ROAD MAKING.

We may expect that our District Councils, organized throughout Canada, may do much the way of Road-Making, that is so very necessary to the general improvement of the country. In every case where money is to be expended in constructing Roads, careful surveys should be made of several lines, by competent persons, in order to the selection of that line, which, in comparison, appears to have the preponderance of desirable qualities for the public convenience. We cannot expect to have Stone Roads made immediately, throughout every Concession in the Province; but, where the main roads that would give accommodation to a large number of Farmers, may be constructed and covered with stone or other hard mettle, it is very desirable that the line of these Roads should be the most convenient, and as much as possible, combine the qualities of straightness and level; the line of direction and line of draught being very carefully adjusted to each other. We have seen an excellent article on this subject in the "Penny Cyclopædia," now being published, and beg to copy a few paragraphs from it:—

"It seems to be the prevailing opinion with modern engineers, that the line of direction of roads, has not generally been made as subordinate as it should be to the line of draught; and it will be well to remember in laying out a new road, that while the effect of gravity must ever remain the same, the resistance occasioned by imperfections in the road, and carriages will be reduced by every prospective improvement in their construction thereby increasing the *proportionate* effects of gravity, and making the line of direction still more subordinate to that of draught, or, in other words, increasing the length of level that may be traversed with the same expenditure of power as would raise the load up as given elevation. Curves increase the resistance to the motion of carriages, and add to the risk of accidents; but, if slight, they increase the length of the road much less than might be supposed. Edgworth, in his Essay on the construction of Roads and carriages, says "a road ten miles long, and perfectly straight, can scarcely be found, and if it were carved, so as to prevent the eye from seeing further than a quarter of a mile of it, in any one place, the whole road would not be lengthened more than one hundred and fifty yards.

However desirable a perfect level may be in theory, a road with moderate inclinations as of 1 in 100, is found to be preferable in practice, because without such a shape it is difficult to get rid of water fast enough, unless the road be raised a few feet above the surrounding land, and thereby exposed to the free action of sun and wind. Slight undulations are also considered by most authors to be desirable in all cases where animal amount of exertion being considered favourable to the horses. On this principle it is recommended that where an undulating road is reduced to a uniform gradient, occasional levels should be introduced to ease the draught. Any inclination exceeding the angle of repose, or that beyond which a carriage would roll down by its own gravity, occasions a loss of power; but all below it are attended with a compensating effect when the traffic in both directions is taken into accounts, the advantage gained by descending carriages being equal to the additional labor required in the ascent. This angle has been stated by Laruuen, to be about 1 in 40, with a good carriage upon a broken stone road of the best quality. A greater sloap not only occasions much additional resistance in the ascent; but, by rendering it unsafe to drive down at full speed, causes a loss of time in the descent also. The following table shows the effect of various inclinations in increasing the draught of a Stage-Coach at different velocities on the same description of road as indicated by a dynamometer contrived by Mr. MacNiell for experiments on the draught of carriages. This useful instrument is mounted in a light Phaeton, and, besides marking the draught at every ten or twenty yards, points out the distance run, and rates of acclivity or declivity on every part of the road:—

FORCE REQUIRED AT

Inclination	6 mile pr. hour	8 m. pr. hour.	10 m. p. hr
1 in 20	262 lbs.	296 lbs.	318 lbs.
1 " 26	213 "	210 "	225 "
1 " 30	165 "	196 "	200 "
1 " 40	140 "	166 "	172 "
1 "600	111 "	120 "	123 "

It should always be borne in mind that the occurrence of one steep hill on a line of road, affects the working of the whole line, as the number of horses required for ascending it must be used, although a portion of their power may be unemployed on the greater part of the road. The inconvenience of a steep inclination where unavoidable, may be diminished by laying a stone tramway for the use of ascending vehicles; a measure which has been adopted with success on the Holyhead road, where, on a slope of about 1 in 20, the power required to draw a ton has been reduced by this means from 294 lbs. to 132 lbs.

In arranging the works necessary for obtaining the required level, the preference should be given to embankments, and, wherever it is practicable the bed of the road should be elevated two feet above the natural level, for the sake of efficient dramage. Deep ditches should be cut for the efficient drainage of the road, which is of paramount importance; and these should be on the field side of the fences. They should extend to a depth of from two feet six inches to four feet below the bed of the road, according to the nature of the ground.

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The effect of a paved or concrite foundation in deminishing the draught, appears, from the subjoined statement, founded on experiments with Mr. MacNiell's road indicated, to be very great; but a more extensive series of trials is desirable for a comparison of different systems under various circumstances. The draught of a waggon weighing about 21 cwt, was found as follows:—

On a well made pavement, ...	33 lbs.
On a road with six inches of hard broken stone on a rough pavement, ...	41 "
On a similar road, with a foundation of Roman cement and gravel in lieu of pavement, ...	46 "
On a road with a thick coating of broken stone on earth, ...	65 "
On a road with a thick coating of gravel on earth.	147 "."

It may not be generally known in Canada, that McAdam used no broken stone in the construction of roads that exceeded six ounces weight and always preferred those that only weighed one ounce. It would be well that the same rule was adopted in making roads here. The drainage of roads made lately in this country, is also very imperfect the outlets from the side drains are not attended to in many instances, and, of course, those drains must be useless, if they have not sufficient outlets, constantly kept in perfect order. The dramage of our new roads would be the most useful part of the expenditure, because, without this they cannot be preserved in good repair without vast expense.

We have introduced this subject as Farmers are greatly interested in good roads and will have to pay a large proportion of the expense of maintaining them. We would request particular attention to what is said in the part of this article which we have copied, referring to the construction of roads over high hills—*in all* cases where it is possible high hills should be avoided, as they cannot fail to be a great draw back on a public road that is much travelled upon. If a high hill has to be ascended and descend in a few miles of road, it prevents the transport of heavy loads, and is a great waste of time and labour; it is also very difficult to keep steep ascents in repair, in consequence of floods we are liable to in this country. We shall refer to this subject again.

LIEBIG'S CHEMISTRY OF AGRICULTURE.

The developement of the stem, leaves, blossoms, and fruit of plants is dependent on certain conditions, the knowledge of which enables us to exercise some influence on their internal constituents as well as on their size. It is the duty of the natural philosopher to discover what these conditions are: for the fundamental principles of Agriculture must be based on a knowledge of them. There is no profession which can be compared in importance with that of Agriculture, for to it belongs the production of food for man and beast; on it depends the welfare &developement of the whole human species, the riches of States, and all commerce. There is no other profession in which the application of correct principles is productive of more beneficial effects, or of greater and more decided influence, hence it appears quite unaccountable that we may vainly search for one leading principle in the writings of Agriculturalists and vegetable Physiologists.

The methods employed in the cultivation of land, are different in every country, and in every District: and when we require the cause of these differences, we receive the answer that they depend upon circumstances. No answer could show ignorance more plainly, since no one has ever yet devoted himself to ascertain what these circumstances are. Thus also when we enquire in what manner manure acts, we are answered by the most intelligent men that its action is covered by a veil of Isis; and when we demand further what this means, we discover rarely that the excrements of men and animals are supposed to contain an incomprehensible *something*, which assists in the nutrition of plants, and increases their size. This opinion is embraced without ever an attempt being made to discover the component parts of manure, or to become acquainted with its nature.

In addition to the general conditions, such as heat, light, moisture, and the component parts of the atmosphere, which are necessary for the growth of plants, certain substances are found to exercise a peculiar influence on the developement of particular families. These substances either are always contained in the soil, or are supplied to it in the form of the matters known under the general name of manure. But what does it