In the case of towns and villages where there is a central equipment, this will cost from $3 to $3.50 per instrument; while instead of a single wire, each instrument will have a metallic circuit, thereby doubling the amount of wire used.

For farmers' lines, the annual cost of maintenance will be about $2 per instrument; and for towns and villages with a central exchange, the cost is about $6 or $8 annually, increasing with the number of subscribers.

Wide Tires.

What is known commonly as the narrow tire, and which still is used to a large extent in many sections, is the greatest enemy of our roads, and each wagon thus equipped does more to injure a road in a season than we could possibly expect the owner to repair.

Every user of a narrow tire is certainly unconscious of the injury he is inflicting on the common property of the community. There may, at one time, have been some reason for the manufacture and use of narrow tires, but now, with the improved condition of the roads, there can be little or no reason for their continuance.

In the building of a proper road, a heavy roller is the most serviceable instrument, as by it the clean, rough material is fully compacted, and the surface made hard and smooth so that the traffic is distributed. If the road is properly crowned, the water readily sheds from the centre. The more the material is rolled, the harder and firmer it becomes. Those who are familiar with steam road rollers know that they are simply heavy loads upon three wide tires. And if loads proportioned to this were on wheels of proportionate width, all vehicles would then have the tendency to preserve the road, and to keep it in repair, rather than to cut it up as is now the case.

Ordinary heavy loads on narrow tires break, cut, rut and destroy the roads. The narrow tire, vibrating under the load, separates the stone and gravel, creating a narrow rut which marks the course for all vehicles. These ruts hold the water, and wagons then simply grind the material, deepen the rut, and allow the water to slowly penetrate the road surface and foundation.

The greatest injury done to the surface of a road is caused by vehicles which create ruts that hold water. The secret of road maintenance is to keep the road in such shape that it will perfectly shed the water. Wherever this form of road exists, a good road is usually found, whether it be of stone, gravel or dirt. To experienced councillors and those who have made the question of roads a study, it is quite apparent that our system of roadmaking is the most expensive in the world, and this is clearly demonstrated on many of our leading roads where the greatest attempt has been made to make them good.

A much greater depth of material than is necessary was at first used, but owing to the fact that the road had not been properly drained or crowned, that the gravel had not been properly prepared, carefully spread, and thoroughly rolled, the first load on narrow tires passing over, separates the material, creating a rut that remains a defect for all time. The continual use of narrow tires demands annual repairs and the application of stone or gravel, each in itself almost sufficient in quantity to make a new road, and yet the road is not good.

Many of the leading roads in Ontario, in consequence of faulty construction, carelessly selected and prepared material, applied without spreading and rolling, and placed on improperly crowned roadways, subjected to the destroying influence of narrow tires, have cost more money than have the best roads of England, or than would even pave them with asphalt.

Our system of raising large sums of money annually, spending it on our roads, and them purchasing narrow tired wagons with which to destroy these roads, seems to be a reckless system which differs so much from the care and economy exercised by the people in every other class of work, and along every other line in private and public life, as to make it ludicrous. The roads of older countries are properly and systematically built, apparently costing more than ours in first construction-but by being carefully made they are preserved and kept in repair by obliging every person who uses them, to have a width of tire that will do them the least injury.

Six inches of broken stone carefully spread and perfectly rolled, on a properly prepared road, under wide tires will make a vastly better road than sixteen inches of gravel or broken stone dumped on in a careless way and subjected to the treatment of narrow tires. Proper implements to prepare the material and carefully lay it, care in forming the road-bed and draining it, and the general use of wide tires, will lessen the quantity of material to be used, lessen the annual cost of repair, and give us cheaper, and at the same time good roads. In many sections of Ontario the interest in this matter is keen. People seeing the financial as well as other benefits have gone in for purchasing wide tires, and many of the farmers, realising their benefit and utility, are now using them exclusively, while others are determined, when buying new wagons, to have wide tires. And at public meetings it is a common thing to have the people say that they are willing to accept all of the trifling objections offered to wide tires, in the interest of better and cheaper roads.

Most councils are now considering the question of wide tires as a means of lessening the present cost of maintaining the roads and making better ones; or creating a healthy interest among the people favoring the adoption of wide tires when purchasing new wagons or renewing only, and it is a subject in which every council can well afford to interest itself.

Sidewalks.

Concrete is rapidly taking the place of plank for sidewalks, a number of municipalities having wholly given up the use of the latter material. Wooden walks now cost six or seven cents a square foot for construction, and their life, with extensive repairs, rarely exceeds ten years, while concrete, although costing nearly twice as much as plank, should last ten times as long. Concrete, made of Portland cement and gravel, or of Portland cement, broken stone and sand, although an artificial stone, is, when properly made, more durable than the natural stone commonly used for walks, and the cost is much less.

These walks are variously called "artificial stone," "granolithic," "cement," "concrete" and "cement-concrete." The term "granolithic" is properly applied to the walks of this class in which granite chips are mixed with sand and cement in forming the wearing surface. Although of similar appearance. concrete walks are not the same material as is used for asphalt roadways, with which they are very commonly confused, the asphalt pavement being a mixture of sand and mineral pitch. Asphalt is occasionally, as in the city of Kingston, used for sidewalks. Vitrified paving brick are also used to some extent for sidewalks, costing about the same as concrete, while they are commonly used for crossings, being laid on a concrete base, and taking the place of the concrete wearing surface.

The usual requirements for a concrete walk are :

(1) A foundation layer of stone, gravel, cinders, or other suitable material, consolidated to a depth of from six to twelve inches in thickness, according to the nature of the sub-soil.

(2) A concrete base from three to four inches in thickness.

(3) A surface coat of cement-mortar, one inch in thickness; mixed in the proportion of one of cement to two of sand.

The foundation layer is intended to provide a certain amount of drainage, as well as strength, and should be greater on a clay soil, retentive of moisture and subject to upheaval by frost, than it need be on a loose gravel soil.

A concrete base three inches in thickness is ordinarily required on a favorable soil, and four inches where the sub-soil is of clay, or where, for other reasons, the drainage is not thought sufficient.

Where broken stone is used in the concrete base, safe proportions would be one part of Portland cement, two and one-half of sand, and five of broken stone. This quantity of sand and cement will make a strong mortar, and there will be sufficient to surround and fill the voids in the stone.

Where gravel is used to form the concrete base, the usual proportions are, one part of cement to five or six of gravel. The gravel used in mixing concrete should