

STONE AND GRAVEL ROAD CONSTRUCTION*

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STONE and gravel roads are the two kinds of roads that are now largely being built, but conditions are changing very rapidly and the time is at hand when other methods of construction will have to be adopted.

We have now at least three classes of roads, viz., provincial, provincial county, and county roads, and I am sure that the Ontario government and those in charge of the Ontario Highway Department are to be congratulated on the assistance given towards the improvement of our roads. The system that has been adopted is one that should commend itself to everyone interested in the improvement of roads.

The first question which presents itself is, what roads should be built of stone or gravel?

The provincial road to connect up not only the provinces but the great nation to the south of us, and will be an advertisement of the province, also a great inducement to tourists to come in, and the great amount of traffic that will be attracted to this road will call for a more permanent type.

Next in importance is the provincial county road, which will link up the different counties and be a feeder to the provincial road. Now that the auto truck is coming into general use, this class of road will also be called upon to carry a large amount of heavy traffic, and if built of water-bound macadam, will require a bituminous wearing surface.

We now come to the county road, which is intended to link up the different centres in the county and to be a feeder to the provincial county road. No doubt the county roads will have to be constructed of stone or gravel, and it is very important that they should be built in the best manner possible.

Method of Construction

1.—The road should be staked out straight, in the centre of the road allowance, from 24 to 28 ft. wide, depending on the locality and the amount of traffic.

2.—The hills should be cut down to a grade of not more than 6% if possible, for after the road is constructed this is not likely to be done, and if it is, it will be at a considerable extra cost, whereas a little extra cost at the time the road is built will give more satisfaction (and the cost is soon forgotten, but a bad job is an eye-sore and an inconvenience for all time to come).

3.—It should be underdrained where necessary, and culverts placed at the natural water courses to carry the water across the road. Never carry it along the road to save putting in a culvert.

4.—The road should then be well graded and the crown for a single track road should be one inch to the foot, to allow for settling, with good open ditches with sufficient outlets. Water should never be allowed to stand in the ditches, as it will soak under and injure the road.

The preparation of the road as stated above, should be done one year before the metal is put on, to give it time to consolidate, or else the road should be thoroughly rolled. The harder one gets the foundation, the better, for it is much easier to consolidate the stone on a firm foundation.

You will never get good results when you build on a soft or yielding subgrade. Very wet weather is a bad time to build a road, as it is important that the foundation of a road should always be dry. It is also important that it be dry and hard when the road is being constructed, for when the road is wet, the stone is pressed down into the mud and the mud is forced up through the stone, and in a very short time the road becomes rutted and soon goes to pieces.

Selection of Stone

After the road has been thoroughly prepared, the next thing to consider is the quality of the stone, which should be hard and tough, of course. Conditions, and the convenience of the stone to the work, will have to be considered in de-

ciding what to use, but don't use a poor quality for the sake of saving a few cents a yard.

The next question is width and depth of metal. For a single track road, 10 ft. should be a suitable width, but it should not be less than that. Greater width would be preferable. The depth of the metal should be determined by the amount of traffic it will have to take care of, and the kind of soil on which it is built. For instance, where the foundation is of a gravel nature, making a good natural drainage, a depth of 8 ins. when consolidated might be sufficient; but where one has to build on a subgrade of heavy clay, it might be necessary to make it 12 ins. In that case the road should be excavated to a depth of 6 ins. and filled with coarse stones and thoroughly rolled when dry. For the second course of stone, from 1½ to 2 ins. would be a suitable size, and this course must also be thoroughly rolled, beginning at the edge of the stone and working toward the centre.

The screenings are then put on, and plenty of water to make a slush. The roller should still be kept going, and at the same time the road should be well brushed with stable brooms to fill the voids.

The water wagon should have wide tires, not less than 4 ins., to prevent rutting the road. In fact all wagons used on the job should have wide tires.

It is very important that the foreman in charge of the work and the man who operates the roller should be competent men, and work together with the end in view that when the road is completed it will be the best road in the county.

Gravel Roads

Gravel, while not so durable as broken stone, has some advantages on account of its being easier to construct, easier to maintain and cheaper. Of course the length of haul is a big factor in the cost of any kind of road, and where the length of haul brings the cost up to anywhere near the cost of stone, gravel should never be considered.

Gravel varies greatly in quality, but as a rule is suitable for roads where the traffic is not too heavy.

When one can get the right proportion of stone, from pebbles up to 2 ins., with just enough sand to fill the voids, it is an excellent material with which to build a road. If the road is well drained, and a sufficient depth of gravel, say from 10 to 12 ins., is put on, and the road well crowned, it will stand up under quite heavy traffic. But it is very rare that one will get a pit where the whole body of gravel is as I have described, nevertheless, in most pits there is some good gravel, and great care should be taken to see that only gravel of good quality is used.

Dirty gravel should be avoided. While gravel with an excess amount of clay will pack quickly and make a good road in dry weather, when the rains come in the spring or fall, it turns to mud and ruts badly and soon wears out.

A few stones are not objectionable if the gravel is otherwise good, as these can be raked forward and placed under the next load. Never leave them in a heap at the end of load. They prevent the gravel from settling even.

Loading at the Pit

See that an even grade of gravel is taken from the pit. One part of the pit may be very fine, another quite coarse and still another may contain too much clay. The teamsters all crowd in at the same time and load wherever it is most convenient, with the result that every load is of a different grade, and when the road is consolidated it will be very uneven, and one is able to tell, from the depressions that will be found, just where every load was dumped. A road of this kind is very objectionable.

Where the gravel has a large amount of stones or boulders, it should be run through the crusher.

Gravel should be spread on the road at least 7 ft. wide and from 10 to 12 ins. in depth. While the traffic will in time consolidate the gravel without rolling, and in a year's time there may not be much difference between it and a road that was rolled, the satisfaction of having the road in a finished state from the beginning, is well worth the cost of rolling.

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