

plant, a minimum temperature for laying being provided as a check against poorly compressed work.

Whether wagons or auto trucks will prove more economical is always a local problem. The auto trucks are good for long hauls with steep grades, but there is frequently greater economy in the wagon for short hauls with flat grades. Provisions should be made for the rapid loading and unloading of either, but especially the automobiles. The writer remembers figuring on one job that it cost one cent a minute to have a horse-drawn wagon of three tons capacity stand for its load, and five cents per minute for a five-ton auto truck. After that we built a loading hopper.

One Cent Per Inch-Yard-Mile

Canvas covers on the trucks are very good at all times, and especially in chilly weather when the crust of the mixture would otherwise become too stiff for proper raking. They should be so arranged that there is a three-inch or four-inch air space between the cover and the load, as this not only saves the cover but also provides much better protection for the hot mixture.

"One cent per inch-yard-mile" is a good formula to remember when considering the cost of hauling asphalt paving mixtures. That is, it costs about one cent to haul enough mixture to lay one square yard of asphalt pavement one inch thick and weighing about one hundred pounds, on a street one mile from the mixing plant. Multiply one cent by the thickness in inches of the pavement, and that by the number of miles between the plant and the job. This is a rough and ready rule that should not be used as a basis for a bidding estimate, but it will help in quickly considering the comparative advantages of various available plant sites. It was the basis of a large asphalt hauling contract in New York City at a time when team hire was six dollars a day.

The mixture should be dumped on the street on some spot outside of where any part of that particular load is to be laid, and all of it should be handled into place for raking by upturning the shovel at the place of deposit. Asphalt mixtures should not be cast long distances through the air to scatter over the foundation upon which they are to be placed. This is particularly true of those mixtures ranging from stone-filled sheet asphalt to bitumethic, in which such a casting about is likely to cause serious segregation.

Laying Asphalt In the Rain

Painting abutting surfaces of headers, curbs, manhole and handhole boxes, and so forth, is an old custom, and, we think, a very good one. The asphalt cement used for this purpose should be the same as that with which the mixture is made, and sufficient of it should be applied to be effective. If this detail of the work is worth doing at all, it is worth doing well, and not in the skimpy, careless way we so often witness on both contract and city work.

Sweep the foundation clean before placing the surface upon it. The investment is too great to be endangered by the neglect of a detail that costs so little. The roughened concrete surface that is preferred for asphalt paving requires some care in sweeping to make certain that all the small depressions are reasonably free from dust and dirt and loose material.

Laying asphalt in the rain is not so serious a matter as one would at first suppose. Experience has demonstrated that sections of pavement laid during quite heavy rain-falls have lasted quite as well as other sections placed when the weather was more favorable. This is not a plea for selecting rainy weather to lay asphalt surfaces, but for

the costly mixture that is frequently hauled to the dump because some inexperienced engineer thinks a little moisture from above during the laying will cause an asphalt pavement to fail. We do not recommend laying in puddles of water, however, and every possible precaution should be taken to avoid bad weather.

Levelling and raking mixture requires more skill and attention than it usually gets. The raking process should be a kneading into place with the tines of the rake so that about the same weight of mixture will cover each square inch of the foundation. Only in this way can a pavement be laid that will get equal compression under the roller and that will be of equal density throughout. We believe that the depressions in asphalt surfaces are frequently due to the further compression under traffic of those parts of the pavement that are spanned by the wide wheels of the asphalt roller at the time of laying. Certainly a roller riding on two dense knobs of mixture cannot properly compress the loose material between.

Asphalt Gutters Should Have Proper Rise

A true surface is essential in any good paving job, but especially is this necessary with asphalt, where every little fault may be seen so easily. Also, if there are no waves, there can be no rolls, and we often think that many surfaces displace partly because the original workmanship left the beginning of the wavy condition that later becomes so objectionable. A long straight-edge, ten feet or more, constantly in use, will do much for any paving job.

The straight-line crown is used more extensively each year with all types of pavements, but it has special advantages in the case of asphalt where there is so much objection to the little shallow puddles of water that form on the centre of other crowns directly following a rain storm. The purpose of the crown is to shed water, and it should be made to do that as effectively as possible with the least necessary drop from a horizontal line. One-quarter of an inch to the foot is sufficient where a straight-line crown is used and the surfacing work well done.

Gutters should be asphalted to the curb. There is no reason for placing a cement or brick gutter on an asphalt street. Whether of asphalt, cement or brick, the gutters should rise at the rate of one inch to the foot or better for the first two or three feet from the curb in order to form a decided dish that will confine the water in a narrow stream against the curbing instead of permitting it to spread several feet therefrom. If the same care had been used in forming asphalt gutters with the proper rise that was used in laying cement or brick gutters on asphalt streets, no one would ever have thought it necessary to employ the other materials. The flat asphalt gutters of early construction have much for which to answer. Proper gutters can be formed and compressed with a tamper, and an experienced roller man can get in to them effectively.

Make Needed Repairs Promptly

Lay asphalt to the street car rail wherever the street railway road-bed is good. Where it is poor, compel the company to make it what it should be, if possible. There is something very disfiguring about a ribbon of blocks along an outer rail on an asphalted street, and it is absolutely unnecessary in most cases. The way in which the asphalt promoters have persuaded cities to lay block pavements along car rails on asphalted streets, has always appealed to me as diabolically clever. These men know that whatever is laid will go to pieces where the rail construction is bad, and, by shunting it over upon the other material, they avoid the discredit that would, unavoidably, though unjustly, fall upon asphalt.