

Seeding to Alfalfa with Corn.

Editor "The Farmer's Advocate":

In your issue of July 12th a subscriber asks for information regarding seeding corn with alfalfa. Last year we had corn on a field which was quite sandy soil. After we had cultivated for the last time, we seeded with alfalfa, 20 lbs. to the acre, then went through it each way with the framework of an old wooden cultivator, with harrow teeth in place of ordinary teeth. The result was a very good catch, which, if we had had plenty of rain, would have been ready to cut the second time now (July 15). F. J. S. Norfolk Co., Ont.

Road Construction.

The accompanying illustration shows a piece of road running from the Village of Beamsville, Lincoln, Co., Ont., up "the mountain," which at this point consists of two short breaks, and a long grade leading to the village a mile to the north. The mountain has been blasted out, the stone crushed and used as indicated. Preparatory to putting crushed stone in place, the road allowance was graded and earth drawn in two parallel ridges, one along each side of the metalled roadway, and the resulting hollow was filled with broken stone about ten inches deep. This is a common method of macadamizing roads, and in certain features is very satisfactory. The ridges of earth serve to keep the stone in place, but the inherent defect is that the stone, after being put in place, is not consolidated by rolling. Left loosely, all rain falling percolates through to the subsoil, which is softened, and vehicles then passing over it force the stone downwards. In this way much crushed stone is lost, and ruts are created. This can be remedied in part by drawing loose stone in the wheel tracks from time to time by a hand rake or with a grading machine, until the road becomes consolidated under traffic. This, however, is a slow method, and the road suffers much injury during the process. Had the road been at once consolidated by means of a heavy roller, the stones would have been wedged into a solid mass, having almost the effect of a single stone laid over the roadway; that is, it would at once shed water to the sides of the road, where it would pass away quickly in the open drains; it would distribute the wheel pressure, so that no stone would be lost by being forced into the subsoil below, and traffic would at once have the further use of a splendid road, instead of being compelled to plow through a layer of loose stone for some months.

Roadmaking is a branch of construction in which there are certain underlying principles always to be observed, and an endless variety of detail in their application. It is merely the observance of Nature's laws—and Nature never repeats. No two roads should be precisely alike, if economic fitness is observed. Yet the basic laws are always followed. Of these, GOOD DRAINAGE is the chief.

DRAINAGE.

Roads which have been particularly expensive or difficult to maintain are almost invariably defective in either surface or deep drainage. It will be found that the surface water rests on the road, soaks into it, and permits the road to cut up under traffic; or the subsoil drainage is defective, water rising in the roadbed from below, tile drains not having been provided to intercept it. Mud on the surface of the road is bad, but mud below the surface is a greater evil.

The method of determining the system to be adopted is seldom difficult. First decide upon the watercourses crossing or adjacent to the road, to be used as main outlets. Then let all subsequent ditching and grading be done with this in view, so that the water will flow steadily from every part of the road to its proper outlet.

Water should be disposed of in small quantities, along natural watercourses. If carried long distances and gathered in large bodies along the roadside it gains force and headway, resulting in extensive washouts, and is in every way more costly to handle. It should be taken away from the roads as quickly as possible, for an excess of water is the great destroyer of roads. A drain without an outlet is useless, or worse than useless. If there is not an outlet, the water is held in elongated ponds by the roadside, to soak into and soften the travelled roadway. This water is drawn up into the entire roadway by capillary attraction, just as a sponge will absorb water and hold it in all its pores.

The most difficult sections of road to improve are those which do not afford convenient outlets for drainage; but rather than spend money year after year in a useless effort to maintain the road without drainage, it will be found a measure of economy to at once provide proper outlets, even if it is necessary to carry the drain a considerable distance across private property.

It may be accepted, as a general rule, that roads tiled without gravel are better than roads gravelled without tile. All roads except those on

pure sand can be improved by tile draining. A single line of tile, placed about three feet below the bottom of the open drain, if the graded portion of the road is about twenty-four feet wide, will accomplish nearly all that tile drainage will do. If one side of the road is higher than the other, lay the tile on the high side, so as to intercept the subsoil water as it flows down the slope. A four-inch tile meets most conditions, but the size will depend on the length of the drain and the amount of water to be carried away. Care must be taken to give the tile a uniform grade, so that there will be no depressions. Give a fall of at least three inches in one hundred feet. The cost will be about fifty cents a rod. The work, if properly done, will be a permanent and substantial improvement to the road, and will save many times the cost, by lessening the amount of gravel needed on the road.

GRADING.

One of the most common reasons why gravel and broken stone are so largely wasted is that the roads are seldom properly graded and crowned before the metal is placed on them. Before gravel or broken stone is put on the road, the roadbed should be put in right condition by using the grading machine. The water-tables should be given regular slopes to natural outlets crossing the road. No hollows should be left either on the roadway or in the open drains, in which water will stand. Drains from which the water does not flow away are merely elongated ponds to hold water, permitting it to soak into and soften the roadbed. They make mud underneath the road, where it does more harm than on the surface; the dry crust is easily cut

ways advisable for country roads; that is, a road graded to a width of 24 feet between open drains should be one foot higher at the center than at the side. This will permit the water to flow readily from the surface of the road to the open drains. If the open drains are not sharply defined, but are cut down to an angle by the use of the grading machine only, a total rise of an inch and a half or two inches, to the foot, from the bottom of the water-table to the crown of the road, is not too great.

PLACING THE ROAD METAL.

When the road has been properly drained, graded and crowned, it is ready to receive the gravel or broken stone. This applies to both old and new roads. Nothing is more common throughout the Province than to see metal placed on roads that are not sufficiently graded or drained. It may safely be said that one-half the gravel and stone placed on roads is wasted from this cause alone.

On new roads, or roads receiving the first coating of metal, the earth grade should first be well raised and crowned. The top of this earth grade may then be turned outward with the grader, so as to leave earth shoulders eight feet apart, between which to place the metal. When the metal has been spread in this channel or trench, the earth shoulders may be again lightly drawn in to the edge of the metal with the grader, so as to complete the crown. This work, with the grader, is cheap, the cost not exceeding one or two hundred dollars per mile on roads as they commonly exist. It is easy to waste twice this value in gravel or broken stone by neglecting to grade and crown the roads properly before applying the metal.

Gravel should always be spread, not merely dropped in an irregular mound and left to traffic to distribute. Apart from being wasteful of the material, it is a hindrance, instead of a help to travel. It is a dangerous practice, and has led to serious accidents. When left a mound of loose material, it is avoided by users of the road until late in the fall, when the muddy and rutted state of the road compels them to drive along the mound. Gradually it is flattened down, and after a year or so, during which time it has been mixed largely with the soil beneath, assumes the shape of a road. The utility of roads made in this way is largely wasted. Roads must be made for traffic, not by it.

As roads are commonly constructed, with the gravel dumped loosely, the fine material sinks to the bottom, allowing the large stone to protrude and roughen the surface. In placing gravel on a road, large stones not removed at the pit should be raked out of the material when it is being spread, and drawn forward, so as to be beneath the next load. These stones should not be left in a mound, but should be scattered; otherwise they create an uneven and wavy surface when the road settles.

Another cause of this wavy surface arises, not only when loads of gravel are dumped without being spread, but also when the metal is improperly spread, by merely "raking off" the tops of the mounds. The gravel should be dropped well back on the preceding load, and then drawn forward. The gravel consolidates at the point where it is dropped from the load, and to lightly "rake off the tops" leaves a deficiency of metal between each load, causing a wavy surface.

Broken stone should be separated into grades, according to the size, the coarser stone to be placed in the bottom of the road, and the finer at the top. This grading of the stone is done by means of a rotary screen attached to the crusher. If the stone is placed in the road without being graded in this manner, the smaller stones wear more rapidly than the larger, and a rough surface results. Large stones at the surface, moreover, are more apt to become loose, to roll under the horses' feet or the wheels. For country roads, there should be placed in the road-



Crushed Stone Left Unrolled.

through. See that the road is so graded that there is a constant fall along all open drains or water-tables to natural outlets.

It is a mistake to make the graded roadway too wide. Twenty-four feet is ample; eighteen is sufficient for most country traffic. A wide roadway looks well, and is more convenient for traffic—if kept in good condition. But a wide, well-built, well-kept roadway means money. A narrow roadway, in good condition, is better than a wide but poor road. Near towns and cities, where travel concentrates, it is well to provide a roadway suited for two lines of traffic, so that vehicles can pass without going off the metal and sinking in the mud; but, away from the town, eight feet of metal for a single line of travel is sufficient.

CROWNING.

Roads should be well crowned when being constructed, in order to provide for the "flattening out" that naturally comes from settlement and wear. Country roads in Ontario are practically all built for one line of traffic, with sufficient room for teams to pass. Vehicles all follow in the one track—the center of the road.

It is better to give the newly-graded road too much "barrel," rather than make it too flat. A road with too much crown will in time improve of its own accord. A road with too little crown gets worse, instead of better, under traffic. Roads flatten and spread out from the bottom, as well as at the surface, particularly in wet or swampy sections.

A rise of 1 inch to the foot from the inside edge of the gutter or drain to the top of the road is al-