

tendents, county and township bridge specifications, testing of road materials, and motor vehicles.

To meet the changing conditions and demands of the people, in 1901 the Highway Improvement Act, previously referred to, was passed, which, after being amended from time to time, was supplemented by the Ontario Highways Act in 1915-16 and the Provincial Highway Act in 1917.

The classification and description of roads under the above acts, taken from the department's last report, are as follow:—

County Roads. These roads are essentially the market roads—the farmers' roads. They radiate from market towns and shipping points, and meet the needs of accumulated farm traffic. The aiding of these market roads by the province is an effective means of assisting townships in their road improvement, in that township councils are thereby relieved from the burden of their most expensive roads, and can devote their energies to the improvement of less-travelled roads, comparatively inexpensive to maintain.

County roads are aided to the extent of 40 per cent. for construction and 20 per cent. for maintenance. All county councils are authorized under the Highway Improvement Act to assume and control a system of leading roads within the county.

Provincial County Roads. Co-operative with provincial roads, but under county control, certain roads may be designated by the Highways Department as "Provincial County Roads." To such roads the province will contribute 60 per cent. of the cost of construction and maintenance. These roads are intended to enable the more equitable maintenance of certain county roads, carrying a considerable portion of through traffic, but which the county may efficiently maintain, and which are not of sufficient importance to be classed as provincial, or which it is not desirable, or expedient, for the province to assume as provincial highways. They continue to be county roads, but because of heavy through traffic will receive an increased subsidy. In general, they will form branches of the provincial highway system, joining up cities and other important terminal points of traffic. They constitute an intermediate link between the provincial and county road systems, and may be subject to special regulation.

Suburban Roads. Provision is made under the Ontario Highways Act that a city may co-operate with the county council in improving the leading county roads adjacent to the city, and thereby obtain a more substantial type of construction for such suburban roads.

A commission is appointed to determine the roads and the length of each adjacent to the city to which the city would contribute.

For construction, the province contributes 40 per cent. and the county and city each 30 per cent.; for maintenance and repair, the province 20 per cent. and the county and city divide the remainder equally between them.

The section of county road designated as "suburban" remains a county road for which the county is responsible; the work of construction and maintenance to be carried on under the county road superintendent, but subject to the instructions of the special commission.

Provincial Highways. Described in the preamble to the act as: "A highway or system of highways from the south-western boundary of Ontario to the boundary line between Ontario and Quebec, together with highways connecting centres of population or other important terminal points."

The Lieutenant-Governor-in-Council, upon recommendation of the Minister, may designate any highway or a

system of public highways through Ontario to be acquired, constructed, assumed, repaired, relocated, deviated, widened and maintained by the Minister of Ontario as a provincial highway.

Every provincial highway and all property acquired by Ontario under this act shall be vested in His Majesty and shall be under the control of the department.

The corporation of every municipality in which work of construction or repair and maintenance is from time to time carried out, shall repay to Ontario 30 per cent. of the expenditure made by the department within such municipality.

No part of the cost of surveys, of machinery, plant and equipment and the repair and maintenance thereof, all general overhead and staff expenses and salaries, and the cost of additional land or property for deviating, widening, or any other purposes of the department, shall be charged to the municipality, but shall be borne and carried by Ontario.

Up to the year 1916, only 20 counties had assumed systems of county roads as authorized under the Highway Improvement Act; now 34 counties out of the 37 in Old Ontario have adopted such systems and are proceeding with the work in a systematic manner under the regulations of the department. The total mileage covered by these roads is 8,427, and the total mileage constructed to date 2,275, the total approximate cost being \$8,600,000, an average of \$3,780 a mile. As the total mileage of rural roads in Old Ontario is 55,000, the mileage covered by county roads at the present time is 15 per cent. of the total. It is estimated by the Highway Department that 20 per cent. of the township roads, those usually included in a county system, carry 80 per cent. of the total farm traffic.

The county roads, when completed, will form an excellent system of market roads located in every part of the province. The provincial county roads will join up these county systems for through traffic and will merge the whole into a province-wide system reaching every county and town in the province, and to complete this system, trunk roads will be added, known as provincial highways, for trans-provincial traffic. This will create a system of provincial highways which will not have an equal in any province or state on this continent.

Road construction has been greatly retarded owing to war conditions, but, as stated above, over 2,000 miles of this system has already been built, the organization is complete, and the work will go ahead with leaps and bounds when the war is over.

In conclusion, a few words respecting road construction. The day for haphazard work by untrained men is past. The road problems of to-day require to be carefully worked out by the expert and the correct principles applied. A bridge is never designed without knowing the particulars as to loading, etc., and in the days of heavily loaded motor trucks it is also necessary, if we are to intelligently design our roads and get the best results, to take into consideration such particulars as the maximum load, width of vehicles, width of tires, nature of traffic, nature of sub-soil, etc.

The maximum load is the chief factor in determining the depth of foundation and a road built for light traffic may at certain times in the year have its surface broken up like pie crust by a heavily loaded truck.

The Ontario land surveyor has the technical qualifications, the training, and the experience to successfully carry on this work, and it would be in the interests of the public and himself to give this important branch of the profession more attention.