Road Drainage.

That the question of road improvement has not received the attention it should is most clearly demonstrated by the fact that every person who has given thought to the matter is at once convinced and freely acknowledges that the matter of perfect drainage is the basis of good roadmaking. An evidence of how much we know about the important question, and how little of this knowledge we put into operation, is most strikingly shown by the fact that drainage is so often ignored. We have certainly been giving too much attention to surface indications. Our system has encouraged us to make as large a showing as possible with a limited expenditure, and consequently it has been our aim to temporarily improve the surface. The time was when some excuse could be given for this sort of thing, but no longer should we practise this false economy. Let us get at the seat of the trouble, where trouble exists, and instead of trying to plaster over a springy hill, or a boggy, low, wet spot, let us drain the foundation. Take away the surface water. Provide proper outlets, if necessary through adjoining land. Crown the road to shed the water into the side ditches. This gives a dry earth road upon which may, later, be placed gravel or stone, and thus provide a perfect roadway.

It is not the average condition of a road that makes it what we term "bad." But rather, the many or the few bad spots in a long stretch of road. It is these bad places that should command our first attention. The most of the expenditure should be made on the bad stretches, first taking the worst. Each year these worst plac s would be made better, each year's work should reduce the rumber, until in a short time the whole road would be made fairly good and ready for gravelling.

In travelling the country, it is surprising to find the work that is being done on the higher and better parts of the roads, making them still better; while the lower parts, which are the worst, are neglected and allowed to grow worse. A further evidence of the error which is being made is so much attention given to the high sections, for which there is often no occasion, and little attention to the low sections, which should naturally and reasonably demand the greatest outlay.

Often the whole beat is made up of a section of road, high and dry, over gravelly soil, with a gravel pit in the centre of it. This beat is kept up, but often the road is made worse than otherwise it would be, by the annual expenditure of practically unnecessary work. At one or both ends of this beat there may be a slough, swamp, or a long stretch of bad soil, through which the people from both beats must constantly pass. More expenditure than is requi ed is made on the upper beat, while less than is needed is made on the lower. In such cases united action should be concentrated upon the worst pieces ensuring gradually better results.

The Road Surface.

A road surface of gravel or broken stone performs various services. The subsoil of clay or loam alone ruts readily, softens quickly after a rain, and has little supporting power. A well-compacted layer of gravel or broken stone over it, distributes the concentrated wheel load over a greater area of subsoil; it does not rut readily, and affords good surface drainage; it gives a smooth, hard wearing surface; water does not easily penetrate it so as to soften and reduce the supporting power of the subsoil.

The depth of gravel or stone to be used must vary with the quality of the material, the amount and nature of traffic on the road, and the nature of the subsoil. A dry, compact and stony subsoil, needs less metal than does a plastic clay, difficult of drainage. No definite rule can be laid down other than that from six to twelve inches of well consolidated material will afford a sufficient range to accommodate most circumstances. Under ordinary conditions, ten or twelve inches of metal should accommodate the heaviest traffic to which a gravel or broken stone roadway can be economically subjected.

A very notable defect of most country roads is the flat or even concave surface. Others present the opposite extreme, and are so rounded up as to be dangerously high in the centre, making it difficult for vehicles to turn out in passing Roads must be crown d sufficiently to shed water from the centre to the open drains at the side, otherwise water will stand in the roadway, soak into it, soften and cause rapid wear and decay; but a crown higher than is necessary to properly drain the surface is also objectionable.

The amount of crown should not be more than sufficient to provide for surface drainage. A steeper crown than is necessary tends to confine the traffic to the centre of the road, and in turning out the weight of the load is thrown on one pair of wheels in such a way as to rut the side of the road. The shape of the crown is a matter on which expert roadmakers differ, but with the class of material available for roads in Ontario, and the methods and plans of construction, a form as nearly circular as possible will be found most serviceable, and easily obtained.

From the edge of the open drain the graded portion of the roadway should be crowned with a circular rise of one inch to the foot from side to centre. That is, a drive way twenty four feet wide should be a foot higher at the centre than at the side. This amount of crown may appear excessive, but with gravel roads and roads metalled with the quality of stone commonly available, is not more than sufficient to provide for the wear and settlement consistent with good surface drainage.

The elevation of the road above the level of the adjacent land need not be greater than is sufficient to provide against the overflow of storm water, which should always be guarded against. The depth of the drain must vary according to the amount of fall and the quantity of water to be provided for; also to the sub-drainage needed and provided. When tile sub-drains are used the open drain can often be very shallow; in which case the width of the graded roadway can be narrowed, there being no danger of accidents such as are caused by a deep trench at the roadside. The tile drains should be placed below severe frost, and usually a depth of three feet will answer.

A degree of moisture is necessary in the summer season in keeping sand roads or roads over sandy ground in their best condition. One of the most lasting and beneficial improvements to sand roads is the planting rows of trees on each side of the road, and close together to provide continuous shade. They will prevent, in part, the drying effect of the winds, as well as intercept the rays of the sun. For this purpose the white elm, with its arching branches, is m st serviceable, and will add much to the appearance of the country.

Concrete Culverts.

The Roads Department is being beseiged with questions relating to the use of cement in culverts and bridges. It is surprising how slowly some municipalities provide for keeping pace with constantly changing conditions. It is surely apparent to the older counties that timber for all such works is becoming scarce and expensive, that we cannot afford to use this material as we did ten years ago, and that something must be provided for taking its place.

Some townships have been using sewer pipe and cement pipe for the last twenty years, while other townships, where the necessity for such economy is greater, are still using timber. The price of timber has gradually increased until few of us stop to consider what timber culverts, at the present market prices, are costing; and some of us do not take the trouble to inquire what the culverts would cost if built of durable material. But an example of the economy of concrete is to be seen in the towns of Northern Ontario. in the very heart of the lumbering sections. where concrete is now being used, instead of timber. Timber is too expensive for culverts. No township can afford it. Nothing can illustrate more clearly the carelessness of a council than to find them still using expensive lumber instead of concrete.

The best sewers and the best telephone service is claimed by Dawson.

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A central heating plant for heating all the municipal offices and buildings is proposed in Lindsay.