

COST AND SERVICE OF NEW YORK STATE HIGHWAYS*

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ESSENTIAL elements in the costs of highway transportation are the cost of road construction and maintenance, and the cost of vehicle construction, maintenance and operation.

The first two costs are primarily the concern of the highway engineer. In these days of million and billion dollar expenditures, there is a tendency to expend fabulous sums for permanent highways, so-called.

Of course, every highway engineer is well aware that no road surface is permanent, and the time is sure to come when a new surface must be constructed.

The actual annual cost of a highway includes the yearly interest and sinking fund charges, the yearly cost of maintenance and the yearly allowance to provide a resurfacing fund.

Interest and sinking fund requirements cease when the bonds mature, but this is often from 30 to 50 years, and for that period, at least, should be included; and at maturity it is difficult to foretell road requirements and problems.

Large sums of money have been squandered in the construction of too expensive highways, as well as in the failure to provide sufficient funds.

Accurate Statistics Needed

Sooner or later, every wasted dollar must be made good—generally by the consumer, who staggers under high living costs, and is apprehensive lest there be no check in rapidly mounting prices. The only sure remedy is to practise economy, particularly in the disbursement of public appropriations, knowing that every dollar saved helps lift the burden. Accurate statistics, comparing tonnage, construction, maintenance and financing costs, would help to determine sound highway policies and proper types of construction, including widths, cross-sections and materials.

Unfortunately, such statistics have not been gathered, but a systematic record of costs and travel should be outlined and comparative figures collected which would be of great value in a year or two, and absolutely indispensable after a term of years.

New York State has expended more money than any other commonwealth in highway construction and has the greatest mileage of connected improved roads, so that her experience is of value in considering the highway problem.

There cannot be much doubt that an expenditure of \$50,000 to \$60,000 a mile is required, and would be justified on the main highway from Buffalo to New York, and possibly on a few other important trunk lines. It is equally certain that expenditures of upwards of \$30,000 per mile would be grossly extravagant on a great part of the state and county highway system, and that \$15,000 per mile would be far too much to spend on the preponderating majority of lateral roads.

A prominent highway official recently stated that every mile of road in the state should be of a type costing at least \$30,000 per mile. There are 80,000 miles, and this plan would require \$2,400,000,000—so impossible that discussion is unnecessary.

All Macadam at Start

Starting in 1898 with an appropriation of but \$50,000, which was supplemented by an equal amount by the localities, the state engineer improved about 12 miles of highways with water-bound macadam at an average cost of \$8,000 per mile. This type of pavement was specified almost exclusively until 1909, and 2,000 miles were constructed during this period at an average cost of about \$9,000 per mile.

In 1909, the State Highway Commission was created, and about the same time motor vehicle traffic began to increase

very rapidly, and other types, such as the asphalt macadam, both penetration and mixed methods, and brick block, became quite common. In 1915, about 61%, and in 1916, about 46% of the state projects provided for the water-bound macadam type of pavement, and a total of about 3,560 miles of this class of pavement was constructed.

Many of the older water-bound macadam pavements which had been constructed on the main routes have been resurfaced, and in some instances reconstructed with more substantial pavements. By reference to the State Highway Bulletin, just published, it can be noted that about 1,040 miles of these pavements have been resurfaced, about 205 with the same type, 810 miles with asphalt macadam, penetration method, and 25 miles with asphalt macadam, mixed method; and about 125 miles have been reconstructed, 67 miles with new concrete pavement and 58 miles with new brick pavement, leaving about 2,600 miles of water-bound pavement still in the state system.

Resurfacing and Reconstruction

New York State, in building water-bound macadam pavements continuously for 20 years, to the extent of 3,560 miles, has found it necessary to reconstruct with a pavement of a radically different type 3½% of the total, and resurface with a new top course of macadam, using the old pavement as a foundation, about 30%.

During the first ten years of state highway improvement, 1899 to 1908, no maintenance was provided by the state, but the law provided that the maintenance should be performed by the towns. In 1909, state maintenance work and supervision were instituted. The water-bound macadam pavements have accordingly been separated into two groups. Of the 2,000 miles of water-bound macadam constructed from 1899 to 1908, and upon which maintenance had been neglected, about 860 miles, or 42%, have been resurfaced and reconstructed. Of the 1,560 miles constructed between 1908 and 1918, about 180 miles, or 12%, have been resurfaced or reconstructed.

With modern conditions of traffic, where motor vehicles predominate, water-bound macadam can only be maintained by surface treatment of asphalt or tar. With the light, cold materials and heavy traffic, the surface treatments are required every year, while with average traffic the treatment may be omitted about every third year.

When the surface treatment is delayed beyond the proper time, surface holes develop rapidly and constant patching is required.

In 1909, the state first undertook the construction of the asphalt macadam, penetration method, and this pavement soon became the prevailing type for the main through and market routes.

The state system now includes about 3,000 miles of this type, of which about 850 miles are old, water-bound macadam, gravel and second-class concrete pavements which have been resurfaced with a new asphalt macadam top course, laid over the old pavement as a foundation.

Maintenance of Asphaltic Macadam

It is significant to note in the bulletin that of the 3,000 miles that have been so constructed, it has been found necessary to reconstruct but about 10 miles, or ⅓ of 1%, with a pavement of different type. About 8 miles have been reconstructed with concrete pavement and about 2 miles with brick pavement. One hundred and ten miles, or about 3⅔%, have been resurfaced with a new top course of the same type. Many of these pavements have been subjected to nine years of traffic and are in perfect condition to-day, resembling sheet asphalt.

Little maintenance is required for asphalt macadam pavements for the first three or four years after construction.

About four years after improvement the pavements are given a surface treatment of light asphaltic oil, which acts as a flux to the asphalt in the macadam, which works to the surface and is distributed by traffic, to the extent that

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