

# **CIVIL ENGINEERING SPECIFICATIONS AND CONTRACTS**

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Civil Engineering Specifications and Contracts by Richard I. D. Ashbridge

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**RICHARD I. D. ASHBRIDGE**

**CIVIL ENGINEERING  
SPECIFICATIONS  
AND CONTRACTS**



# CIVIL ENGINEERING SPECIFICATIONS AND CONTRACTS

PREPARED BY

**RICHARD I. D. ASHBRIDGE**

CIVIL ENGINEER

MEMBER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS



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"For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it. Lest haply, after he hath laid the foundation, and is not able to finish it, all that behold it begin to mock him, saying, This man began to build, and was not able to finish."—St. Luke XIV: 28, 29, 30.

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CHICAGO

1920

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## INTRODUCTION

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**I**N engineering work, often involving millions of dollars and the labor of thousands of men for months, there can be no more important matters for the interested parties to consider than exactly what is to be done, how it is to be done, and what it is going to cost. An important contractual relation, which is to last sometimes for years, is to be entered into and, to avoid trouble and litigation, the "meeting of the minds" must be exact on all points. On the one hand the interests of the corporation or individual for whom the work is to be done must be carefully safeguarded; on the other hand, no injustice must be done the contractor, nor any provisions introduced or omitted which will prevent him from making an honest profit on his work.

¶ The author, who has a wide experience in Civil Engineering work, has tried first to develop a logical system of preparing specifications, and to present a method of avoiding the mistakes and omissions all too common in papers of this kind. He has also attempted to cover all types of specifications from railroad work, bridges, culverts, excavations, fills, tunnels, and road-beds to country and city paving. In addition to typical specifications, the proposal, agreement, and contract forms are discussed and illustrated. Advice is also given as to the points to be considered and avoided in drawing up a set of specifications and in properly drafting a contract. Altogether, a thorough presentation of this important subject has been given and it is hoped that this volume will be a distinct contribution to engineering literature.



**BEAUTIFUL REINFORCED-CONCRETE BRIDGE SPANNING ARROYO SECO, PASADENA, CALIFORNIA**

This is an excellent example of an artistic, and at the same time well-designed, bridge and shows a marked departure from the ponderous massing of concrete usually found in reinforced-concrete bridges. The bridge is 1,475 feet long and 148 feet high, and consists of nine large and six small spans. The designing engineers were Waddell and Harrington of Kansas City; the contractor, The Merces River Bridge and Construction Company, Los Angeles, under the supervision of the Pasadena City Commissioners.

# CIVIL ENGINEERING SPECIFICATIONS AND CONTRACTS

## PART I

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### INTRODUCTION

In the preparation for letting a piece of work, the Engineer must, by drawing and written description or specification, set forth his ideas. He must also make estimates of the cost of the work under different methods of construction to determine the least expensive method of accomplishing the desired result and, if he wishes to let the work, he should make such public announcements as shall reach the greatest number of desirable contractors.

In order to insure an early execution of the construction, it is his duty to prepare the form of bid or proposal, with the instructions to bidders and, later, after attending to the opening of bids, he must adopt a form of articles of agreement and fix a bond, which, together with the specifications, drawings, and proposal, form the contract. These various steps will be treated in the following work, in the order of their importance in the contract from the Engineer's point of view.

### GENERAL INSTRUCTIONS

**Engineering.** Engineering may be defined as the science or art of utilizing the forces and materials of Nature with the greatest amount of economy. It has been defined epigrammatically as "the science or art of making a dollar go the farthest". Engineering is divided into Civil Engineering, Mechanical Engineering, Electrical Engineering, Mining Engineering, Hydraulic Engineering, Gas Engineering, Chemical Engineering, Agricultural Engineering, etc. According to modern usage, *Civil Engineering* is confined strictly to fixed construction, such as railways,