

particular, in my opinion, is a good rule. Let the engineer observe the margin of safety that has been used in various structures, and it will serve as a guide in designing new ones. If the margin of safety is so small that the structure appears to be insecure, and gives indications of failure, it evidently should not be following. If the margin is evidently excessively large, demanding several times the amount of material that is necessary for stability and durability, such factor is too great. Any engineer, without scientific skill or economy in the use of materials, may err in his direction to any extent; but if the margin appears reasonably safe, and the structure has remained stable for a long time, it serves as a valuable guide, and one which may safely be followed under similar circumstances.

(To be continued)

#### Good Roads vs. Railroads.

At a recent meeting of the Peel Farmers Institute, Mr. William Porter read a paper on the subject of country roads. He treated it in the right way; that is, he spoke of the roads of his own county, with which he is familiar. In Peel, he said, there are 800 miles of road; some fairly good clay roads, more bad and still more indifferent.

"About four-fifths of this county has paid bonuses to the extent of \$210,000 to railways. These immense grants of the people's money have been handed over to private corporations who, as common carriers, exact from us the last farthing that can be safely done to retain our custom. It is no secret that we in Ontario pay relatively very much higher rates for railway service than those living farther west. I am told that freights on our roads, that have been built at our expence and credit, carry at lower rates from Chicago and other American western points to the Atlantic seaboard than from any Ontario town to the same destination. Living near a leading road to Toronto, I often meet men from the Township of Albion, a township that taxed itself heavily to bonus the T. G. & Bruce, now the C. P. R., yet when the roads are good they find it to their profit to drive all the way to Toronto; the nearest point to Toronto is 25 miles. As an illustration, last winter I met a man who claimed to have gained \$14 on his load, principally barley, that being the difference between Bolton and Toronto prices."

He estimates that for the sum of \$210,000, the amount of railway bonuses, the county could have 100 miles of good macadam or gravel road.

#### Anchoring Bolts in Stone.

M. J. Butler, Napanee, Ont., writes to Engineering News as follows:—For some years past I have invariably used Portland cement for above purposes. In using 1 1/4-in. bolt I have the hole drilled with a

2 in. drill and the bolt ragged. I have used this style of anchor bolt for the heaviest class of work—engine beds, turbines, pulp grinders and heavy bearings. Some years ago, owing to lack of proper experience in pouring sulphur at the temperature, I made a failure and then tried the cement with success. I have no hesitation in saying that in every respect good Portland cement is the best material I know of for anchoring bolts in masonry.

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At a mass meeting of those interested in the improvement of streets and reform in the city government held in Philadelphia on 22nd January, the following resolution was adopted: "We believe that the present system of maintaining and improving the highways is wasteful, expensive and not adapted to the requirements of a large city, and exercises a pernicious influence in city politics, and, while not committing ourselves to any plan, or passing judgment upon or favoring any particular pavement, we believe that a better system can be devised, and pledge ourselves to use all honorable means to accomplish a practical reform in this branch of our municipal government, and to secure a direct, immediate, and comprehensive improvement of the streets of this city."

#### A New System of Paving

A trial is being made in Paris of a new system of wood-paving. It consists of pieces of oak about 4 inches long, split up similarly to the ordinary firewood and laid loosely on end in fine sand on a bed of gravel from 4 inches to 4 1/2 inches in thickness. A layer of fine sand is then spread over them, and they are alternately watered and beaten several times. In about forty-eight hours the humidity has completely penetrated and caused the wood to swell, and it is claimed that the mass becomes thus absolutely compact and homogeneous, and capable of supporting the heaviest traffic.

#### Care of Country Roads in Germany.

The highways of Germany are built to last forever, and their excellence is not surpassed anywhere. In addition to the main road there is a sidewalk for foot passengers, and another path for horseback riders. All along the sides, trees are planted as soon as the roads are finished. Usually these are fruit trees, the crops of which furnish a part of the income of the men, who take care of the road; or of the toll gatherer. For every vehicle, a small toll is collected for a given distance, except farm wagons which are free. Heavily loaded trucks have to have broad tires on their wheels. The cost of building and maintaining these roads, is not put on the rural population alone, but the cities, desiring to secure the rural traffic assume the largest share of it. The principal highways are macadamized and are

built by the State, which has also the control of them. Along both sides of these roads are ditches banked with turf to carry off the surface water. The droppings of the animals travelling on the road are gathered regularly, piled up at convenient places, and sold at fixed prices to the neighboring farmers.

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The following extract from the *Empire* may interest the councils of towns where the local improvement system is under consideration. "The local improvement system is responsible for more bad work and increased debt and cost of government than all the civic administrations for the past twenty years put together. It has built sidewalks out into cow pastures; it has laid pavements through open fields; it has dug sewers into farm lands, and placed water mains and hydrants in the midst of forests.

"It has about doubled the civic debt, piled up the taxes on the outlying districts, flooded the city hall with officials and it is moulding a burden for posterity that will make it round shouldered to carry if this thing is not stopped.

#### Toll Roads.

In a letter to the Editor of *The Sentinel-Review* a correspondent from East Zorra stated that the toll road question had lain dormant for some time from the fact that those interested in the removal of tolls are in the minority and consequently the County fathers prefer to postpone, rather than grapple with the question. But when the toll nuisance disturbs the tranquility of a neighborhood, when individuals are charged toll, and others, making similar use of the road, allowed to go free according to the inclination of the toll keeper; when only favored parties can contract their toll by the year; when a cheese manufacturing company cannot approach their place of business without being intercepted by a toll-keeper; when ratepayers living on the toll road have been compelled, since it was built, to pay their toll fees, do their statute labor on other roads, and pay their taxes for the maintenance of all the other public roads in their respective townships; is it not high time for county and municipal fathers to take decided action in the matter and mete out to the toll road ratepayers equal justice with all other ratepayers in the municipality? In this enlightened age we pride ourselves on our civilization, the stronger showing humanity to the weaker, but in this toll road system the relics of barbarism are still lingering with us, the majority holding the iron heel down on the neck of the minority.

In some places a grievous injustice is done to those who live in the immediate vicinity of a toll gate. If they only use 100 yards of the roads they are obliged to pay the same fee as one who uses all the road.