

GOOD ROADS AND STREETS.

A. L. Hallstead.

- * -

Good Roads and Streets.

A road has been defined as a public thoroughfare, or that on which one rides or travels; a road or avenue cut in a wood or through grounds to be used as a place of travel. The word is generally applied to highways, and as a generic term it includes highways, street and land.

When the first settlers came to this country they found nothing but a dense wilderness. The streams of water were their only roads, and because of this fact they were compelled to locate along the streams in order to communicate with each other. They soon became dissatisfied with this only means of travel because of the long distance they were sometimes compelled to go owing to the crookedness of the stream, so they began to penetrate the wilderness and use the old Indian trails for roads. These were soon widened into bridle paths and later were made into wagon roads, but no efforts were yet made to smooth the rough places or bridge the streams.

As the country became more densely settled the demand became greater for direct and better roads to the landings, which became the distributing centers. In response to this demand a public road system was inaugurated. Improvement was then begun by laying out wider and straighter roads and improving them in the worst places.

In a good many parts of the country no further efforts toward improvement have been made and today we find these roads just the same as they were then. We are glad, however, to note that in most parts of the country development has continued although in some places at a

very slow rate, yet they have made considerable improvement so that their roads are much better than the first.

There are to be found a few places, especially in some of the Eastern states, where improvement has been pushed to the fullest extent until, indeed, it seems they have almost reached perfection. They have taken the lead in road building and have successfully shown what may be done when the means are available. The Cumberland is an example of the results of their earlier efforts. It was built almost a hundred years ago and today her bridges still stand and are in as good condition as when first built and the road is in a fair state of preservation. Oh, that we may have more "Cumberlands!"

"The common roads of a country are not only necessary to its development but their condition is a measure of its civilization. The highest type of mental and moral culture and development cannot be attained without the means of easy and rapid communication between all parts and sections of the country."

It has been said that the railway and telegraph lines have been the great civilizers of the world. This is hardly true because without the common roads, the railways would be of little use, while both taken together they are indeed one of the greatest factors.

The common roads are to the world as the veins are to the body; the arteries are of vital importance to the body, but without the connecting links, the veins, the arteries would be useless. So with the railroads. They are of great importance to the world but without the connecting links, the common roads, the railroads would amount to practically nothing. The arteries carry the blood in large quantities through the body, but it is the veins that distribute and gather up this blood which is carried through the arteries. Likewise

the railroads carry large quantities of supplies through the country but it is the common roads that gather up and again distribute them for the railroad. Again if in any part of the body the veins are destroyed, that part fails to develop, or life ceases in that particular part. So with the world; if in any section of the country the common roads become impassible, that part deteriorates and to an extent which is increasing with the division of labor. In the earlier times when there was no division of labor, when families produced all of their own necessities of life, they did not need roads so much, but now with the great division of labor, good roads are of great importance to all classes of people because they are all more or less dependent upon one another. The farmer needs good roads so he can haul his wheat to market or to mill; the miller needs good roads so he can get the wheat to grind; the merchant would be unable to get the flour to sell if the miller could not get the wheat; the inhabitants would be unable to buy flour of the merchant and so on. Thus we see they are all not only dependent upon each other but also on the common road.

It has been calculated that 99% of every load hauled by railroad, steamboat or express must be carried in a wagon, or truck over a highway. This alone is proof enough to show that all cities, manufacturers, corporations and laborers are interested with the farmers in the problems of rapid and economical road improvement.

The average cost of hauling one ton a distance of a mile through the United States is 25¢, while the cost of the same on the best improved roads is from 7 to 10¢, a difference of from 15 to 18¢ per mile. Remember this is only the difference between the best and the average while the difference between the best and worst is much more. In some states it is as much as 32¢. This, of course, is a

loss, but it is not the only loss. Quite often farmers are unable to get to market, when the market is good, and many things they are unable to market at all. The products lost by farmers every year, because of the bad roads, amounts to about \$600,000,000. This amount, if spent on improving the roads would build at least nine hundred thousand miles of the best earth road or about seventy-five thousand miles of the best macadam.

"That good roads bring prosperity is no idle dream". "It is enforced idleness that makes farmers poor. No farmer need be idle a day on account of bad weather or wet fields if only his roads are good. On a road there is always paying work of some kind, and wet weather is just the time to go on the road. The French farmer never loses a day in his field for he can do all his marketing in rainy times. What prosperity would burst upon the country if every farmer, and farmer's boy not in school, and every farm hand and team could earn a full day's wages every day in the year, rain or shine."

Besides the economical advantage gained by good roads, there is the opportunity they will afford to the promotion of education. Once having good roads we may be able to provide free transportation for school children, and then we can do away with all the little district schools, establish much larger and better institutions, secure good instructors and give the children of the country educational advantages that will mean something to them.

Another important phase of the question of improving our roads is from the moral and social standpoint. With the establishment of good roads it means the establishment of more rural free mail routes. This will bring the country people more directly in contact with the world through the literature that could be distributed.

"What greater benefit could accrue to a farmer living a number of miles from town or post office than to have his mail delivered daily at his door? How much of the monotony of his isolation would be removed if he could receive his daily paper, read the news of the outside world, watch the market for his product and be able to take advantage of prices that are often lost to him, and see his children happy and content, instead of restless and dissatisfied, or else growing up in the stolid indifference that is the outgrowth of mental lethargy, and ignorance." The financial benefits derived from a rural free delivery are so great that the increased value of land has been estimated from two to five dollars per acre.

The kind of road that should be constructed in a certain locality depends largely upon the natural supply of available material suitable for road building, and the amount of labor that can be expended. For a country where neither stone nor gravel can be obtained without too great expense, an earth road would be advisable. If stone cannot be secured, but there is a natural supply of gravel then probably a gravel road would prove more satisfactory and economical than earth road. If, however, a good quality of stone can be had, then macadam is the best and most economical in the long run, for either country roads or streets in the cities. The Cumberland mentioned above is a road of this kind. Brick paving makes fine streets and is used considerably in cities where they can obtain brick cheaper than the stone for macadam. Most all cities of today have either macadam or brick paved streets.

For the construction of roads the following machinery is necessary:- a road machine and power to drive, preferable steam power; a heavy roller, if the roads are large, a steam roller of about

fifteen tons is preferable; a sprinkling wagon, and for stone roads, a quarry and a stone crusher are also needed.

In the construction of a road whether it be earth, gravel, macadam or brick, the first thing to do is to reduce all grades to a minimum either by cutting down the hills and filling in the hollows or by going around the hills where they are too large. In well designed roads an effort should be made to keep the grades below a rise of seven feet in one hundred feet. When the grade has been properly adjusted then the next step is the preparation of the road bed. This is the foundation of the road and therefore is of great importance, because the usefulness and durability of the road largely depends upon the road bed.

The construction of the road bed is just about the same, whether the road is to be made of earth, gravel, stone or brick. The first problem is that of drainage. Much depends upon this because if it is not well drained it is very apt to give way beneath the road sooner or later and then the road is left in poor condition.

When the surface is more or less rolling and underlaid with coarse porous material, so that standing water in the ground does not occur within ten feet of the surface, underdrainage is not necessary, but where ever at any season of the year, the water rises within three or four feet of the surface of the road-bed should be drained from beneath. When underdrainage is necessary this may be accomplished by laying one or two lines of tile lengthwise with, and beneath the road from two to four and one-half feet beneath the surface. If the water comes up from beneath and the road is not more than sixteen feet wide, one line of tile should be placed directly beneath the center of the road, but if the water comes from one side of the road

as from a hill near by, the drain may be placed toward that side of the road from which the water comes. If the soil is naturally very wet, or the road is wide, two drains should be placed beneath the road, one on either side. These drains where it is possible should be laid so they will have about an inch fall to the hundred feet and they should be opened out to the sides of the road where ever there is an opportunity. For these drains, ordinary four or five inch drain tile will answer the purpose where they can be put in deep enough to escape the action of frost, but if it must be exposed a better quality of tile should be used. Besides the subsurface drains, surface drains are always necessary to carry away storm water. For this purpose, two open drains are made, one on each side of the road. With the road machine, the road bed is graded so that it has a convex surface, the sides sloping gently from the center of the grade to the surface drains. The sides of the grade should have about a 4% slope. This will carry the water off quickly and thus prevent the road bed from becoming soft. The road bed should always be rolled until it is firmly compacted before any other road material is applied.

Earth roads are the cheapest kind that can be built because of the cheapness of the material and the comparatively little labor required to construct them. They have some advantages over gravel or stone roads, other than that of the cost of building. They are not so hard on horses, one can make better time on them, and carriages ride easier on them than on the stone roads, but on the other hand they require a great deal more repairing, are more dusty in dry weather and in a prolonged wet period they are a great deal more apt to get soft and be cut by the wheels, but when the road is well rounded and the drains kept open the danger is little.

To make a good earth road, after the road bed is completed, the road should be built up by spreading on the earth in layers. Each layer should be rolled until it is solid before the next layer is applied, the layers should be slightly thicker in the center of the road than at the edges so as to give the sides when completed about a 6% slope or even a little more when the land is very wet.

Good earth roads can be made, including stone and iron bridges for the streams; for from \$500.00 to \$1000.00, and in many parts of Kansas they can be made for much less.

Gravel roads are more substantial than earth roads. They resist the pressure of the wheels better and are more durable, but are also more expensive. After the road bed is completed three layers of gravel should be applied. If the gravel is very irregular in size it should be screened and the coarser gravel put in the first layer. Each layer should be firmly compacted before the next is applied. In rolling the gravel it is necessary to begin on the outer edge of the road to prevent the gravel from spreading out, and leaving the surface flat. Each layer should be about three inches thick after it has been rolled.

When stone of a good quality can be obtained at a reasonable cost, macadam is a much better road than either earth or gravel. It will bear heavier loads and will last much longer. The road bed is prepared the same as for the other roads except that a small shoulder of earth is left on each side. When it is possible it is well to have the road bed prepared ^{and exposed} for a year or more to travel, which will generally be found the most economical and best means of compacting. The shoulders can best be made with a road machine. With this the shoulders can be made at the same time the road bed is being graded.

The stone should be crushed and then screened to separate it into three sizes and is spread on the road in as many layers. First the coarsest size is spread over the road bed in an even layer and rolled down solid, then the medium sized stone are applied, followed by another rolling, and last the finest size stone are spread over the top and that is rolled down solid. The addition of water to the stone just before rolling is helpful. In most parts of the country a road of this kind can be made for \$7500.00 or less including the cost of bridges for the streams.

Brick paving makes fine smooth roads for streets in the cities. The road bed is prepared as for the macadam, and after that is done, curbing is set along the sides. Then the road bed is covered with a layer of sand about six inches thick. This is leveled off very smooth and on this the brick are laid very close, and rolled to smooth and the crevices between the brick are filled with sand.

- * -