## WHY SOME MUNICIPAL ASPHALT PLANTS FAIL.

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Many cities throughout the United States and Canada now own and operate their paving plants. A majority of these paving plants have proven a success, but a number of them have been unsuccessful. It is not the intention in this paper to discuss the advisability of municipal paving plant ownership, but to show, in a manner, why some municipal paving plants fail to accomplish their purpose and prove to be a losing venture for the city that owns them. As facts are more interesting than theory, a short description of the methods used by one city owning a municipal paving plant may prove interesting.

This city, of about 50,000 inhabitants, situated in the middle eastern States, purchased a municipal paving plant and the necessary equipment for laying its own pavements, the initial capital expense amounting to about \$10,000. According to the usual custom, the plant manufacturers offered the services of a so-called expert to get the plant in running order and demonstrate its economical qualities. This so-called expert, as is too often the case, was not familiar with the paving industry, and was absolutely incapable of organizing and properly running a paving plant. The city engineer, whose paving experience had been largely that of supervising the laying of brick pavements, justly became disgusted with the methods of this so-called expert and decided to operate the paving plant according to his own ideas.

Without intending to unjustly criticize the engineer and other officials in charge of this municipal asphalt plant (for without question they were running it to the best of their ability), the operation of this plant under the conditions was bound to result in a failure for the municipal plant, which eventually would disgust the taxpayers with municipal plant ownership.

The concrete foundation was laid according to the same grades and profiles used for laying brick pavements, and was in most places rough and uneven. The laying of the foundation to such grades naturally made it necessary to put down a bituminous pavement consisting of a binder and wearing surface of between  $5\frac{1}{2}$  and 7 inches, which, of course, was contrary to all correct and recognized principles of sheet asphalt construction. The engineer gave as his excuse for laying the foundation in such a manner that, should the sheet asphalt prove a failure, then it could be easily torn up and replaced by a brick pavement.

The paving plant was in charge of an employee who had had some previous experience in plant work, but who was not familiar with the present-day methods, and who was certainly not running the plant in an economical way. The plant site was too small, and was carelessly laid out, making it impossible to run the plant efficiently.

On account of there not being any satisfactory stone in the near vicinity, gravel was used for binder. It was used just as it came from the pit, and contained a considerable percentage of round, smooth boulders, varying in size from  $\frac{1}{2}$  to 2 inches in diameter. Of course, it was absolutely impossible for the binding material to hold and bind these boulders together in any satisfactory way. While this unsuitable gravel was run into the mixer from one side of the plant the asphalt cement was run into the mixer from the opposite side, the melting and mixing going on simultaneously. This is contrary to the best practice, and much better results could have been accomplished at a very small expense by having a separate kettle for melting the asphalt cement. After the mix had been running for what the foreman considered a satisfactory period it was dumped into wagons. By the time the last of the mix was out of the mixer the temperature was about fifty degrees higher than the first that came out, the result being that there was usually a part of the load that was either too cold or else overheated.

The binder was then taken to the street and laid by inexperienced men (as will later be described), to a thickness of between 3 and 4 inches. After there had been laid what was considered a sufficient amount of binder, the plant was stopped and changes made in order to run the surface mixture. No system was used in making these changes from running binder to surface mixture, and there were many useless and expensive delays.

The surface mixture consisted of sand, marble dust and asphalt cement, the sand and marble dust analyzing as follows:—

Sand.

			Per cent.
Passing mesh		200	0.0
(	·····	100	0.0
" "		80	0.5
		50	12.5
		40	14.0
		30	28.0
······································		20	11.5
and the secold of		IO	13.5
an all and in		. 4	20
The state of the second	dopphanes rate.)		oll and
	Marble Dust.		
			Per cent.
Passing mech			0 6

P	assing	mesh	• •	• • •	• • • • • • • • • • • • • •	200	. 80.6
			• •	• • •		IOO	12.4
		"	•••	• • •		80	6.0
	Provide l		•••	•••		50	I.0

The marble dust was of good quality and satisfactory for filler. The sand, which was to comprise 80 per cent. of the pavement, and which is too often considered of little importance, was poor and very unsatisfactory for high-grade sheet asphalt work. As will be noted by the grading, it was entirely too coarse, and especially so when the heavy traffic of the street was taken into consideration. Sometimes it is necessary to make the best possible mix out of the available materials, but in this instance a suitable sand could have been obtained at a very small increase in cost. This poor quality of sand, mixed with too low a percentage of marble dust, was run into the mixer at the same time as asphalt cement, and, as was the case with the binder, all the materials were heated and mixed simultaneously. After the mixture had been heated for what was considered a satisfactory length of time it was dumped into wagons, the same deviation of temperature occurring during the discharge. The wearing surface after having received this improper treatment at the plant was taken to the street and carelessly laid and rolled to a thickness of between  $2\frac{1}{2}$  and  $3\frac{1}{2}$  inches.

The inefficiency exhibited by the street crew was even worse than at the plant. This crew did not contain a single man who was experienced in the laying of sheet asphalt pavements. The rakers, tampers and smoothers were merely laborers picked up in the city and knew nothing whatever about paving construction. The rollerman was inexperienced in paving work. He knew nothing at all about proper compression or the proper time to start