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CONSTRUCTION MANAGEMENT FUNDAMENTALS

Clifford J. Schexnayder
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Construction Management Fundamentals

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P R E F A C E

The construction industry has changed dramatically in the last 25 years and, driven by the capabilities of the computer chip, change is continuing at an even more rapid pace. We are in the age of the laptop computer and the Internet. With our computer systems we now move data directly from the designer's computers to the field. This abundance of data must, however, be turned into information that will help us better manage construction operations. The challenge is to do things not only faster but better. Technology improvements will greatly enhance the constructor's ability to make better decisions relating to equipment, planning, and construction methods.

This text is intended for use in Constructing Management courses for undergraduate Civil Engineering students or for the Construction Management graduate students who need a text that covers the fundamentals of construction in a logical, simple, and concise format. Construction management is about controlling time, cost, quality, and safety, and about acting in a socially, politically, and environmentally acceptable manner. These tenets are covered in *Construction Management Fundamentals*. With a solid understanding of these concepts, the designer and constructor are better prepared to make intelligent design decisions, and to interact in a meaningful and productive manner.

Many photographs from actual projects are included in the text to illustrate ideas and construction methods. Additionally, the use of examples to reinforce the concepts through application has been incorporated in the text. Based on professional practice, standard formats for analyzing common problems are presented. Many companies use such formats to avoid errors when estimating production during the fast-paced efforts required for bid preparation and closing.

To enhance the value of *Construction Management Fundamentals* as a college textbook, problems and questions are provided at the close of each chapter. The solutions to some problems are included in the text at the end of the problem statements. Together with examples, they facilitate learning and give students the confidence that they can master the subjects presented. There are some questions that require the student to search construction publications or Web-based sources to locate basic information in support of construction management decisions. These questions expose the student to the process of independently locating necessary information. At the close of each chapter there are names, addresses, and in many cases the Internet address, for sources of additional information.

Engineering News-Record (ENR), the primary weekly publication serving the construction industry, is a recommended information source to support a construction management course using this book. *ENR* provides the latest information concerning developments in the industry. Use of the magazine provides the student with an exciting view of construction and a source of critical infor-

mation. Students should be particularly encouraged to read the “Legal” column that regularly appears in *ENR* as it provides practical management information. Visit www.construction.com for links to *ENR* and other McGraw-Hill construction resources.



This book benefited from the advice provided by many people actively engaged in the construction industry. Additionally many professors who are teaching construction in universities around the world gave freely of their counsel. Without the many hours of guidance by my good friend William A. (Wink) Ames, of the Minard-Ames Insurance Group, Chapter 9, “Construction Accounting,” would not be a reality. Likewise Chapter 4, “Scheduling Techniques for Construction Projects,” was much improved by the efforts of Sandra Weber, of the Del E. Webb School of Construction. She is one of my lifelong friends and collaborators. Her critical review and insightful advice added much to this text. Aviad Shapira, of the Technion-Israel Institute of Technology, Haifa, Israel, helped draft the section on Tower Cranes in Chapter 11, “Equipment Selection and Utilization.” Many other individuals and firms supplied information and illustrations for this text; however, I take full responsibility for all material.

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Most importantly I thank my wife, Judy, who typed chapters, proofread too many manuscripts, and who otherwise got pushed further into the exciting world of construction than she probably wanted. Without her support this text would not be a reality.

Comments on this edition are solicited.

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As Chief Engineer he was the qualifying party for the company's Contractor's License, and had direct line responsibility for the coordination and supervision of both the estimating and construction of projects. He provided management, administrative, and technical direction to the company's operations and represented the company in project meetings and negotiations.

Additionally he served with the U.S. Army Corps of Engineers on active duty and in the reserves, retiring as a Colonel. His last assignment was as Executive Director, Directorate of Military Programs, Office of the Chief of Engineers, Washington, D.C.

He has taught construction courses at Arizona State University, Louisiana Tech, Purdue, Universidad de Piura in Peru, the U.S. Air Force Academy, Virginia Polytechnic Institute and State University, and at the U.S. Army Engineer School. In 2003 he was a Fulbright Scholar Awardee to the Universidad de Piura, Piura, Peru.

Dr. Schexnayder is a registered professional engineer in eight states, as well as a member of the American Society of Civil Engineers. He served as chairman of the ASCE's Construction Division and on the task committee, which formed the ASCE Construction Institute. From 1997 to 2003 he served as chairman of the Transportation Research Board's Construction Section.

Richard E. Mayo (1940–2002) was a Structural Engineer for Communications Services, Inc. (CSI), Mesa, Arizona, and taught in the Del E. Webb School of Construction at Arizona State University. He received his Ph.D. in Civil Engineering (Construction Management) from Stevens Institute of Technology. He also held a Master's of Science degree in Management from Rensselaer Polytechnic Institute and a Master's of Science degree in Civil Engineering from Purdue University. He was a 1962 graduate of the U.S. Military Academy at West Point, New York.

Dr. Mayo was a construction engineer with nearly 40 years experience. He served in the Corps of Engineers for 22 years, completing his service as the Deputy District Engineer in New York City. Following his retirement from the

Army, he was the Director of Construction Services for the RBA Group in Morristown, New Jersey, for seven years. At RBA he supervised the widening of the New Jersey Turnpike and bridge repairs on the Garden State Parkway.

In 1975 *Engineering News-Record* recognized Dr. Mayo at the Construction's Man of the Year Dinner for his service in the construction of a fibrous concrete Army tank motor pool pavement at Fort Hood, Texas. At that time the project was the largest fibrous concrete facility in the country.

Dr. Mayo taught Construction Management at Stevens Institute, Roger Williams University, and in the Del E. Webb School of Construction at Arizona State University. He was a registered professional engineer in several states. He is the author of much of the management material in this construction text.

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