

MUNICIPAL DEPARTMENT

THE SCIENCE OF ROAD-MAKING.*

Road-making is a science, a branch of engineering, the difficulties of which are not usually appreciated. It is a common expression that "anyone can make a road." Which merely indicates that the average man knows so little about road construction that he does not realize how much there is to know. If it is true that anyone can make a road, it is also true that anyone can build a house, a bridge or a steamship. "Anyone" can do these things, but in most cases at a great waste of money and labor, and with very inferior results. For centuries in England it was left for anyone to make the roads. It was not until McAdam and Telford appeared, but one century ago, that the people in England became convinced that "anyone" could not build a road. This work was then placed in the hands of expert road-builders and the transformation has been nothing short of wonderful.

In too many townships of Ontario "statute labor" means that once a year the rate-payers gather to make roads under the direction of "anyone." They plow and scrape the mud and pile on a ridge of gravel, after violating every rule

* From the Eighth Annual Report of the Commissioner of Highways for Ontario.

and principle laid down by McAdam. After doing everything McAdam told the people of England not to do, the result of this statute labor is called a "macadamized road."

Among the earliest roads of which we have definite information were those built by the Romans, chiefly as military highways, leading east and west to the remote provinces, from which arose the proverb, "All roads lead to Rome." So substantially were these roads built, of layer upon layer of stone and concrete, three and four feet in thickness, that many of them still remain, and are commonly believed by the peasantry of Spain and of other countries of Southern Europe, to be of supernatural origin. These roads were built at an enormous waste of money and labor, and, while of the greatest durability, they lack the first essential of modern construction—a properly balanced union of economy and efficiency.

For several centuries after the downfall of Rome, road-making became a forgotten art. In France during the eighteenth century, under the engineer Tressaugnet, road construction was revived, but on very different principles from those followed by the Romans. The type of road built by the French engineer was that introduced into England by Telford, and consisted of a foundation of large stones, laid on edge and carefully shaped, upon which was placed a coat of finer broken stones. Early in the nineteenth century McAdam advocated and constructed in England a still more economical design, in which the foundation of large stone was omitted, but greater care

was given to drainage and roadbed. McAdam's system is that most commonly followed to-day, with a number of important alterations consequent upon the introduction of road-making machinery.

In the time of McAdam the best method attainable was to break stone by hand, which was then placed loose on the roadway and left for traffic to consolidate. The progress of consolidation was slow, during which a considerable amount of the stone was forced into and mixed with the earth subsoil, injuring the consistency of the road. Under present methods, by means of a crusher, stone is broken much more cheaply than it could be done by hand.

Stone dust and chips (screenings) are created in the process of crushing, which are used to fill the voids, instead of waiting for this to be produced by traffic, or allowing the clay or loam from beneath to be forced up among the stones. With a road roller the road metal is made thoroughly compact, forming a strong, waterproof covering over a firm subsoil. The result is that more perfect work is done in a few days and at less cost than the methods of McAdam or Telford would accomplish in several months. The main features of present day road-making, which are of recent introduction, are:

- The use of grading machines for forming the earth subgrade and open drains.
- The thorough drainage of the soil underlying the road so as to make a strong foundation.
- The use of a roller to consolidate both the earth foundation and the surface layer of stone or gravel.
- Where broken stone is employed, the use of a crusher to prepare the metal, instead of breaking the stone by hand.
- The screening of broken stone so as to grade it, for application to the road in layers according to size.

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