

Engineering Department

A. W. CAMPBELL, O. L. S., C. E., M. C. S. C. E.

PLACING ROAD METAL

To know how gravel or stone should be placed on the road, it is necessary to have a knowledge of why it is placed on the road. This is a matter to which very few of our road-makers have given the slightest attention, and very few could give an intelligent answer to the question. The popular idea is that the stone makes a sort of carpet for a while, in a short time it will be forced down into the soil to form a bottom, and on this more gravel or stone will have to be placed, and that this process will have to be continued indefinitely until a good road is made. There is even a very general belief that it is not necessary to drain a road but that the only means of accomplishing the desired end is to pile on gravel year after year, and that water, unless it actually floods over the top of the road, has little to do with the matter, and that so long as the actual surface of the road does not get wet it does not matter how boggy it may be underneath.

In the intelligent construction of a road, the intention of the gravel or stone coating is to form a waterproof covering for the soil underneath as well as to form a hard wearing surface. Of course, gravel and broken stone can not, as a matter of fact, be entirely impervious, but so far as the coating of these materials does prevent the water passing through to the sub-soil, it fulfills the greatest portion of its mission. To accomplish this to the greatest possible extent there are several points which it is necessary to pay attention to :

- (1) The road must be crowned or rounded up in the centre.
- (2) The material must be as compact and solid as possible.
- (3) The surface of the road must be made and kept smooth.

Crowning the Road

By having the road crowned and rounded up in the centre, water is at once thrown to the sides where it can be carried away in the drains. If the road is flat on top, or if hollow, as many of the roads in Canada are, water stands on the road, soaks down through the road covering and softens the soil beneath. Then the trouble begins, there is nothing to support the gravel, so that when a loaded vehicle passes over it the wheels are forced down through the gravel and into the soil. The soil is plowed up and mixed with the gravel, and the serviceability of the road is largely destroyed.

The means of providing a proper crown must depend on the circumstances. For an average country road on which a grading machine is used, the best method will be to first round up the natural soil giving it a slightly less crown than it is intended the finished road shall have. This completed, pass the grader over one side of the centre cutting off the top and turning the loosened dirt to the side, then pass the grader back along the other side turning the loosened dirt to the side. This will leave a flat surface in the centre of the roadway, along each side of which is a shoulder of loose earth, forming a shallow trench. In this the gravel should be placed, spread with a rounded surface, and the loose dirt at the sides levelled off to conform to the shape of the roadway.

Old gravel roads are commonly flat, in ridges with square shoulders at the edge of the ditches. In this case

the better plan is to cut off these shoulders throwing the loosened dirt outwards. The ditches are usually very wide and flat, the road having been graded by drawing the earth out of the ditches with a scraper, so that the shoulders thus turned outward merely widen the graded roadway without interfering with the drain. If, however, these ditches are sharp and deep, the loosened earth may drop down so as to obstruct the water, in which case it will have to be thrown across the drain to the roadside by hand, a proceeding seldom necessary.

Usually a sufficient depth of gravel will be found upon these roads, requiring only that the centre should be raised by cutting off the sides. After this is done as above described, a light coating of clean gravel to fill the ruts and depressions and restore the crown will make an excellent road.

Consolidating Material.

The road covering should be solid and compact in order to shed the water. Under present methods, the gravel or stone is dumped in the centre of the road and is left as it falls, a mound of loose material, avoided by the users of the road until late in the fall when the muddy and rutted state of the road compels them to drive along this mound. Gradually it is flattened down and after a year or so, during which time it has been mixed largely with the soil beneath, assumes the shape of a road. The utility of roads made in this way is largely wasted. Roads must be made for traffic, not by it.

This loose stuff absorbs the rain as it falls, even before it is cut into ridges by wheels and the feet of horses. When it has been cut into this condition it acts as a receptacle to hold all the moisture its surface will receive. In this way the whole surface and foundation of the road is softened, is readily cut up and destroyed.

The best remedy for this waste in road-making is to spread the road metal to conform to the required surface of the finished road, and then thoroughly consolidate it by the use of a heavy roller. It can be largely remedied also by taking proper care of the road, if a roller cannot be had. By raking the loose material into the ruts and wheel tracks as fast as they appear, nearly the same end will be accomplished, but less perfectly, and requiring a longer time. The first vehicle passing over the road does comparatively little injury; it is when ruts have been formed which hold water, and other wheels follow in these tracks, that the greatest damage is done.

A Smooth Surface.

It is evident that a smooth surface is essential to a good road. A rough surface is necessarily such as will impede the flow of water from the centre to the drains. To such roads rain is always an injury. With roads properly built, on the contrary, a good dash of rain will flush away the dust which has accumulated, and which, if it remains on the road in time of steady rain and slush, acts as a sponge to absorb moisture and soften the surface of the road.

The Guelph Municipal Electric Railway has added a 150-h. p. storage battery to its plant.