

the versino or rise should be $2\frac{1}{2}$ inches nearly. Thus, if an average of 10 inches of metal is to be given, the thickness at the edges should be $8\frac{1}{2}$ inches, and at the middle it should be $11\frac{1}{2}$ inches. This curve is quite sufficient to drain off the water, and it is strictly in accordance with the required strength of the road at the centre and at the sides,—for by observation it is found that on a road much used by wagons, the waste is in the following proportions:

Action of the atmosphere.....	20 per cent.
Carriage wheels.....	35 “
Horses' feet.....	45 “

Therefore, if the atmospheric action is equal over the breadth of the road, and the action of the horses' feet being most frequently on or near the centre, it follows that the centre ought to be stronger than the edges, in the proportion of 7 to 9. Hollow arching of the materials ought to be carefully guarded against; for a percolation of water from the surface will take place wherever it exists. This hollow arching cannot be avoided when the full thickness of the metal is put on at once; therefore it ought never to be done. Covering the surface of the road with loose materials such as gravel or sand, has a still more pernicious effect. It forever prevents the angles of the stones from combining, and a road so used must ever remain hollow underneath.

It has been found on roads where great traffic exists, that if they are made of clean hard broken stones placed on a firm foundation, and rendered impervious to water, and sufficiently strong not to yield under the pressure of the wheels, the wear is about one inch in thickness per annum—but on weak ill-drained roads, pervious to water, and yielding under the pressure of the wheels, the wear of materials has been as much as 4 inches per annum.

The size of the broken stone ought to bear a proportion to the hardness of the material used.

One and a half inch Cubes of Aberdeen Granite are compressed by a weight of.....	25,536 lbs.
Peterhead Granite.....	18,656 “
Cornish Granite.....	14,302 “
Purbeck Limestone.....	20,610 “
Compact Sandstone.....	15,560 “

It follows if $1\frac{1}{2}$ inch Cubes of Aberdeen Granite is a proper size, $2\frac{1}{2}$ inch Cubes of compact Sandstone (the material chiefly used in this country) would be equivalent to resist the same pressure. $2\frac{1}{2}$ inches is too large, but certainly upon every sound principle, the softer stone ought not to be broken so small as the harder.

Having briefly traced the outlines of the formation and construction of a well-made road, we shall endeavour to examine how far the roads lately made in the Home District are conformable to sound principles of road-making,

and in so doing shall take each road in succession.

Yonge Street road was the first experiment. It is not necessary here to enquire into the justice or injustice of the much-agitated question about the expense of that small portion of road made during the first season. It is enough to say that expense was not spared. The road was formed of a greater breadth than has been done since; the metal was laid on thicker, and an expensive, but injudicious system of drainage was adopted. Unfortunately, those adaptations which science has supplied to the art of road-making, were totally disregarded, and a low standard of action was placed before the public. In future seasons this has not been remedied, it is even worse. The road has been carried forward in a nearly straight line, regardless of the expense of animal strength which the Commissioners were entailing upon the public, and heedless of the certainty that in a few years, if the Province prospered, the steep inclinations which they were forming, would be altered at an expense probably as great as the first cost. The proceedings at Gallows' Hill, and at Hogg's Hollow, will fully justify these remarks. I shall confine myself to the latter of these. An excellent line of road, with an inclination of about 1 in 30 on each side of the ravine, could have been obtained at a moderate expense. Instead of adopting this line, the road was carried right across the ravine; the inclinations are not regular; at the steepest parts they are almost 1 in 14. The principle of action appears to have been to reverse the geometrical truth,—lessen the inclination by increasing the distance; for the distance was lessened in order to increase the inclination. The consequence is, that if Yonge Street road had been properly laid out, a regular descent could, with three or four exceptions, have been obtained from the oak ridges to Toronto, and one horse could have drawn in a ton weight of produce to the city; but Hogg's Hollow, and one or two other mismanaged places intervene, and it is absolutely necessary to employ two horses to bring in a ton of produce, instead of one horse,—a tax upon every individual who lives to the northward of the hollow, far heavier than both the tolls upon the road, besides having toll to pay for two horses instead of one, into the bargain.

The metal bed is badly formed—the inclinations irregular, resembling the section No. 2,—the metal laid on in masses, and imperfectly consolidated—drainage seems to have been neglected, or not understood—and the road is breaking up.

Some further remarks are then made on the West and East Toronto Roads, showing the errors committed in their construction.

This paper is followed by one stating that roads must be made perfectly dry in the first