



NAWIC Education Foundation

CONSTRUCTION INDUSTRY SPECIALIST



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Preface

The NAWIC Education Foundation (NEF) was established in 1973 by the National Association of Women in Construction (NAWIC). NEF is an IRS 501 (c)(3) non-profit organization and is governed by a Board of Trustees. Since its inception, NEF has focused on construction education and offers a number of construction related adult education programs. NEF is proud to be named a Quality Education Provider by the American Council for Construction Education (ACCE).

In its effort to continue focusing on providing the most up-to-date educational opportunities, the NAWIC Education Foundation (NEF) has developed the Construction Industry Specialist (CIS) certificate course as a more comprehensive overview of the terminology, practices and applications found within the construction industry.

This program may be used as a self-study program or as part of a high school or college construction program. Upon completion of these materials, the participant will complete an on-line examination through an NEF approved testing center. Upon the successful completion of the exam, the participant will receive an official NEF certificate, pin and will be able to use the letters CIS after their printed name.

Construction Industry Specialist

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NOTE TO THE PARTICIPANT:

This Construction Industry Specialist (CIS) Textbook contains all the information needed to prepare for the examination leading to certification. Supplemental information over and above this material may be used for reference purposes only. Likewise, personal and professional experiences may vary or differ from the program content. For that reason, personal and professional experiences should be treated as any other supplemental information or references. Please note that any supplemental materials **WILL NOT** be included in the examination leading to the CIS certificate.

Chapter 1- The Construction Industry and Career Pathways

Chapter Description This chapter outlines the basic framework of the construction industry, the economic factors that shape the industry and the general public's perceptions and misconceptions of construction in general. The chapter also examines a variety of construction careers and how to enter the construction field.

Chapter Objectives

1. Explore and define the common construction industry sectors.
2. Examine the basics of construction economics and the impact of world markets on the industry's success.
3. Analyze the general public's overall perceptions and misconceptions of the construction industry and careers.
4. Explore the various personal skills needed to be employed in a construction career, the various types of careers available, and methods to obtain desired positions in a chosen construction field.
5. Discuss how to create and maintain a resume that can be used to obtain construction-related careers.

The Construction Industry

Did you ever wonder what your life would be like without construction? Let's think about how that can be possible. Did you wake up in a warm home this morning? Did you brush your teeth? Did you drive or take public transportation to work or school? In one way or another, all of these activities are dependent on construction. Construction workers built your home, installed the plumbing you used to brush your teeth, and built the roads you traveled to get to school this morning. It is hard to imagine a world without buildings to live and work in, water, electricity, or even roads for traveling.

Throughout history, construction has played a major role in the advancement of society and civilization as we know it today. Construction has evolved and changed throughout time to

Chapter 2-The Construction Project Team, Business Environment and Project Delivery

Chapter Description This chapter discusses the construction project team, project delivery methods, and different types of construction business environments. You will learn about the construction trade associations, professional societies and institutes that support the efforts of the construction industry.

Chapter Objectives

1. Define the construction team and the various roles team members play in the construction process.
2. Explore various types of construction project delivery methods.
3. Explore the various types of construction business environments.
4. Define and explore business ethics.
5. Discover the various trade associations, professional societies, and institutes that are common to the construction industry.

The Construction Team

The key individuals involved in a typical construction project are the owner, one or more design professionals, one or more contractors, and one or more suppliers and vendors.

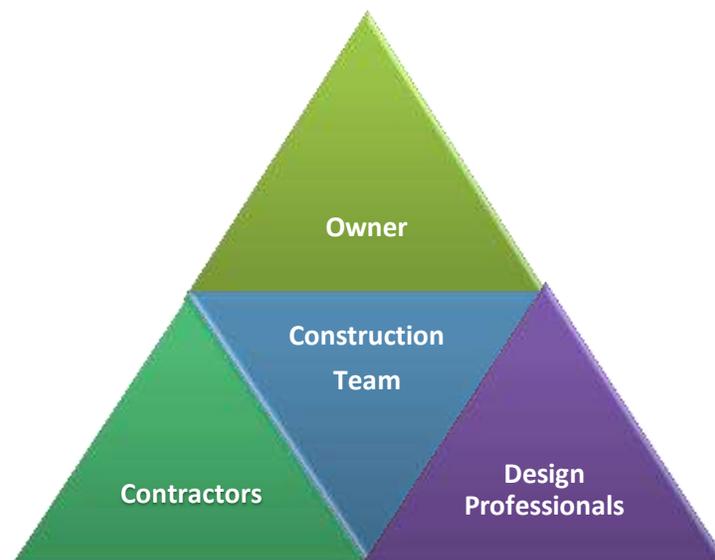


Figure 2.1- The construction project team members depend on each other to complete a project.

Chapter 3- The Construction Documents: Construction Drawings & Materials

Chapter Description This chapter focuses on the importance of the construction documents.

The design process, drawing types, and project manuals will be explored and discussed.

Chapter Objectives

1. Explore the phases of the design process.
2. Define and explore the types of construction drawings.
3. Examine the standard ordering of construction drawings.
4. Define and analyze the construction project manual and how it is used in conjunction with the construction drawings.
5. Explore the various sections of a construction project manual.

The *construction documents* or *contract documents* are crucial to the successful completion of a construction project. The construction documents consist of *construction drawings* and a *project manual* that contains information on everything from dimensions to the type, quantity, quality and color of all materials. Without the construction documents, the project would never be completed to the owner's specifications. Every project design is unique and so is every set of construction documents. To fully understand how the construction documents are developed, it is important to learn about the design process.



Chapter 4- The Construction Documents:The Project Manual

Chapter Description This chapter focuses on the importance of the project manual as it relates to the construction documents.

Chapter Objectives

1. Define and explore the construction project manual and how it is used in conjunction with the construction drawings.
2. Explore the various sections of a construction project manual, including: bidding requirements, general conditions, supplementary conditions, technical specifications and performance specifications.
3. Explore and discuss the importance of MasterFormat® and how to use it to create a project manual.

As described in Chapter 3, the *construction documents* or *contract documents* are crucial to the successful completion of a construction project and consist of *construction drawings* and a *project manual* that contain information on everything from dimensions to the type, quantity, quality and color of all materials. While the construction drawings are a graphic description of a building, the project manual defines in words the requirements for materials, labor and building functions.

Documents of a Project Manual- In the beginning, the project manual concept was an organized collection of written documents that were split into two categories. The two general categories included documents describing the bid requirements (non-contract documents) and documents that became part of the contract (contract documents) upon the signing of the agreement (contract). The following are documents that are consistently used in developing the construction project manual.



Chapter 5- Construction Estimating and Bidding Techniques

Chapter Description This chapter focuses on commonly practiced construction estimating and bidding techniques.

Chapter Objectives

1. Define and explore the art and science of construction estimating.
2. Explore the qualities, characteristics and tools of a construction estimator.
3. Examine how contractors find potential construction projects to bid.
4. Identify and analyze the types of construction bids and delivery methods used in different construction sectors.
5. Define and explore the documents used in construction estimating and bidding.
6. Examine construction material analysis.
7. Explore the addition of labor, material and overhead costs to the construction bid.
8. Analyze and discuss how historical project data may be used in the estimating and bidding processes.
9. Explore the bid opening and acceptance procedures.
10. Examine the use of close out meetings to develop a contractor's future estimating processes.

Construction estimating and bidding can be considered both an art and a science. The art comes through the understanding of the construction process, the various building systems, tools, materials and manpower. The ability to take this information and translate it into financially understandable terms is a true art form. The construction estimator must be able to take the construction drawings and calculate the materials, tools, equipment and labor needed to build the project. At times, the construction drawings will be partially complete; dimensions and specifics on materials may be missing. The estimator must be able to take that information and translate it into the necessary financial information that an owner will need.

The science of construction estimating requires the ability to quantify the specific amounts of all materials, tools, equipment and labor needed and the associated costs. An

Chapter 6- The Construction Process

Chapter Description This chapter examines what may happen during each of the various stages of a construction project. The final part of the chapter will address the importance of a construction schedule, analyze the various types of construction schedules and explain how using one will help keep a project on track.

Chapter Objectives

1. Define and explore the various stages of a construction project.
2. Explore who is involved in each stage of a construction project.
3. Examine project mobilization, permits, inspections and safety plans as they relate to a particular stage of construction.
4. Identify and analyze quality assurance programs and value engineering.
5. Explore production control and how it is used during the construction stage.
6. Analyze the various methods for planning and scheduling construction projects.

Stages of the Construction Process

Construction is a unique business and no two construction projects are ever alike. Each job has its own unique design, project team, challenges and characteristics. A construction project brings together many different individuals. Owners, contractors, architects, engineers, financial agents, lawyers, insurance agents, realtors and government officials may all be involved at some point in the construction process. No matter the project, the general procedure for obtaining the final product follows a very clear process. From the initial idea through completion, typical construction projects progress through six stages. They are:

Development

Bidding/negotiating

Construction

Design

Pre-construction

Project close-out

Chapter 7- The Construction Contract

Chapter Description This chapter will explore construction law and legalities. Included will be a discussion on construction contracts, purchase orders, mechanic's liens and how to avoid or solve claims and delays.

Chapter Objectives

1. Examine how the legal system affects the construction industry and some construction laws.
2. Analyze examples of the various construction contracts.
3. Define and understand a Mechanic's Lien and how to release one from a contract.
4. Discuss what causes construction claims and delays and how to resolve them legally or with mediation or arbitration.

The Law and Construction Contracts

In the past, it was not unlikely to see construction contracts formed by verbal agreement and a handshake. However, the modern construction process follows a more complex set of laws and contract practices that will be discussed in this chapter.=

The Federal Court System

To fully understand construction law and contracts, it is important to first understand the basics of the US legal system. Under the authority of the US Constitution, Congress has created the Supreme Court, eleven (11) federal courts of appeal, the US district courts (at least one in each state) and others such as the Court of Customs and Patent Appeals, the Court of Claims, and the Court of Tax Appeals that handle subject matter as indicated by the name of the court.



Chapter 8- Construction Administration

Chapter Description This chapter explores the administrative processes of the construction industry.

Chapter Objectives

1. Discuss and understand the importance of completing, revising and maintaining construction project records.
2. Explore the various types of insurance and bonds required for construction projects.
3. Analyze the construction submittal process.
4. Learn about various types of construction paperwork such as RFIs, daily logs, time cards and schedules of values.
5. Examine the construction change order process.
6. Review the schedule of values and payment process for construction projects.
7. Explore and discuss what causes construction claims and delays and how to minimize the risk of encountering them on a construction project.
8. Analyze the construction close-out process.

Construction Project Records

Along with the contract documents, a construction project will generate volumes of paperwork and documentation from the beginning of a project until its completion. This documentation serves as important historical and legal data for the project. For that reason, it is important that this documentation be treated with great care. In order for all information related to a project to be stored and retrieved as needed, the contractor needs to develop a *project filing system*. Each contractor will develop his or her own filing system; however, it should contain all project-related documents and provide for the effective and efficient flow of project correspondence. Likewise, the creation of standard forms for memos, minutes, transmittals, logs, change orders, daily time cards and daily construction reports helps ensure that project information is