

PRACTICAL ROAD CONSTRUCTION

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The First Thing to Do with a Road Is to Grade and Drain It. Roads Require Continuous Attention. They Should be No Wider than Traffic Requires. Weak Spots in a New Road Should be Attended To at Once.

In the building of roads there are scores of different ideas worked out in Ontario. One man believes a road should be graded forty feet wide; another man believes that it should be thirty feet wide; another that it should be twenty feet wide. One man thinks a road should be flat, perhaps hollow in the centre; another that it should have only a slight crown; another that it should be sharply crowned. One man has theories of drainage which prescribe shallow drains; another believes drains should be deep; and so the story goes. All these cannot be right. There must be some one way that is best and all the others inferior.

It is not to be supposed that all the work done on the roads has been defective—quite the contrary. While some roads have numerous faults, the majority have perhaps only one or two that are well pronounced. Skill in road-making is shown by the absence of the one defect that destroys or impairs the entire work.

GOOD DRAINAGE

One of the most apparent faults in road construction is the neglect of the foundation. Some appear to think that to pile gravel or stone on a road is the first and last requirement of road-making, whereas it is only the last, and it is very often the least important. The first principle of roadmaking is drainage. The reason roads are good in summer is because they are dry. It follows that to keep roads good all the year round, they should be so constructed as to be as dry as possible; that is, there should be a firm stratum of dry soil on the surface to support any gravel or stone that may be spread on it as a surface covering.

There are three important departments of drainage:—(1) The road should be crowned or rounded in the centre, so as to shed water to the sides of the road. (2) There should be open drains at the sides of the road to carry storm water away quickly. (3) There should be under-drainage to carry away as much sub-soil water as possible.

TREATMENT OF SUB-SOIL

The soil in the sub-grade as influencing the drainage, may be described in three general classes; (1) clay; (2) sand or gravel; (3) sandy loam.

Clay, as found in the sub-grade, is variable in quality. It may be pure blue clay, or it may have sand mixed with it in different proportions. With blue clay, the ground water must be removed as far as possible if stable results are to be secured. In addition to the open surface drains, one or two deep tile drains should be laid along the roadside underneath the open drains, and leading to free outlets. It is customary to place one tile drain on a side-hill, and one on each side in a cut or on a level grade. If the clay contains a considerable proportion of coarse sand, it drains more freely than does pure clay, and one tile drain along the roadway will do all that two can do if placed at sufficient depth. If, on the other hand, the sand is fine-grained, it may be in greater need of deep drainage than if it were pure clay, becoming, when wet, almost a fluid in consistency.

Sand or gravel sub-soil may demand little or no tile drainage to produce a reasonably strong foundation. Tile drains may be omitted at the time of construction but can be put at points

where the condition of the road under traffic indicates that the "water line" should be lowered, of where "spouty" spots occur in the spring. A sandy loam is a soil which is often difficult to treat. As a rule, in addition to good surface drainage, a tile drain on one side will be needed, particularly in drying out the road quickly in the spring, when it is most subject to injury under traffic.

It follows that the first thing to do with a road is to grade and drain it, straighten it so that it is in the centre of the road allowance, and see that both open drains and under-drains have free outlets. Drains without outlets are merely elongated ponds to hold water and permit it to sink into the earth.

THE ROAD SURFACE

Where gravel is used to surface the road, it should be clean. The best pit gravel for road work is clean, free from an excess of sand and clay; is composed of stones of varying size up to 1½ inches in diameter, with just enough fine stone to fill the voids and make a compact mass. Dirty gravel is the chief thing to avoid. Gravel containing much clay, sand or earthy material packs quickly and makes a good dry-weather road, but in the wet weather, of spring or fall, it turns to mud and slush, and runs readily. Fine gravel is weak and is not so durable as the more stoney quality of gravel, with plenty of pebbles up to 1½ inches diameter. It is stone that is required on the surface of a road, not clay or sand.

Where broken stone is used, care should be taken to select a strong and durable quality of stone, and to see that it is broken to a suitable size. The depth of stone used must be sufficient to consolidate into a compact layer. A sprinkling of stones over the surface is useless. Six inches of broken stone is a standard thickness, and it should be the aim of councils to increase this as circumstances permit.

WIDTH OF ROAD

The most durable roads and the most satisfactory, after a couple of years use, are those which have first been made narrow and thoroughly crowned. After a road is constructed, the constant tendency is to flatten and settle. There are no forces which will cause it to become higher. In consequence, a road should be, when first constructed, too high in the centre, otherwise it will shortly be too flat. From the edge of the ditch to the centre of the road, a crown of two inches to four inches is not too great.

Roads should be no wider than traffic requires. Twenty-four feet from edge to edge is ample for heavy traffic near towns and cities. For ordinary travel on country roads, a width of twenty feet is sufficient. Narrow roads are much more easily maintained than wide roads. Every extra foot of width increases the cost of maintenance very materially, for the sides of the road become cut up and rough. When in this state, they impede surface drainage; the road becomes wet on the surface and is in consequence more easily rutted. The choice is usually between a narrow but good road, and a wide but inferior road.

In the treatment of old gravel and stone roads, the use of a grading machine, or rather its misuse, has at times resulted in a great deal of harm. Soft material should never be placed over a firm and hard roadbed, yet the grading machine has been used in many cases to draw

the soft material, earth and sod, from the shoulders of the roads to the centre, to form a crown. High and square shoulders at the side of a road should always be cut off, but the material of which they are composed should be turned outward, never drawn to the centre. If, in repairing such a road, a higher crown is required at the centre, it should be obtained by spreading a new coating of gravel or stone.

The use of modern roadmaking machinery should be encouraged throughout the Province. These machines are labor-saving, and enable a much superior type of road to be built. The cost of machinery is not as great as is commonly supposed, since the saving in extra labor in construction, offsets very largely the cost of machinery.

HILLS SHOULD BE SHARPLY CROWNED

Hills require special care for construction and maintenance. They must always be counted on as an extra expense. The chief distinction between a hill and a flat road, as regards construction, is that a hill should be more sharply crowned. This crown should start some distance from the top of a hill and should curve well away from the foot. If a road is flat at the top of a hill, it encourages water to flow down the wheel tracks. If it is flat at the foot of a hill, the water lies on the road in pools.

Roads should have continuous attention. There is no work in which careful attention to details will so well repay the outlay. Repairs should begin on a road as soon as a road is built. In fact a new road should very often receive more care the first year after construction, than it should require during the following five years. It is neglect in not giving roads proper care during the first year following construction, that very often promotes their rapid deterioration. There are always weak spots in a new road, which, if not attended to when they first appear, will cause continual trouble afterwards; whereas if they are strengthened as soon as the weakness becomes apparent, the roadway becomes of uniform strength throughout.

We have been thoroughly convinced of the importance of cow testing work. Our herd was a rather poor one, and was greatly in need of weeding out. There is no other way to effect this with any degree of certainty than by the use of the scales and the Babcock test.—Robert Newton, Labelle Co., Que.

Few farmers appreciate that their barn yard manure is their capital; that in their manure pile they have a bank upon which their draft will always be honored. Its value is not uncertain, but has been established beyond doubt. It has been estimated that the annual secretion of a cow is worth from \$25 to \$50; of a horse, from \$20 to \$40; of a pig from \$3 to \$5; of a sheep from \$2 to \$4. These estimates are carefully compiled from the results of experiments by agricultural experiment stations, both in this country and abroad, and are computed upon the basis of the cost of the amount of nitrogen, phosphoric acid and potash contained in a year's excrement of the animals above named. The amount of these fertilizing constituents varies largely in accordance with the age of the animal, the food upon which it is fed, and the manner in which the manure is cared for.—K. H. Housser, Oxford Co., Ont.

Cows give a greater return when freshening in the months of December, January and February and if well fed, will give nearly as much milk during the summer as those which freshen in April or May.—W. E. Thompson, Innerkip, Ont.