

Asphalt Pavements

By CHARLES A. MULLEN.*

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(Continued from last month.)

We have Seen a Mixture Produced by an asphalt paving plant at one o'clock that was all that could be desired, and at four o'clock of the same afternoon that plant was turning out, under the same formula of batch weights, a mixture that was not even third rate. The reason was that no attention was being paid to the sand. At one o'clock the supply was being drawn from a section of the pile that by chance happened to be of a very good grading, but by four o'clock the laborers had worked into a large pocket where the sand was very coarse.

The Result of this Carelessness was a poorly-graded, sloppy mixture, that could not be expected to give service under heavy traffic, and that cost as much as the better mixture made earlier in the day. It will mark badly in warm weather, and probably shove, whether it has a binder course or not. The quantity of asphalt cement that is correct for a mixture having the standard grading of mineral aggregate is far too much for one in which the sand is coarse; but a plant crew that was not well enough organized and trained to watch the sand pile could not be expected to know when the proportion of asphalt cement should have been reduced to prevent a sloppy mixture.

Three Grades of Sand are Needed in most cases to sufficiently approximate the standard or model sand grading. These may, for convenience, be termed fine, medium and coarse grade sands for asphalt paving purposes. It will assist the layman to an understanding of the matter if we say that the fine is of that size which is sometimes spoken of as blow sand, the medium a good plaster's sand, and the coarse a sand of the type we all recognize as suitable for portland cement concrete work.

One Sand is Occasionally Found that is in itself a sufficient approximation of the standard grading; but such cases are rare, and, even then, it is a good precaution to have on hand small stocks of fine and coarse sands for tempering purposes in case the main supply does not at all times prove sufficiently uniform. Frequently a well-graded sand may be secured from a stratafield deposit, by working the face to a certain depth that will take in layers the mixture of which, in falling and handling, will give a satisfactory approximation of the model. This we succeeded in doing with good effect last season at Woodstock, Ontario.

The Mixing of Three Sands at the asphalt paving plant is not a difficult matter. At Saint Foy in Quebec, last season, where the Province was laying a stone-filled sheet asphalt pavement, we combined five grades of material in the mineral aggregate, exclusive of the filler, without difficulty. The various piles are arranged around the boot of the bucket elevator that feeds the heating drum, and then an intelligent laborer can be directed to feed so many shovels of this material and so many of that. A satisfactory result is secured in this way without additional expense, other than possibly half-a-dollar a day extra to make the man doing the feeding interested in his job.

All Sands are not Suitable, even if a satisfactory grading can be secured. We must consider the shape of the grains, the character of their surfaces, the cause of the coloring, and any foreign matter that is present. Sands that are the result of incomplete disintegration of rock, and contain lumps of fine grains, must be avoided.

The Sands for Asphalt Paving are to be found in almost every locality, if one will only look for them. We were told they were not to be had around Montreal, but a survey of the country for fifty miles about uncovered abundance, some in the very deposits from which the city had been getting its supply. Later, the fine sand that had previously been neglected was found within the limits of the city of Montreal, and on city property at that. We have had the same experience with Quebec City and Quebec Province work; and recently, Mr. J. A. Baird, City Engineer of Sarnia, Ontario, in following our suggestion that he search his own city, has found excellent grades of all the sands required.

The Asphalt Paving Plant has never been more than a crude machine at its best. Wherever possible, we are inclined to insist upon the standard type, especially the twin-plug mill mixer with a batch capacity of at least one thousand pounds and means arranged above for propor-

tioning the materials entering every batch by the weighing of each material separately.

Steam Melted Asphalt Cement is never burned in the kettles. Therefore, direct firing should be avoided whenever possible, and watched with great care where not avoidable. Precautions should also be taken not to maintain the asphalt in a molten condition for too long a period, as this will cause it to become harder and lose some of its ductility.

Asphalt Cement in Tank Cars should be arranged for whenever possible. The material may usually be had cheaper this way, and is easier to handle. If there is not sufficient storage capacity at the paving plant, a small quantity of the cement in iron drums should be kept on hand in case of the delay in transit of one of the tanks. Asphalt plants cannot afford to stop work during the busy season, for the overhead expense is too high.

Thoroughly Mix the Aggregate before pouring the asphalt cement into the mill. The practice of putting in the cement before or at the same time as the dust is dangerous. The sand is hot enough before being combined with the dust, so that after it has lost some of its heat to this cold material, the aggregate will still be of the desired temperature; and this original heat of the sand is too great for a thin film of asphalt cement to stand without damage. If the mixer is covered, there will not be this tendency on the part of the mixer man to put in the asphalt cement first to keep the dust from flying into his face.

The Analysis of the Mixture should approximate, as closely as is possible in good practice, the following standard or model:—

Bitumen		12%	12%		
Mineral Aggregate:					
Sieve Test.		Model		Model	
Passing.	Held on.	Asphalt Mixture.		Sand Grading.	
200	mesh	13%	13%	Not over	5%
100	200	13%		17%	
80	100	13%	26%	17%	34%
50	80	23%		30%	
40	50	10%	33%	13%	43%
30	40	8%		10%	
20	30	5%		8%	
10	20	3%	16%	5%	23%
8	10	0%	0%	Not over	5%
Totals.....		100%	100%	100%	100%

The model sand grading is but the reduction to one hundred per cent of the seventy-five per cent of the mixture model that is supplied by test and aggregate free from dust filler.

An Asphalt Paving Formula to produce the approximation of the foregoing mixture, with the usual materials, would be as follows:—

Asphalt Cement, pure bitumen.... 120 lbs. or 12%
 Stone Dust filler, 80% 200 mesh.. 150 lbs. or 15%
 Sand, specially graded and mixed.. 730 lbs. or 73%

Batch of Mixture 1000 lbs. or 100%

Three Methods of Maintenance for asphalt pavement surfaces should be considered. There is the simplest way, the cutting out of the defective section and replacing it with new mixture; the surface burner method has been used extensively, with fair results; and the re-melting and re-placing. Needless to say, all three methods can be used mixing process has been successfully employed in many to advantage in every large city, each being fitted to different conditions that are sure to confront the engineer.

The Re-melting and Re-mixing of the old surfaces has always seemed to the author the one way that should be more carefully developed, with a view to the future maintenance of our asphalted streets. The re-use of the old material, which can be made as good as ever at little cost by re-melting and re-mixing, with possibly a little added soft asphalt to rejuvenate it, will effect great economies in pavement maintenance over a period of years. The cost of new material is saved, and the expense of hauling the old surface to a dump is avoided. The trucks must return to the mixing plant anyway, and they may as well carry a load of old asphalt surface as go back empty for the next load of mixture.