

I M P R O V E M E N T O F P U B L I C R O A D S .

A . W . P A R R A C K .

## OUTLINE.

- I. Importance of the Road Question.
- II. Roads in different parts of the Country.
- III. Kansas Roads and Kansas Road System.
- IV. Plans for building and maintaining permanent roads.
- V. Reform in methods of road work.

Perhaps no question is of more universal importance, and yet less written or spoken on, than that of public wagon roads. The railroad is a subject of common discussion. It forms a part of the theme of the political orator, is commented on by every citizen who thinks and talks on public questions, and no layman is so ignorant as not to have an opinion about how the railroads, factories and schools should be controlled. This is true of questions relating to taxation, tariff, money, and expansion; but, when it comes to the question of wagon roads, that is a subject too common and insignificant for many to think on; and, altho we are constantly worrying over it, the wagon road is left to the care of the wind and flood and a few yearly scratches directed by the inefficient Kansas "Road-boss."

One reason why the development of the common road has been so slow is the marvelous increase in railroad building, it being assumed that the latter obviates, to a considerable extent, the necessity of the former. But, notwithstanding the fact that our whole country is covered with a network of railroads, there is still as great a need of good public roads as before; in fact, this great system of railroads seems to have increased rather than have diminished their necessity. It is true that the farmers do not have to haul their farm products twenty or thirty miles to market, as they did fifty or seventy-five years ago, because the railroad has taken the place of the public roads connecting the farming districts with the central markets, such as Kansas City, St. Louis and Chicago. But, on the other hand, the existence of the railroads effects a more complete utilization of the land of a community, and a large increase in the number of inhabitants. This means an increase in agricultural products, and the necessity of more and better roads that these products may be hauled to the local market - the point at which the farmer now disposes of his produce;

tho the final market is any place on the globe that is in telegraphic and steam connection with his station, and where there is a demand for what he has to sell.

The railroads have increased rather than diminished the necessity of common roads; and as the great cost of railroads precludes the possibility of their coming to every farmer's door, it is evident that the need of common roads will continue, and perhaps increase, for all time, so far as human foresight can determine.

Some of the eastern states have a well established road system, and a considerable percent of their roads are of the best quality. In these states, they have different modes of road construction, such as the Macadam, the Telford, the stone pavement, the wood pavement, the gravel road and the steel road.

These permanent roads are generally found connecting the trade centers, and they usually constitute main or trunk lines. The roads less travelled, not leading directly to the trade centres, are generally of a less permanent character; but, in the older, settled sections of our country, there is a good deal of attention paid to their construction and maintenance. These permanent roads have, in some cases, been built entirely with state funds, and are then styled "State Roads";

others have been built by county appropriations; others by township or county bonds, these bonds being paid afterwards by an income from toll-gate charges on passengers. Still others have been made entirely by contributions of the citizens themselves. In all cases where these roads have been properly constructed, they have proved to be investments which have been paid financially and otherwise - preventing accidents, increasing the pleasure of driving, adding to the beauty of the country, etc.

The above is a brief discussion of the road question in general; but, as my intention at the outset was to treat particularly on the

Kansas roads, showing the many defects in their mode of construction and maintenance, I will now endeavor to show some of these defects and suggest some improvements which may be made in the care and management of roads.

The public roads of Kansas are established on section lines, except in special cases, as where there are impassable barriers or where by special petition the site is changed for the convenience of those concerned. A site being surveyed and established, it is then and there a fully equipped public highway, open for traffic, and practically left to take care of itself. In the eastern part of the state; most of the section lines are open where passable, and the road site is fenced; but in the western one-third of the state the traveller is, in many cases, left to take what course he chooses.

Our law requires every able bodied man between twenty-one and forty-five years of age to work two days of eight hours each on the public roads, and a tax, the maximum of which is three mills, is levied on property for road improvements. Even this small amount of work and tax is expended in such a careless and unsystematic way as to be of almost no benefit. The road-bosses are almost invariably incompetent men having practically no education in methods of road construction; and it is a lamentable fact that in localities which have been settled for thirty or forty years, this ill-directed work has made the roads but little better than they were when first laid out.

In many of the eastern states, the question of road construction has attracted considerable attention; and it has been proved beyond any doubt that some form of permanent road is cheaper than the dirt road. Statistics show that the work expended on the dirt roads from year to year would, in the course of ten or fifteen years, if expended in a well directed and systematic manner, be sufficient to make all of the roads permanent ones.

In Kansas, the most practicable kind of permanent roads would be those made of stone - there being enough of this material in the state to construct a good road on every section line. The cheapest and best kind of stone roads are those made by the macadamizing process.

The first course or foundation of the macadam road can be made of the coarsest stones from the crusher; provided that they are of uniform size, and that they are not more than two and one half inches in diameter. Where the road bed is to <sup>be</sup> eight inches thick when completed, this foundation should be made four inches thick.

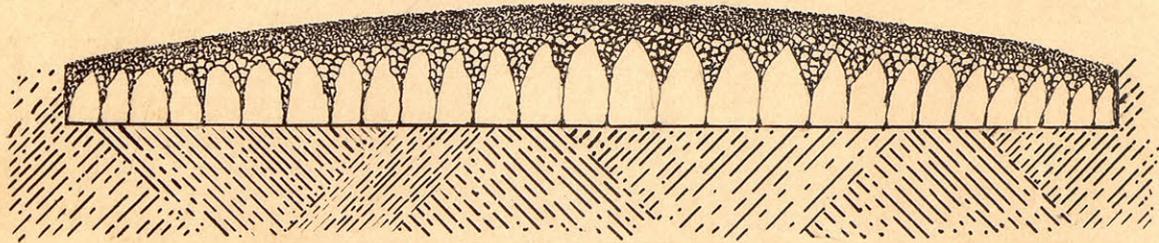
After the foundation is thoroughly rolled, the interstices should be well filled with sand. This should then be wetted and thoroughly rolled again until the surface becomes hard and uniform. Upon this foundation the surface material, which should consist of stone one inch in diameter, should be placed, wetted and thoroughly rolled. Ground stone screenings should then be spread upon the surface, wetted and rolled as before, until a hard smooth surface is obtained.

The telford foundation is composed of stones of various sizes, but not exceeding ten inches in length, six inches in breadth on the broadest side, and three inches in thickness on the narrow side. These stones are placed vertically and lengthwise across the road, breaking joints. The interstices are filled with stone chips all points are broken off, and the whole structure is wedged, consolidated and made as firm as possible. This foundation should be covered with coarse sand or stone screenings so that all voids may be filled, and the whole brought to a hard and uniform surface by rolling; then the surface stone should be placed on and treated the same as the surface stone in the macadam road.

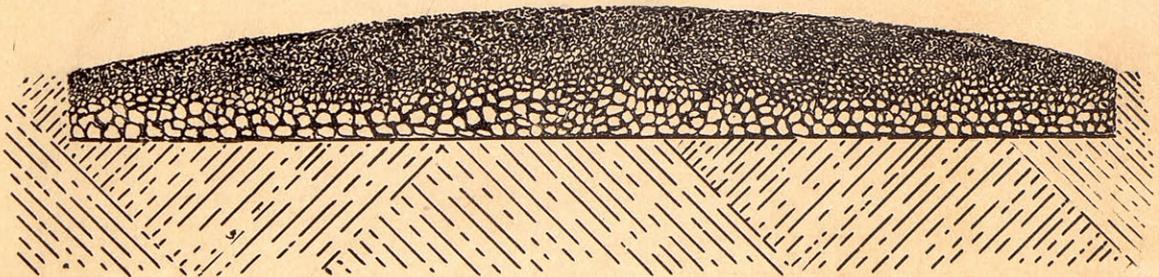
The most practicable road in Kansas would be one with a single macadamized track, and one or two dirt tracks, cuts of which are shown in plate three.

# Road Beds.

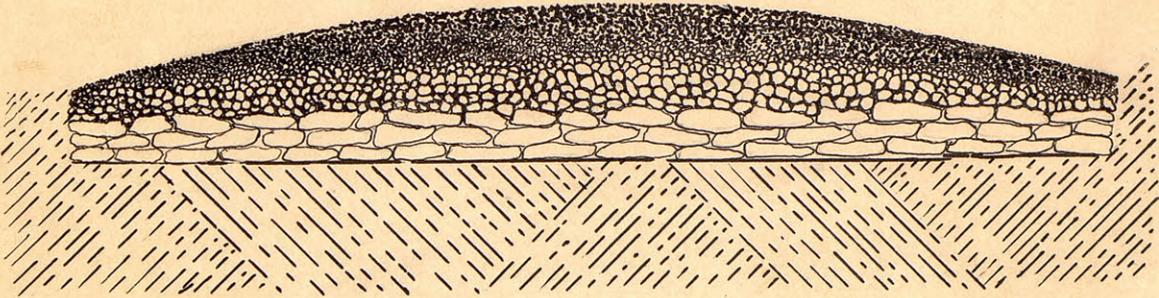
Telford

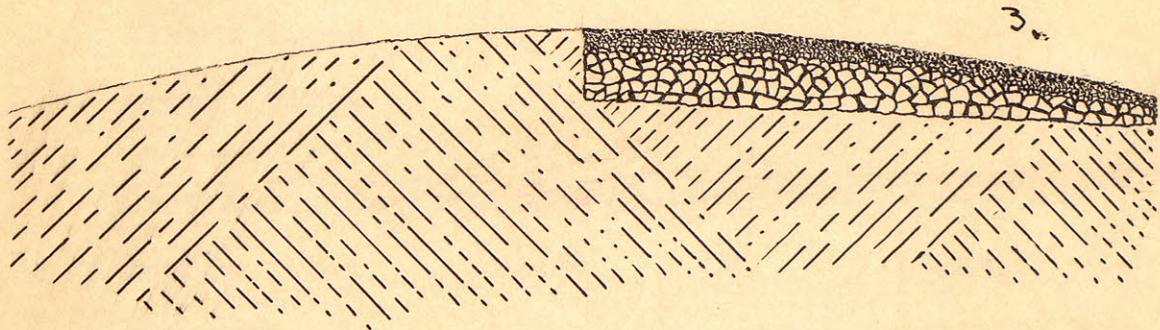
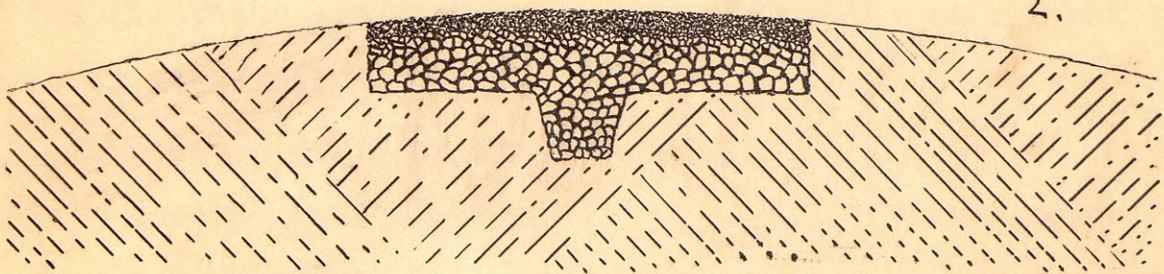
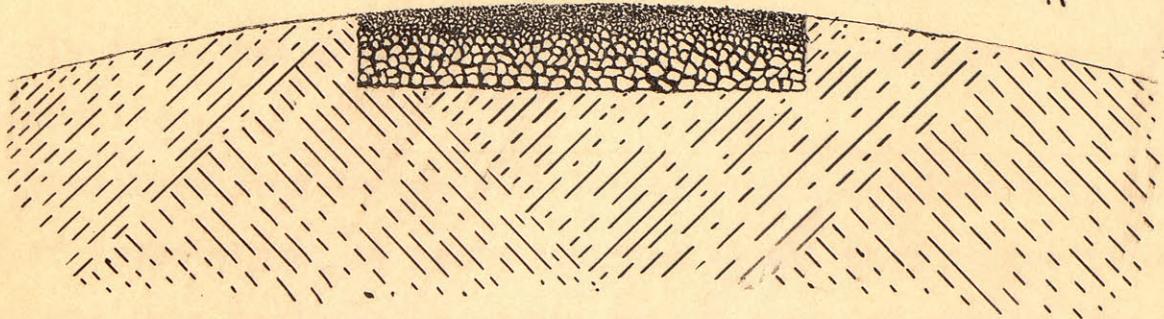


McAdam



Rubble Stone





Single Macadamized tracks.

The advantages of such a road are self-evident, and need not be discussed to any great extent. I will simply say that such a road would cost only about one-half as much as a double macadamized track. The dirt road could be used at least eight months in each year, and the wear of the macadamized road would be decreased about one-half. Not only this, but a smooth dry, dirt track is easy on the horses' feet and legs.

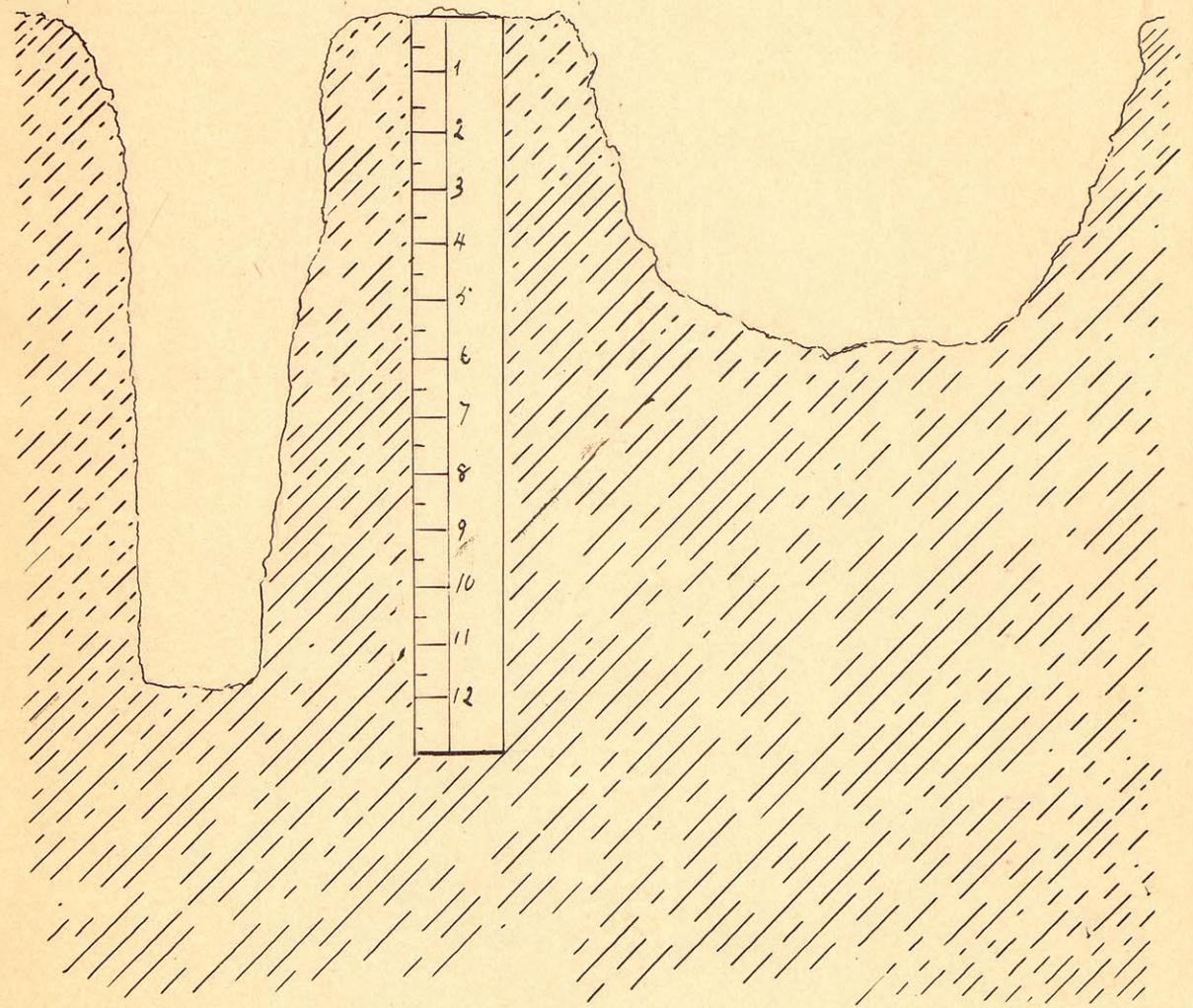
Closely allied to the question of road maintenance is the subject of broad tires; it being admitted by all that narrow tires are among the most destructive agents to all kinds of roads. The tests which have been made in regard to this question have shown conclusively that the draft is less with broad tires than with narrow ones.

The following are statistics taken from the experiment station reports of Missouri:

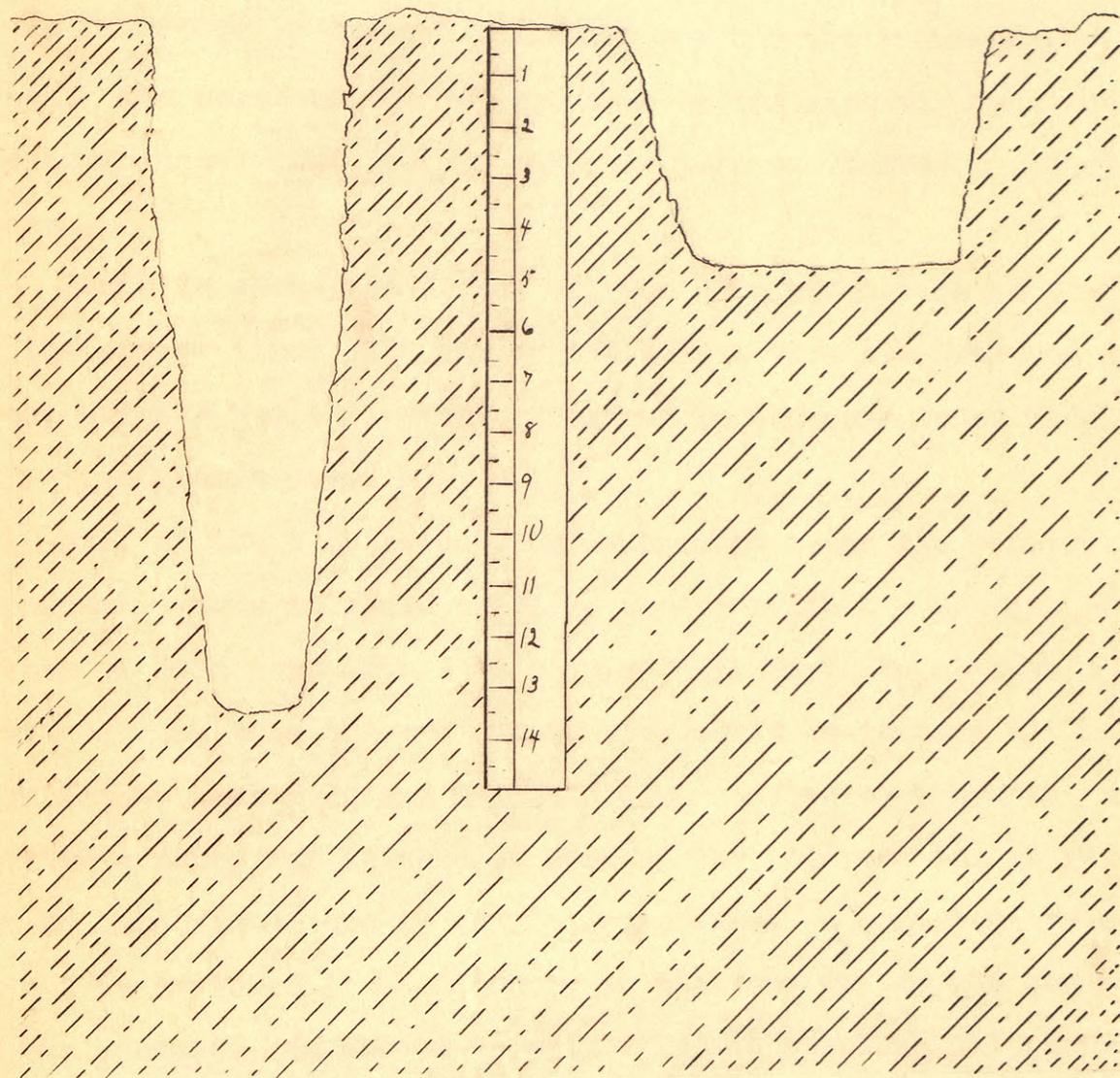
Average draft of one ton.

1. Macadam Road	Average draft.
Narrow Tires	99.4 pounds
Broad Tires	73.4 "
Gravel Roads	
Narrow Tires	218.4 "
Broad Tires	163.8 "
Dirt Road. (Dry and hard).	
Narrow Tires	137.3 "
Broad Tires	104.8 "
(Wet and soft.)	
Narrow Tires	825.3 "
Broad Tires	551.9 "

PLATE 3.



A. W. Parrack



These tests show that not only is the draft less with broad tires on soft roads but also on roads that are hard and smooth.

The accompanying illustration will give some idea of the injury done to a road-bed by narrow tires, as compared to that done by broad tires. Plate III. shows the depth of the rut made by the different tires in meadow land where the wagon was run twelve times in the same track. The depth of the rut produced by the wide tire was four and one half inches, and that of a narrow tire was thirteen and one-half inches.

Plate IV shows the effect of running a broad tire in the rut made by the narrow tire. The rut of the narrow tire was fourteen inches deep, but the broad tire which was run in the same track made a rut only five inches deep.

But, if the people could be induced to begin the construction of permanent roads it would still be necessary that some more efficient system of road work should be adopted. It seems to me that a much better system than the one now in use, would be to have all money required to construct and maintain the roads in each county, raised by levying a money tax instead of working out the road tax as is the custom in this state, and in many other states. A competent road engineer should be employed in each county in the same way as the superintendent of the schools. He should be authorized to purchase all teams and necessary machinery and to employ competent foremen in the different districts of the county. The foremen should have control of the teams and machinery in their respective districts, and have power to employ, control and discharge the number of laborers directed to be employed by the engineer.

The engineer and his foremen and the laborers employed should be required to devote their entire time to labor on the roads. Each foreman should be required to go over and examine all the roads in his

district at least once each week, so that there would be no possibility of ditches or broken or washed-out culverts, and to remove all loose stones or other surface obstructions. Work for repair of surface should be constantly pursued and the material required on the road-bed should be applied when the surface is dry and hard. The winter should be devoted to quarrying and crushing stone, and hauling it to the place where it is to be used, so that it may be applied when the dirt road-bed is in the proper condition. Under such a system, the amount and efficiency of the work done would be several fold greater than under the present system; and the tax, altho it might be higher for the first five or six years, but not necessarily so, would, after all the roads were completed, be reduced to only a small fraction of the road tax at the present time.