

**BROKEN STONE.**

There are localities in Canada where good gravel is not obtainable, but where stone can be had, either as bed rock or field boulders. Some townships have used stone, broken by hand, but a stone crusher with screen attachment affords a much cheaper method.

The stone should be separated into grades according to size, the coarser stone to be placed in bottom of the road, and the finer at the top. This grading of the stone is done by means of the screen attachment. If the stones are placed in the road without being graded in this manner, the smaller stones were more rapidly than the larger, and a rough surface results. Large stones at the surface, moreover, are more apt to be come loose, to roll under the the horses feet or the wheels. For a country road there should be placed in the roadbed (1) a layer of stones such as will pass through a 2½ inch ring; (2) on this a thin layer of stones such as will pass through a one inch ring; (3) on this a coating of screenings, that is, the dust and chips created in crushing.

Care must be taken in choosing the stone to be used. Some limestones make good metal; but limestone shales of a slaty nature, or limestone which decays rapidly on exposure to the air, should be rejected. Sandstones are brittle and do not unite well in the road. Granites, which are found in the northern part of Ontario, make good road metal. Trap rock is the best obtainable. Gneiss is very frequently a good rock. The latter, with other hard stones, are frequently found as boulders scattered over the southern parts of Canada. In using field boulders, care must be taken to reject such stones as are evidently softened by exposure. Rocks which crumble readily under successive blows of a hammer, or which show iron stains when broken, should be discarded. A little experience will quickly teach a judicious roadman to detect boulder stone which is unfit for road purposes.

There must be a sufficient body of broken stone to consolidate into a compact layer. A sprinkling of stones over the surface is useless. It merely impedes travel on what might otherwise be a good dirt road. Six inches of broken stone is the least which should be used in making a durable roadway for any purpose, and it should be the aim of councils to thicken this covering as circumstances will permit.

**VILLAGE STREETS.**

Village streets, town streets, city streets and country roads, in matters relating to their improvement, are all subject to the same general principles, but in many matters of detail there are distinctions which too many are apt to overlook. Every street, indeed, is in some respects a problem in itself, and no general formula can be applied to all, except at a disadvantage.

In general the streets of a village naturally divide themselves into three classes: (1) The business section, (2) the residential streets which are also main thoroughfares, and (3) the side streets.

The first of these, the business section, requires special treatment as to width of road, and depth of stone, to accommodate horses and vehicles, standing for a length of time, and occupying considerable space. There is in this section much wear at the side of the road to which the ordinary street is not subjected.

The second class of streets are occupied by residences, but are on the line of through travel to a railway station, mill or other place of business, from the surrounding country, and are therefore heavily travelled, and require a substantial form of construction, but the roadway need not be so wide as in the business section.

The third class requires treatment more for the purpose of improving their appearance than for providing for traffic.

**The Business Section.**

The common practice is, in making a permanent improvement in the business section, to lay concrete sidewalks next the street line, and to macadamize or gravel the roadway from walk to walk. The gutters may be paved, if desired, to protect them from the tramping of horses tied at the curb, either with concrete or cobble stones. In places, however, where the use of the business section is very slight, it may be treated more as a residential street, a curb being placed some distance away from the walk, the roadway narrowed to thirty or thirty-five feet, and the space between the walk and curb sodded. When this plan is followed, special walks will have to be laid from each store entrance to the curb.

The roadway should have a covering of broken stone or gravel at least nine inches in depth after consolidation. If stone is used the bottom seven inches should be of the larger grade of stone coming from the crusher, and the top two inches to be of finer stone, such as will pass through a one-inch ring. In applying the stone, the bottom seven inches should be put on in two layers, and into each layer should be harrowed sufficient stone dust or screenings to fill the voids.

If a road roller is used, each course of stone (and the earth sub-grade) should be well consolidated after the screenings have been applied. Rolling should be done, as far as possible, after a rain, and should commence at the curb gradually approaching the centre. A roller will produce a more satisfactory and permanent roadway than if the stone is left for traffic to consolidate it.

If a roller is not used, ruts, holes and uneven places should be kept from forming by frequently raking the stone into the wheel tracks.

This roadway should have a rise of about one inch to the foot, from the side to the centre of the road. By means of this "crown," surface water will flow to the side of the road. The angle between the curb and road-surface will form a gutter to carry the water to an outlet, thus doing away with the need for an open drain. Further drainage should be provided by placing tile under-drains about 2½ or 3 feet below the road surface and carried to proper outlets.

**Residential Streets.**

These are comprised under "class two" previously referred to, and are usually the main roads, not in the business section, leading through the village. The more important is apt to be a street from the business section to the railway station, as this gathers traffic from every direction.

Much that has been said of the business section applies to such a street. The chief difference is that the roadway should be narrower, say twenty-five feet in width between curbs. Stone should be placed on the road, about nine inches in the centre and about five at the sides. Care should be taken to grade the road in such a way that the surface water will flow freely in the gutters to an outlet.

The surface drains should not be interrupted at street crossings. Defective drainage is largely the cause of the bad condition of roads in wet seasons, and for the way in which broken stone is lost in the mud year after year. Good roads are largely a matter of good drainage.

As with the business section, the sidewalks should, when renewed, be built of concrete. The first cost is slightly more than for plank, but after a term of years, if they are properly made, by their greater durability, concrete walks will be found the cheaper and more satisfactory. They may be placed in the old position near the fence; but the better practice is now to place them outside of the trees, either next the curb or a few feet from it.