficient inspection and testing and no one in consultation who is possessed of the special knowledge required to differentiate. This will even happen where the testing is well organized if the directing force is not what it should be. Testing alone is not sufficient. Many can make the bare tests more or less well who do not recognize the significance of the results after they have got them, and who do not know how to go about correcting the defects indicated by the tests. To be of certain value, the scientific work should begin with a study of the sources of supply of the materials, the costs of securing them, their proper selection and combination regulated by field tests, and the final laboratory analyzing and testing of the finished product as a check upon the practical work that has been done in the field. Only in this way can a road department be certain that it is not squandering the public funds in under-grade work.

Have Nothing to Offer; Wish to Start Something.—I have nothing to offer in the line of a satisfactory plan for the general improvement of road and street paving contracts and specifications at the present time. Some particularly flagrant instances of defective documents, and their consequences, have come under my observation recently, and it is the deep feeling engendered by these instances that makes me willing at this time to help start something in the nature of an organized advance along these lines. I do not know yet what I may be able to do, but whatever part of the work of reconstruction comes my way, I shall be ready to do it. Such work, however, is usually the combined effort of many; and I see no reason why we should not find in the Canadian and International Good Roads Congress an organization through which effort in this direction may be centralized and made to bear good fruit.

I have not in mind the issuance of additional standard specifications; though there is, of course, still much to be done in that line. The matter that seems to me to be of the greatest present importance is the proper use, by local adaptation, of even those standard specifications that are extant. When one has found cities using sections from such standard specifications in such a way that they were putting themselves in the position of advertising for something that could not be delivered from their environment, and could only be secured at a cost that they had no intention whatever of paying and should not pay, it is time to realize that something more requires to be done than the adoption and promulgation of standard specifications. In order to get a standard that will be possible in most sections of a country, much has to be sacrificed that can later be cured by adaptation of the general specification to fit the special needs and local advantages. It is time we bestirred ourselves to do this work of adaptation; and much other work in the proper drawing of a contract and specification besides.

A meeting of the Council of the Royal Architectural Institute of Canada will be held at the Chateau Laurier, Ottawa, Ont., on Saturday, April 28th, 1917, at one o'clock p.m., for the consideration of very important matters, to decide where and when the Tenth General Annual Assembly will be held this year, the creation of the R.A.I.C. Medal, the celebration of the Tenth Anniversary, etc. Hon. Secretary, Alcide Chaussé, Montreal.