

ECONOMIC STATUS OF GUARANTEES FOR PAVEMENTS ON ROADS AND STREETS*

IN view of the looseness with which the terms "guarantee" and "maintenance" are often applied to paving contracts, your committee, in discussing the subject assigned to it, wishes to make clear that it believes the two terms should be regarded as separate and distinct and that the guarantee period should not be longer than the reasonable life of the pavement without repairs except those rendered necessary by reason of defective material, workmanship, or both.

This is in accord with numerous court decisions in connection with assessment work and automatically settles the question of legality and at the same time clearly indicates the maximum period which should be called for in a guarantee. Your committee recommends that the maximum period should be fixed at five years.

Three Types of Guarantees

Three types of guarantees are in common use: (a) Bond—preferably from a surety company; (b) retention by the municipality of a certain amount of cash; (c) bond and retained percentage.

The intent of the guarantee is to guard against defects in material and workmanship and non-compliance with the specifications, but in many cases defects may develop in the pavement or roadways, which are due to other causes and conditions which may have been entirely outside of the scope of the contract.

It is apparent, therefore, that the responsibility for a satisfactory and lasting pavement is shared by both the engineer and the contractor. With the engineer rests the responsibility for providing proper drainage and adequate foundation, and the selection of a suitable type of pavement and the preparation of comprehensive plans and specifications. He must also provide such inspection as is necessary to insure strict compliance with the specifications.

With the contractor rests the responsibility of carrying out in a satisfactory and workmanlike manner the plans and specifications and instructions of the engineer.

The safeguarding of the public welfare lies, therefore, in the hands of the two parties above mentioned with the following possible exceptions:—

In a number of instances pavements have failed due to causes which may or may not have been controllable by the engineer or the contractor, as perhaps, the following: Defective street railroad construction; settlement of trenches for underground service pipes; improper system of cleaning the pavements; leaky gas or water mains.

Engineer Responsible to Community

The engineer is directly responsible to his community, and if he is negligent or incompetent should, and presumably can, be removed. Generally speaking, the question of public welfare or economics in this connection is not directly involved in the guarantee clause of a contract except in those cases where an incompetent or negligent engineer has prepared faulty specifications and as a consequence thereof has asked a contractor to guarantee a pavement which is likely to fail through causes other than defective materials and workmanship.

Assuming that the plans and specifications are entirely competent and proper, the next duty devolving upon the engineer is that of inspection, which includes testing of the materials to be used. This requires a laboratory equipped for physical and chemical testing and the services of someone who has made a specialty of testing paving materials,

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as such work does not come within the scope of an ordinary chemist. Most states and a number of the larger cities maintain their own laboratories and testing staffs. Smaller municipalities may, and frequently do, avail themselves of consulting and testing experts, but a certain proportion of them do not and, on the contrary, permit their pavements to be laid with only such supervision and inspection as their engineers can personally give to the work, and in many instances these engineers are not well qualified in this particular line and would gladly avail themselves of expert help were they permitted to do so.

In addition to the preliminary testing of materials, provision must be made for the inspection of the work as it progresses. Where the pavement is manufactured in a plant and then delivered to the street, inspection at both the plant and the street is essential. For example, in the case of a large asphalt plant where 200 to 300 batches of mixture are sent out daily, involving 600 to 900 separate weighings, a rigid inspection, such as would justify the total elimination of a guarantee clause, would require two inspectors. The preparation of the subgrade, the mixing and laying of the concrete base, and the laying of the wearing surface would similarly require two or three inspectors; and these must all be trained men, not haphazard appointees.

Rigid Inspection is Costly

From the standpoint of a municipal engineer this is a very serious problem. His reputation, as judged by the lasting qualities of his pavements, might often rest in the hands of inspectors whose appointments and qualifications were entirely outside his control.

In the abstract, it has been justly said that with competent inspection, guarantees could and should be entirely eliminated, but from an economic standpoint there remains the question of cost of sufficiently adequate inspection and the difficulty of securing it.

The drawbacks and defects in the guarantee system are too well-known to require elaborate discussion in this report, but it is a fact that present inspection systems have been devised and carried out with a view to providing reasonable (but not absolute) security, having in mind the certain or uncertain amount of additional protection accruing from the guarantee clause inserted in almost all paving contracts. If this is to be abolished the inspection must be made more rigid and, therefore, costly, and the lines must be drawn more tightly than heretofore, both as to materials and workmanship.

Engineering is not an exact science, so that in all cases a certain factor of safety must be employed and there is no such thing as a hair-line division between good and bad. When the results are guaranteed, even though the guarantee is far from perfect, it is human to require a somewhat lower factor of safety than would otherwise be insisted on. Where the contractor assumes no responsibility for his finished work, the inducement to slight it and thereby save money is greatly increased, and the inspecting force must be still more competent, vigilant and trustworthy than would otherwise be necessary.

Guarantee is Not Expensive

The cost of a guarantee bond to the average contractor does not exceed 1% of the total cost of the contract. On a pavement costing \$3.00 per square yard, this would amount to 3 cents per square yard, which would barely cover the increased cost of inspection above described, without taking into consideration at all the increased bidding price likely to result from increased severity of inspection.

Assuming that the guarantee is only for the normal life of a pavement without repairs, there exists no legitimate reason for the contractor to increase his construction bid by more than the cost of his bond.

As between a reliable and established contractor and one who is lacking in experience, resources and equipment, it is easier and cheaper for the reliable contractor to secure his bond and this can only be regarded as a legitimate advantage to him. As a general rule, he will favor a guarantee bond.

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