

MUNICIPAL DEPARTMENT

THE IMPORTANCE AND ECONOMY OF PAVEMENT MAINTENANCE.

By S. WHITNEY, IN ENGINEERING MAGAZINE.

No one in these times doubts the great value to the citizen of good street pavements. They contribute more perhaps than any other city improvement to the comfort and convenience of the public. They promote business, and add to the material prosperity of the community. They enhance the value of property; they conduce to good health by making cleanliness and correct sanitation possible. They make an appropriate framing for the beautiful homes, surrounded by flowers and lawns, for which our American cities are noted. In short, they are both a necessity and a luxury of modern city life.

It is not surprising, therefore, that we find the subject of street pavements occupying much of the attention of both citizen and city official. No municipal problem is being more closely studied than that of how to provide our city streets with the best pavements at a reasonable cost. Able engineers are devoting themselves to this problem with the zeal its importance demands. They are studying the merits and demerits of the several kinds of pavement; they are preparing specifications for this work with the care and attention to detail that characterize the best modern practice among civil engineers in other lines of professional work. They are subjecting all the materials used to rigid inspection, in order to exclude everything that is defective, and placing eagle-eyed inspectors on the street to see that every part of the work is done in the best manner. The result is, as might be anticipated, that we are building in this country street pavements that do not suffer by comparison with the best in any country, creditable alike to the public that pays for them and to the city officials to whose supervision their excellence is due.

If the same intelligent and vigilant care were exercised in maintaining these pavements as in constructing them, their life and usefulness would be greatly prolonged, large sums of money would be saved to the tax-payers, and our paved streets would not become, as in too many cases they are, as discreditable to the community as they were creditable when first completed. Dirt and refuse of every kind are allowed to accumulate on their surfaces. The ruthless plumber, the gas-fitter, and the sewer-tapper are allowed to cut into or undermine them at will. When these have accomplished their purpose, they generally throw back the material removed without regard to the condition in which the pavement is left. Unlawful loads are hauled over them, breaking the surface, or making ruts and depressions.

The children build bonfires on them. In short, a street pavement seems to have no rights that the public are bound to respect.

It is not surprising that under such treatment the best of pavements come to need extensive repairs. The public and our city officials seem not to have learned the important lesson that, however well street pavements may be built, and however satisfactory they may be when first opened to use, their usefulness and beauty can be maintained and prolonged only by giving them the care that every other engineering structure must admittedly receive.

Even when the greatest care and vigilance are exercised by all parties concerned in their construction, unforeseen defects are almost sure to appear in time, either in the pavement itself or in the various constructions under, or connected with, the pavement proper. Below the pavement is usually a net-work of pipes for various purposes, as well as large and deep-laid sewers. These are frequently not completed long enough before the pavement is placed over the trenches made for them to allow natural settlement of the material with which these trenches are filled, and little or no care is taken to properly compact the filling as it is replaced. It is not unusual to find that, by subsequent settlement of this filling, the pavement structure is left unsupported, and performs the services of a bridge as well as a pavement. As might be expected, the pavement is generally insufficient for this double service, and fails under some unusually heavy load that may be hauled over it. But, aside from such extraneous causes of failure, pavements are subjected to the destructive action of the elements, the casualties of use, and the abrasion of travel. No perfect and indestructible pavement has yet been discovered, nor will there be, for some of the qualities necessary to make a perfect pavement are antagonistic — cannot exist together. Thus one of the essential qualities of a good pavement is that it must afford a good foothold for man and beast. Another is that it must be durable. To afford good foothold, there must be friction between the pavement and the feet of men and horses. There can be no friction without abrasion, and abrasion means destruction sooner or later.

The wear or disintegration and failure of pavements, and the consequent necessity for repairs, are due principally to two causes.

(1) If the material of which the pavement is constructed is subject to natural decay, it will in time be destroyed by this cause alone, regardless of the amount of travel to which it may be subjected.

(2) Whatever may be the natural durability of the materials of which the pavement is made, the action of travel over it will in time wear it out. Its life will be measured by the character and quantity of the travel and the ability of the material to withstand that travel.

The frequency and extent to which pavements require repair differ with the

materials used in their construction and the use to which they are subjected. Some pavements, among which may be named those properly built of good granite blocks, will require little repair, even under very heavy travel, for several years. On the other hand, a macadam pavement, however well it may have been constructed, will require constant care and attention, and more or less repair, from the time it is opened to travel. Brick pavement of the best character should need little or no repair for a time after its completion, dependent on the quality of the brick used and the amount of travel it carries. Good asphalt pavement, the material of which is an artificial composition requiring great skill and experience to properly prepare and lay, is quite likely soon to develop weak spots requiring attention, but these should be neither great in extent or expensive to remedy.

The value of any pavement and the cost of maintaining it cannot be correctly judged from the fact that repairs become necessary at a comparatively early period. In the broad sense of the word, maintenance, as applied to pavements, covers:

(1) The cost of keeping the pavement in good repair from the time it is completed until it is so far worn out as to require renewal.

(2) The cost of renewal.

(3) The interest on the sums expended for repairs from the time those expenses are incurred until the renewal of the pavement. The sum of these three items divided by the life in years of the pavement will give the true annual cost of maintenance, and is the standard by which the relative economy of maintenance of the various kinds of pavements may be correctly judged.

It is not the purpose of this paper to consider the economic value of the several kinds of street pavement from this standpoint, but it may be observed that we have as yet few complete and reliable data for the solution of the problem, especially in America, and are left to depend upon estimates more or less speculative. We have, however, enough data to warrant the conclusion that macadam pavements, where subjected to considerable travel, are the most expensive of all pavements to maintain; that granite pavements, while requiring little repairs during the earlier years of their life, cost a relatively large sum for renewal, and cannot therefore be considered economical; that wooden-block pavements, as laid in this country, while short-lived, can be renewed cheaply, and are, therefore, if judged by this standard alone, economical; and that, while asphalt pavements may require slight repairs early in their life, the cost of maintenance for a long period of years will be very moderate, which is due partly to the facts that the pavement has a permanent concrete foundation, and that the asphalt surface can be renewed at a comparatively small cost. Our experience with brick pavements is yet too limited, and the quality of the brick used too variable, to enable us to form a fair estimate of the cost of maintaining them.

(To-be-Continued.)