

**MODERN ROAD CONSTRUCTION; A
PRACTICAL TREATISE ON THE ENGINEERING
PROBLEMS OF ROAD
BUILDING, WITH CAREFULLY COMPILED
SPECIFICATIONS FOR MODERN HIGHWAYS
AND CITY STREETS AND BOULEVARDS**

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Modern road construction; a practical treatise on the engineering problems of road building, with carefully compiled specifications for modern highways and city streets and boulevards by Austin T. Byrne & Civil Engineer

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AUSTIN T. BYRNE & CIVIL ENGINEER

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FICATIONS FOR MODERN HIGHWAYS, AND
CITY STREETS AND BOULEVARDS

BY

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CALIFORNIA

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CHICAGO

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INTRODUCTION

THE science of good road building is an old one as evidenced by the many highways in Europe which have withstood the wear of travel for centuries. Most of these famous roads were cut from solid rock or built of crushed stone of such a character as to be unaffected by weather conditions. Modern road building, however, has been largely influenced within the past fifteen years by the enormous increase in the amount of travel due to the automobile. This has not only been the means of developing new road surface to meet the more severe requirements of this type of vehicle but it has developed a country-wide interest in good roads, thus making it possible for the enthusiastic travelers to take long tours without meeting the formerly ever-present bugaboo of bad roads, besides making the ordinary town-to-town travel more satisfactory.

¶ It is with the idea of giving a clear conception of the engineering problems involved in road building, that is, laying out of the road by the best and easiest route, the questions of grade, contour, and drainage, and the construction of culverts and bridges, that this treatise has been written. The author has had long experience in the field of highway construction and has treated the different types of roads in a very complete and practical manner. Natural soil, gravel, broken stone, bituminous macadam and concrete roads are all carefully treated, not only as to material, but as to the best methods of laying them. The city pavements are also given due consideration, accompanied by typical specifications for the new surfaces developed for boulevards.

¶ Altogether, the article covers the entire field of road building, both city and country, and should appeal either to the highway engineer or to the untrained reader who has merely a passing interest in the subject.

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HIGHWAY CONSTRUCTION

PART I

COUNTRY ROADS AND BOULEVARDS

RESISTANCE TO MOVEMENT OF VEHICLES

The object of a road is to provide a way for the transportation of persons and goods from one place to another with the least expenditure of power and expense. The facility with which this traffic or transportation may be conducted over any given road depends upon the resistance offered to the movement of vehicles. This resistance is composed of: (1) resistance offered by the roadway, which consists of (a) "friction" between the surface of the road and the wheel tires, (b) resistance offered to the rolling of the wheels occasioned by the want of uniformity in the road surface or lack of strength to resist the penetrating efforts of loaded wheels, (c) resistance due to gravity called "grade resistance"; (2) resistance offered by vehicles, termed "axle friction"; and (3) resistance of the air. The magnitude of each of the components has a wide range, varying with the kind and condition of the road and its surface, the form and condition of the vehicle, the load, and the speed.

Resistance to Traction. The combination of road resistances is designated by the general term "resistance to traction", the magnitude of which is measured by the number of pounds of effort per ton of the load required to overcome it; this is ascertained by a form of spring-balance variously called "dynograph", "tractograph", etc., one end of which is attached to the vehicles and the other end to the draft animals.

The road which offers the least resistance to traffic should combine a surface on which the friction of the wheels is reduced to the least possible amount, while possessing sufficient roughness to afford good foothold for the draft animals and good adhesion for motor vehicles; and should be so located as to give the most direct route with the least gradients.