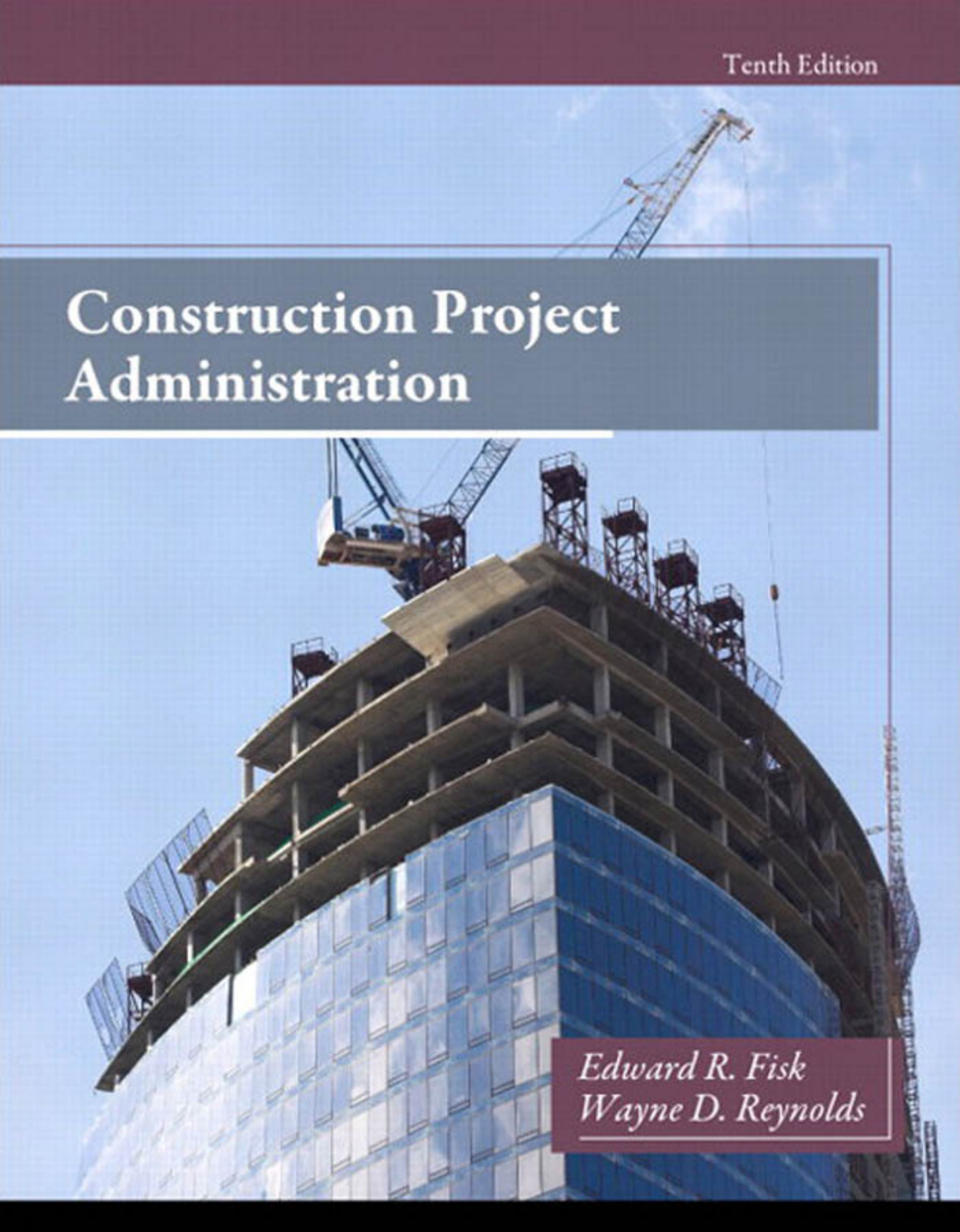
Tenth Edition

Construction Project Administration



Edward R. Fisk
Wayne D. Reynolds

Construction Project Administration

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TENTH EDITION

Edward R. Fisk, PE

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PREFACE

NEW TO THIS EDITION

Mr. Fisk's original preface still remains applicable to this, the tenth edition:

> *The principal objective of this book is to provide those of us who are active in the construction industry with a single source of information that will help address the responsibilities and risks that we are likely to encounter.*

The principles covered in this book have been gleaned from hundreds of projects worth billions of dollars over hundreds of years of construction. They are applicable to: horizontal as well as vertical construction; small and large projects; and government, commercial, industrial, and private construction. All may not be applicable to a particular project, but they remain valid principles nonetheless.

The revisions in this edition were necessary because of changes in technology and industry practices as well as shifts in the way that owners choose to have projects constructed. There have been some changes made as a result of user feedback and chapters reorganized in order to improve the flow of the material.

- The material covering Preconstruction Conferences in Chapters 10 and 12 has been combined into Chapter 12 to minimize redundancy and to improve readability.
- Since so many projects are now being constructed using the Design–Build (DB) project delivery system, it became appropriate to elaborate further on how DB impacts the principles discussed throughout the book.
- With almost universal usage of computers to schedule projects, arrow diagramming has fallen into disuse and hence most of the arrow diagramming discussion was removed from Chapter 14.
- Leadership in Energy and Environmental Design (LEED) has become so prevalent in the construction industry that the author felt it appropriate to address its impacts on material already presented in the book.
- The National Pollutant Discharge Elimination System (NPDES) was added to Chapter 8 because those permits are required on the vast majority of construction projects and a Resident Project Representative needs to understand them.
- Experience Modification Rating (EMR) was also added to Chapter 8 to further emphasize the importance of safety on all construction sites.
- Due to the widespread use of electronic project administration on construction projects, more emphasis was placed on electronic reporting and usage of electronic devices.
- There have been some changes to chapter questions in order to be consistent with the revised text material.

Principal contributors to this tenth edition were Mr. Scott Arias PMP, PSP, CPC, and Dr. Bryan Dyer PE, PLS, LEED AP, both professors in the Construction Management program at Eastern Kentucky University. Mr. Arias, President of ACE Consulting, Nicholasville, KY, brought his considerable scheduling expertise and worldwide construction experience to this revision, and Dr. Dyer, President of Dyer and Associates, Richmond, KY, contributed extensive insights into Design–Build construction as well as LEED. I owe them both a great deal of gratitude for their significant contributions to improving the breadth and depth of this edition. I also wish to thank my wife, Karen Reynolds, for her patience and support while I worked on this revision. And last, but not least, I wish to thank my mentor, Mr. Ed Fisk, who taught me so much and gave me the opportunity to keep his vision alive in this textbook. He is sorely missed.

While many people have contributed to writing this book throughout the years, I alone take responsibility for any errors found in this edition.

The author is grateful to the many contributions made since this book was first published. Contributors to previous editions included: Julius (Jim) Calhoun, Esq., Asst. General Counsel for Montgomery-Watson in Pasadena, CA (ret.);

Gary L. McFarland, PE, and Charles H. Lawrance, PE, President and Vice-President, respectively, of Lawrance, Fisk, & McFarland, Inc., of Santa Barbara, CA; Wendell Rigby, PE, former Senior Civil Engineer of the City of Thousand Oaks, CA; Albert Rodriguez, CPCU, ARM, President, Rodriguez Consulting Group, Inc., Jacksonville, FL; Robert Rubin, Esq., PE, of Postner & Rubin, Attorneys-at-Law, New York, NY; Joseph Litvin, Esq., PE, Attorney-at-Law, Dayton, OH; Arthur Schwartz, Esq., General Counsel for the National Society of Professional Engineers, Alexandria, VA; Robert Smith, Esq., PE, of Wickwire Gavin, PC of Madison, WI, General Counsel for the Engineers Joint Contract Documents Committee (EJCDC); members of the EJCDC whose contributions to the tools of the contract administrator are without equal; Donald Scarborough, President of Forward Associates, Ltd., of Novato, CA; William W. Gurry, President of Wm. Gurry & Associates, Atlanta, GA; Associated General Contractors of America; Mr. Harold Good, CPPO, formerly Director of Procurement and Contracting for the City of Palm Springs; W. Gary Craig, PE, President of ProjectEDGE; Mr. Steven E. Williams, Autodesk Inc.; Mr. Matt Gumm, Alliance Corporation; and Mr. James Dall, Dormitory Authority—New York. The author would also like to thank the reviewers of this edition for their helpful insights: Scott Arias and Bryan Dyer, Eastern Kentucky University; Denise Gravitt, Western Illinois University; and Matthew W. Nawn, Frederick Community College.

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ABOUT THE AUTHORS

Edward R. Fisk, PE, LS, was a construction consultant in Orange, California. He was a licensed civil and structural engineer, land surveyor, and licensed general contractor and held licenses in 13 states. Before becoming an independent consultant, he was president of Gleason, Peacock, & Fisk, Inc., of Brea, CA, construction consultants; vice president of Lawrence, Fisk, & McFarland, Inc., engineers, of Santa Barbara, CA; and vice president of Construction Services for Wilsey & Ham, engineers, Foster City, CA. Prior to that he served as Corporate Director of Construction Management for J.M. Montgomery Engineers (now MWH Global), and VTN Consolidated, Inc., and was an Engineer and a Field Engineer for Bechtel Corp., Power Division. He had extensive experience in both the public and private sectors. He was a Life Fellow of the American Society of Civil Engineers and former chairman of its Construction Division and was a Fellow of the National Academy of Forensic Engineers. He taught short courses statewide at the University of California, Berkeley, Institute of Transportation Studies, and at the University of Washington, Engineering Professional Programs, Seattle, for many years. He lectured nationally and internationally for the American Society of Civil Engineers until succeeded by coauthor Wayne Reynolds.

Wayne D. Reynolds, PE, is a Professor and Program Coordinator in the Department of Applied Engineering and Technology at Eastern Kentucky University. He teaches or has taught introduction to construction, project organization and supervision, scheduling and cost control, contracts and bidding, quantity and cost estimating, engineering economy, statics, structures, and soils in the Construction Management program. He also lectures nationally and internationally for the American Society of Civil Engineers. He received his B.S. degree from the U.S. Military Academy and M.S. degree in civil engineering from the Ohio State University. Mr. Reynolds has experience in design and construction projects including transportation facilities, navigation structures, flood protection, and institutional buildings, and has served as Inspector, Project Engineer, Assistant Resident Engineer, Project Manager, Deputy District Engineer, and Contracting Officer. He was an Assistant Professor of Civil Engineering at the U.S. Air Force Academy and completed service in the U.S. Army Corps of Engineers as a Lieutenant Colonel. He is a member of American Society of Civil Engineers and the Associated Schools of Construction.

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CONTENTS

Construction Project Administration

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CHAPTER **ONE**

THE PROJECT DELIVERY SYSTEM

Throughout the ages, human beings have been building to meet the needs of their habitation on this earth. Then, just as now, the planning and building of each such project involved the collective efforts of many workers, all with different skills and types of specialized knowledge. At first the methods were primitive but effective. As the products of modern technology replaced the older, outdated tools of these early builders, the methods of construction and the types of skills and specialized knowledge required to complete a construction project had to change to keep pace. Now, in the twenty-first century, we are again experiencing change as the computer has revolutionized the way that projects can be administered, both on the Web and in extranet applications.

PROJECT PARTICIPANTS

Whether the project involves a building, bridge, dam, pipeline, sewage treatment plant, water supply system, or any one of numerous other types of projects, it requires the skills and services of a project team comprised of three principal participants or only two participants if we consider the concept of a design–build contract.

The owner
The designer
The builder
The design-builder

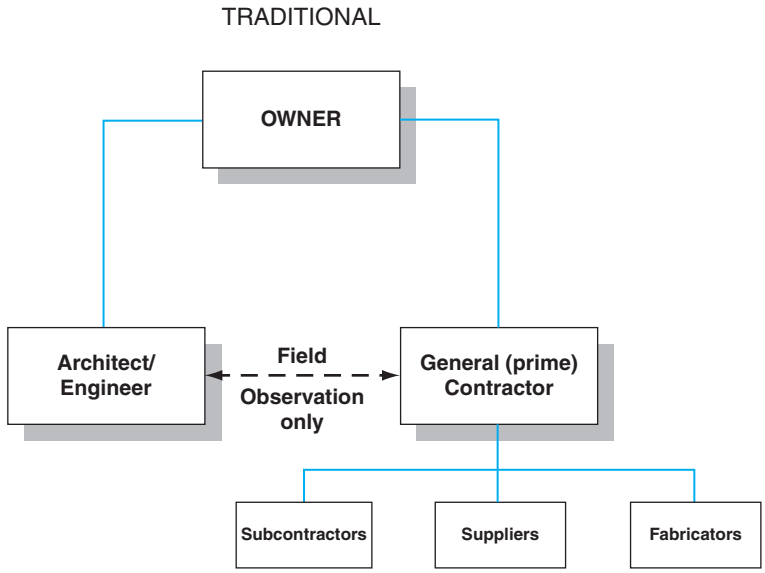
In practice, the owner usually enters into a contract with an architect/engineer or a design–build contractor to plan and design a project to satisfy the owner's particular needs. The owner participates during the design period to set criteria for design, cost, and time limits for completion and to provide decision-making inputs to the architect/engineer or design–build contractor.

Under conventional contracts, upon completion of the planning and design process the project is ready for construction, and the advertising or selection process to obtain one or more qualified construction contractors begins.

After selection of one or more qualified construction contractors, or, as in the case of public works projects, selection of the lowest qualified bidders, the owner enters into a contract directly with each prime contractor, who will then be fully responsible directly to the owner or the owner's designated representative for building the project in accordance with the plans, specifications, and local laws. The contractor has the further responsibility for the integrity of the new structure that has been built—in effect, the contractor must guarantee the work. Although the architect/engineer may be obligated to make field visitations to the construction site during the progress of the work, such periodic visits are for the purpose of observing materials and completed work to evaluate their **general** compliance with plans, specifications, and design and planning concepts only. Such basic services should not be interpreted as including full-time inspection for quality control and assurance.

Thus, on the typical project, there are usually only two prime contracts with the owner: one with the architect/engineer for the design and planning of the project and the other with a single construction contractor or occasionally several prime construction contractors to build the project.

As is frequently the case on a modern, complex project, numerous special types of construction are involved, and the contractor who enters into an agreement with the owner to build a project finds that the work can be better accomplished by subcontracting with a specialty contractor to do a particular portion of the work. Such subcontracts are agreements between the prime or "general" contractor and the subcontractor only and involve no contractual relationship between any subcontractor and the owner. Under the owner's contract for construction, the general contractor is fully responsible for the entire work, whether or not subcontractors have been utilized to accomplish any portion of it. The traditional contractual arrangement is illustrated in Figure 1.1.



- Separate designer
- Single general contractor
- Numerous subcontractors
- Fixed price, unit price, guaranteed maximum, or cost plus a fixed fee construction contract
- Negotiated professional fee for design service

FIGURE 1.1 Traditional Construction Contract Relationships.

Figure 1.1 does not take into account the relationship between an owner with its own in-house engineering staff (such as many public agencies and utility companies) and the construction contractor. However, by combining the functions of **owner** and **architect/engineer,** as in the diagram, the relationships would be similar.

CONSTRUCTION ADMINISTRATION

"Construction administration" and "contract administration" are terms easily confused. As used in this book, the term **contract administration** means the management or handling of the business relations between the parties to a contract, which is popularly thought of as being limited to the administrative paperwork or electronic project management applications. In this book, the term **construction administration** is used to refer to the much broader responsibility of relating to **all** project-related functions between the parties to a contract—not only the traditional contract administration duties, but also the conduct of the parties, relations with the contractor, communications, business systems, procedures, responsibility, authority, duties of all of the parties, documentation requirements, construction operations, planning, scheduling, coordination, materials control, payment administration, change orders, extra work, dispute procedures, claim handling, negotiations, all project closeout functions including punch list inspections, final cleanup, and administrative closeout. Thus, as used in this book, contract administration, whether electronic or traditional paperwork, is just a part of construction project administration.

It is not uncommon for the architect/engineer's or owner's Project Manager to function as the contract administrator, working out of the home office, who jealously guards the control of the job by reserving all meaningful project administration duties to himself or herself, while the authority of the Resident Project Representative at the project site is often limited to inspection and routine clerical duties. However, it is organizational hierarchies such as these that are the root cause of numerous construction claim losses to the owner or architect/engineer.

The mark of a good manager is the ability to select and hire qualified people and then to be willing to delegate as much authority as possible to such people. As long as a manager refuses to delegate and reserves all or most of the contract administration tasks to himself or herself, the capabilities of that manager will be severely inhibited, and, furthermore, the Project Manager will be incurring considerable risk of loss to the parent organization through potential delay-claim losses. A manager's authority is in no way diminished through delegation, but rather is strengthened.

As a means of implementing such a sound relationship between a Project Manager and a Resident Project Representative, the organizational chart shown in Figure 1.2 suggests a division of responsibility between field and office management personnel. A Project Manager can efficiently handle several projects without needlessly delaying any

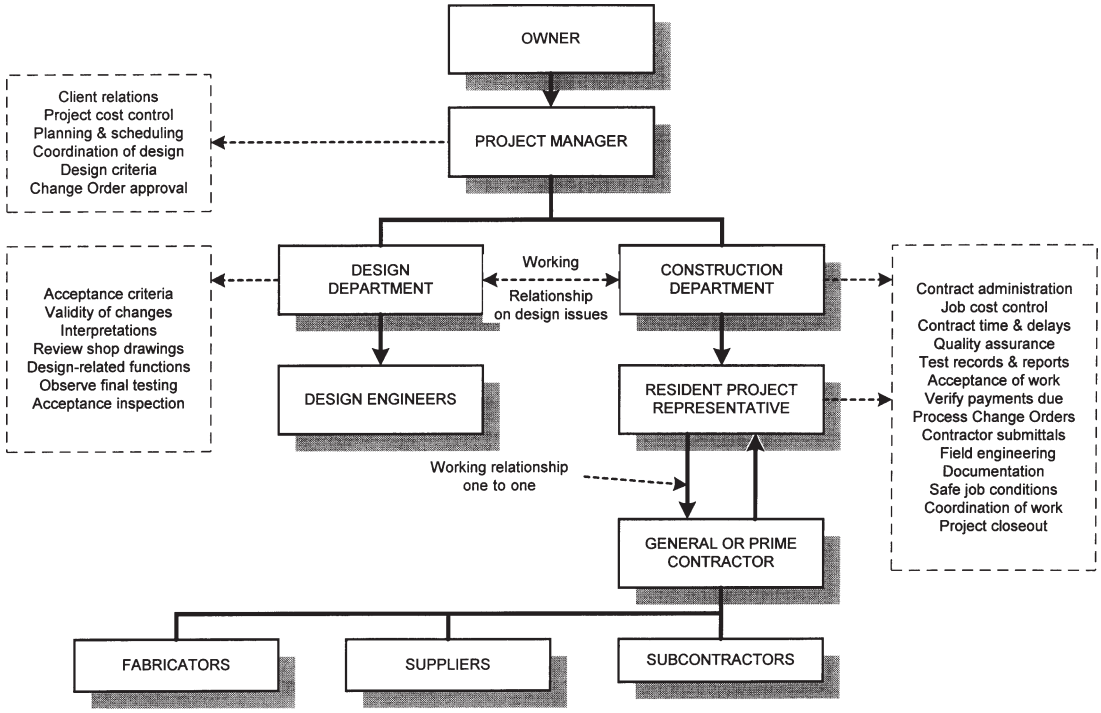


FIGURE 1.2 Delegation of Authority by the Project Manager during Construction Phase of a Project.

one of them by delegating the authority to make decisions on matters that should be decided at the Resident Project Representative's level. This contributes to the smooth and efficient operation of the construction activities and lessens the risk of contractor delay claims that would normally follow the delays caused by routing routine matters through the home office as a prerequisite to obtaining permission to act.

The Resident Project Representative is under obligation to keep the Project Manager informed every step of the way. Where the Project Manager's decision is required, the Resident Project Representative should obtain a decision by telephone, fax, or e-mail or through the use of extranet or Internet applications, prior to issuing a consent order to a contractor to proceed with some particular work or corrective action. Then, of course, proper administrative paperwork or electronic documentation must be completed to confirm the actions taken. Failure to expedite decisions often results in otherwise preventable claims that have a way of escalating into major claims the longer they take to be resolved.

The most effective Project Manager, or Contracting Officer (as he or she is known on U.S. federal projects), is the person who is willing to delegate as many contract administration functions as possible to the Resident Project Representative in the on-site field office. If unwilling to delegate, the Project Manager's only alternative to save the job is to relocate the Project Manager's office to the job site and run the project from there. On matters affecting time or money, however, only the Project Manager or Contracting Officer is empowered to execute contract modifications or Change Orders.

The One-to-One Concept

One of the single most important philosophies in construction project administration, the **one-to-one concept,** is a vital administrative procedure that can eliminate much conflict, reduce exposure to claims-producing problems, and result in greater efficiency for all parties to the contract.

Under this concept, the owner, architect/engineer, or Construction Manager designates a single individual, preferably located at the project site, to be the sole spokesperson representing the owner's interests. This person should be the Resident Project Representative, sometimes simply referred to as the "Project Representative." Under this arrangement, **all** orders issued to the contractor must be issued through the Resident Project Representative, and no one in either the owner's or the architect/engineer's or construction manager's office should be permitted to make any commitments to or issue orders or instructions directly to the contractor or any of its subcontractors, except by communicating such orders to the Resident Project Representative for issuing to the contractor. Failure to follow this procedure may place the owner and the contractor in a difficult contractual position. Under the contract law principle of implied authority, it is generally held that the contractor may receive orders from any individual whom it has reason to believe has the authority to issue such orders on behalf of the owner (see "Apparent Authority" in Chapter 2). Thus, the project manager, department heads, vice presidents, city or county engineers, or other persons of authority might otherwise visit the site and make statements that result in the creation of constructive changes (see Chapter 19) and not only bind

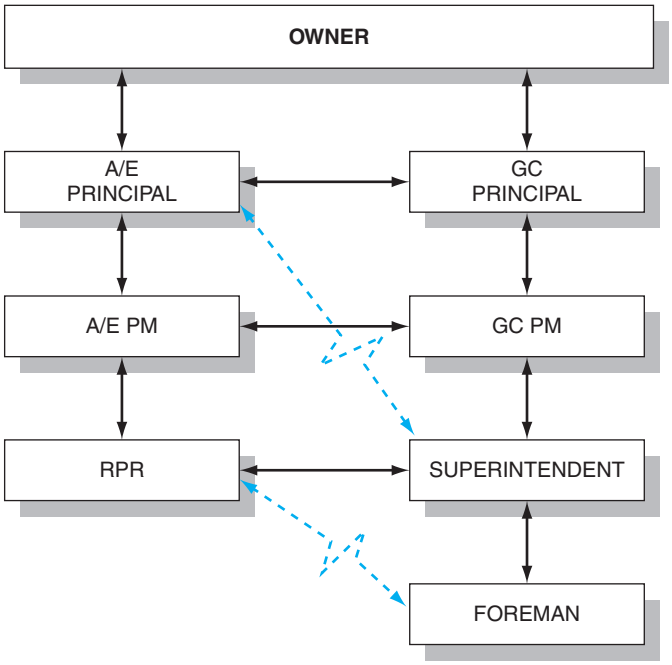


FIGURE 1.3 One-to-One Concept in Practice.

the owner, but also lay the foundation for a contractor claim. Such "diagonal" communication as shown in Figure 1.3 must be avoided at all costs.

One situation where the author visited a construction site with a principal of an engineering firm was a classic example of what **not** to do. Upon arrival at the site, the principal went to the field office to confer with the Resident Project Representative. Then the principal toured the project site (one of his monthly site visits) with the Resident Project Representative and the contractor's representative. Up to this point, everything was done "by the book." However, from this point on, the principal's actions became a classic example of what not to do.

The principal listened to the contractor's side of the difficulties experienced during the previous month, including failure to achieve certain high standards of quality and workmanship in certain areas. The principal listened, then unbelievably made commitments to the contractor by accepting such nonconforming work without ever talking it over with the Resident Project Representative. In short, he gave away the store!

To complicate matters further, the principal's actions totally stripped the Resident Project Representative of his authority and ability to deal effectively with the contractor, as after that the contractor realized that all that would be necessary to avoid unpopular decisions made in the field would be to do an end run around the Resident Project Representative and go directly to the principal to obtain concessions. Thus the principal's workload is increased, the effectiveness of the on-site inspection forces is diminished, and the risk of claims is greatly increased.

What should have been done would be for the principal to listen to the contractor's comments about the project without offering comment at that time, then go back to the field office with the Resident Project Representative and, behind closed doors, discuss the events and issue orders to the Resident Project Representative as to the acceptability or nonacceptability of the contractor's work. This would have placed the Resident Project Representative in a position of receiving backing from the home office, and the contractor would have realized that in the end, all orders will be received only from the Resident Project Representative.

The principal is still the only person with the authority to make the final determination but is advised to issue those orders only through the Resident Project Representative to preserve the one-to-one relationship. One of the greatest difficulties, where a project is being administered by an architect or engineer on behalf of an owner, is to keep the owner from violating this vital management concept.

As a part of the one-to-one concept, the contractor, too, must organize so that a single management person located at the project site is designated as the contractor's sole agent. This is best set up as a provision of the specifications. Then, it should be arranged during the preconstruction conference that the contractor's agent should be designated in writing, and that no substitutions are permitted under the contract without the written authority of the corporate office. The designated person should be capable of speaking officially for the contractor, although it is certainly acceptable to use an on-site superintendent or project manager as the agent of the contractor, just as the engineer or architect uses his or her Resident Project Representative. The military has a word for this. It is called "chain-of-command."

The Five-Step Process of Initiating a Project

An important part of organizing a project so as to avoid later difficulties, which could include award disputes, charges of preference, loss of money due to bidder default, and later disputes over lost time and delays in the work, is the initiation of the project according to an orderly administrative procedure. This process is what the author calls the "five-step project initiation process" (Figure 1.4). It holds that there are five vital steps that must be followed when initiating a project, especially in public works projects:

United States	International
1. Advertise for bids.	Solicit tender.
2. Open bids.	Open tender.
3. Award contract.	Issue letter of acceptance.
4. Sign agreement or "contract."	Execute contract agreement.
5. Issue Notice to Proceed.	Set commencement date.

While it is common for many owners and architects or engineers to follow most of these steps, items 4 and 5 are, unfortunately, often combined, sometimes even with the uninformed blessing of the owner's attorney, as well.

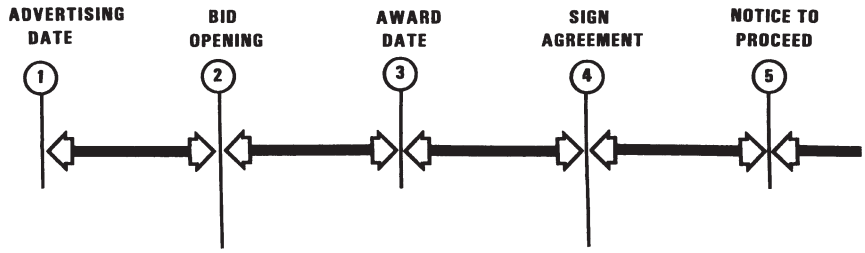


FIGURE 1.4 The Five-Step Process.

An important point should be noted here. The procedures for the signing of the agreement often take time. If a cautious contractor chooses to wait until it actually "sees" the agreement with the owner's signature, and if the project time is stated in the agreement as beginning as of the date of signing the agreement, there is the possibility of a valid delay claim against the owner even before the project begins. The contractor can rightfully claim that (1) it could not start until a signed contract was received, (2) the time lost in receiving the signed document was part of its construction time, and (3) it should be compensated with an extension of project time to cover the days lost while waiting for a signed agreement.

Throughout the book references will be made to the five-step process and partial diagrams will retain the identification numbers in the foregoing list to identify any of the five tasks listed.

CONTROL OF QUALITY IN CONSTRUCTION

Without definition, the term **quality control** in construction can have several meanings. To be sure, the actual quality of construction depends largely upon the control of the construction itself, thus involving the contractor to a great extent. What constitutes quality control and quality assurance appears to be the subject of dispute by some. For example, checking the placement of reinforcing steel in concrete formwork may be considered as quality control if the contractor does it and as quality assurance if the owner observes or verifies that it has been done; yet the physical act of checking this work is exactly the same in either case.

Whether the subject is called quality control or quality assurance, the function performed is essentially that which has been recognized over the years as being construction inspection and testing of materials and workmanship to see that the work meets the requirements of the drawings and specifications. Inspection takes many forms, and its responsibilities vary somewhat depending upon the intended inspection objective. As an example, an inspector in the employ of the local building official is principally concerned with the safety and integrity of the structure being built and whether it meets the local building code requirements. Quality of workmanship or aesthetics is largely beyond the code inspector's responsibility and, because his or her salary is paid by the public, quality of workmanship is, to a great extent, left to the owner to control, using the owner's, contractor's, or designer's personnel. However, inspection by the owner's representative is intended to include concern not only for the structural integrity and safety of the structure, but also for the quality of workmanship, selection of materials being used, aesthetic values, and similar matters involving compliance with the provisions of the contract plans and specifications.

ORGANIZATIONAL STRUCTURE OF A CONSTRUCTION PROJECT

There is no single organization chart that will remotely approximate the organizational structure of the field forces of the owner, the design organization, or the contractor on all projects. Before the internal structure of any of the principals to a construction contract can be examined, some understanding of the several basic types of contractual relationships must be gained. Of the several types of contractual relationships frequently encountered in construction, four of the principal types are as follows:

1. Traditional architect/engineer (A/E) contract
2. Design/construction manager (D/CM) contract
3. Professional construction manager (PCM) contract
4. Design–build contract (similar to turnkey construction)

Under the provisions of the **traditional architect/engineer** contract illustrated in Figure 1.1, the owner usually engages the services of an architect/engineer to perform planning and design services, including preparation of plans, specifications, and estimates. Professional services of the architect/engineer during the construction are generally limited to performance of intermittent field visitations and certain contract administration functions such as review of the contractor's payment requests, review of shop drawings, evaluation of contractor claims, interpretation of plans and specifications during construction, change order requests, and final inspection.

A **design/construction manager** contract, illustrated in Figure 1.5, is quite similar to the traditional A/E contract with the exception that the architect/engineer's project manager is fully responsible to the owner during both the design and planning phases as well as the entire construction phase to provide for all project needs. This includes all scheduling, cost

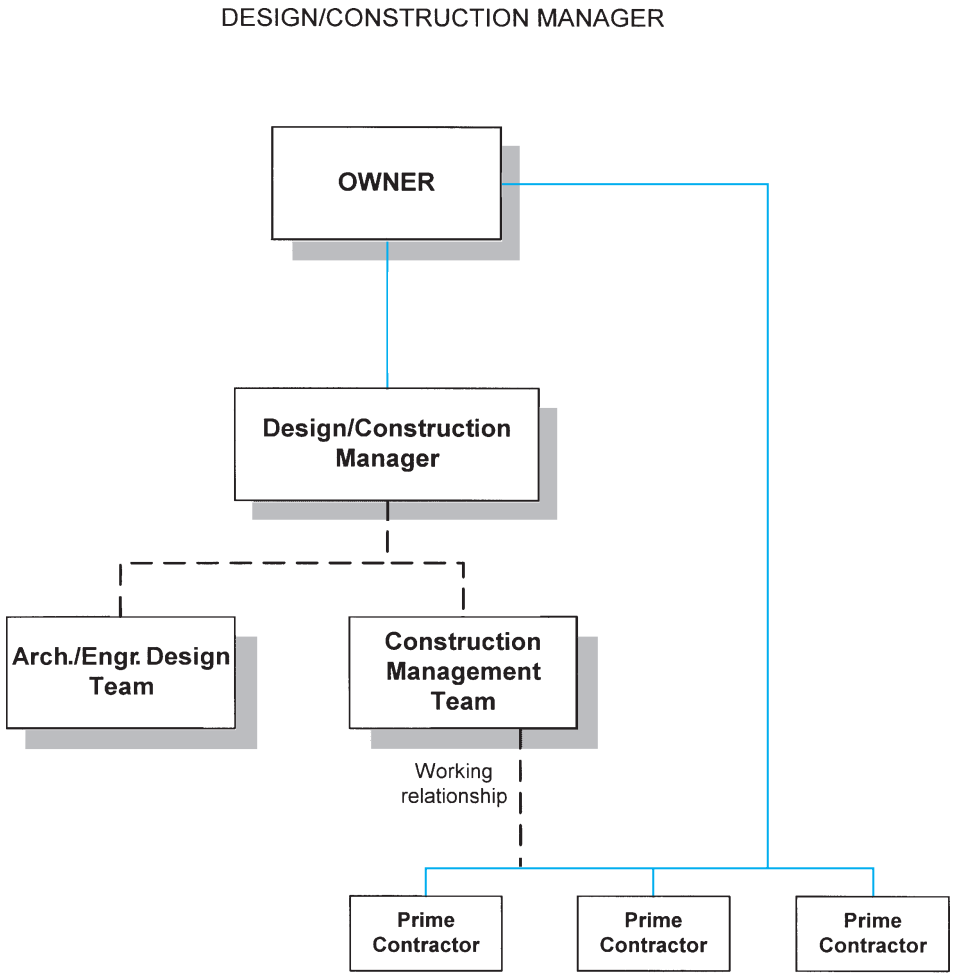


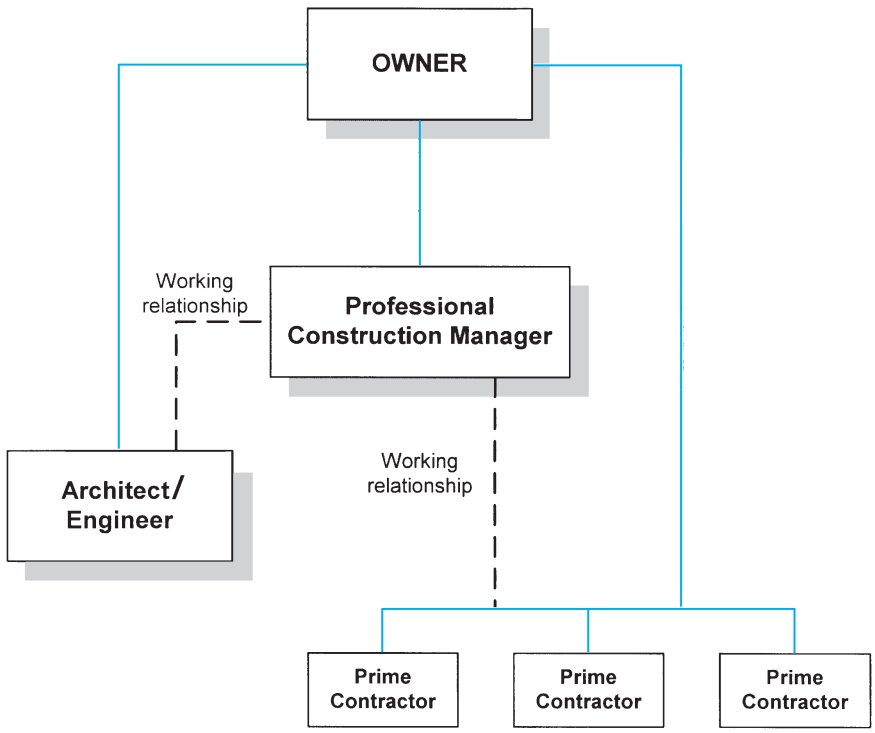
FIGURE 1.5 Contractual Relationships under a Design/Construction Manager-Type Contract.

control, quality control, long-lead purchasing, letting of single or multiple contracts, and coordination of the work. The design/construction manager responsibilities do not terminate until final acceptance of the completed project by the owner.

These responsibilities include the examination of cost-saving alternatives during both the design and construction phases of the project and the authority to require the design or construction changes necessary to accomplish the owner's objectives.

A **professional construction management (PCM)** contract is based upon a concept pioneered several years ago by the General Services Administration of the federal government, and for a time was used extensively by that agency for the construction of public buildings. Although the functions performed by the professional construction manager may be no different than those of a design firm doing construction management, the responsibilities and contractual status are significantly different. Under the professional construction management (PCM) concept, illustrated in Figure 1.6, the owner engages a construction management firm under a separate contract in addition to a conventional architect/engineer and construction contractor contract. Thus, instead of only two contracts for a project, the owner has actually executed three. In keeping with the principles of this concept, the professional construction management firm performs no design or construction with its own forces, but acts solely in the capacity of an owner's representative during the life of the project. In many cases, the PCM is responsible for reviewing the architect/engineer's payment requests in addition to those of the contractor. In any case, the PCM is responsible for total project time and cost control and coordination as well as quality control and, as such, provides supervision and control over those functions of the architect/engineer and the contractor that relate to these important subject areas.

PROFESSIONAL CONSTRUCTION MANAGER
(AGENCY CONTRACT)



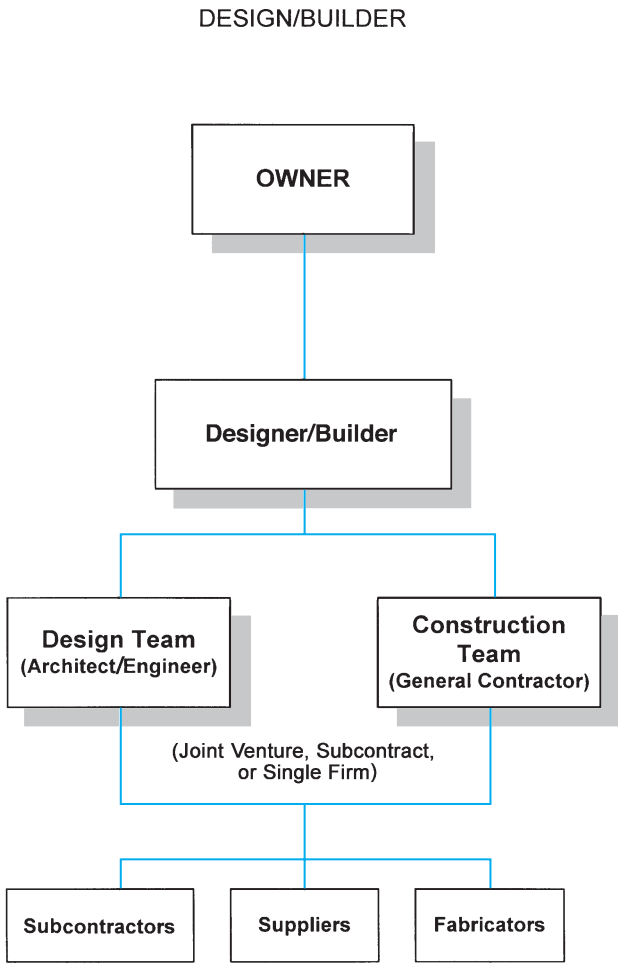
- Three-party team of owner, designer, and construction manager
- Fixed price or negotiated separate prime contracts directly with the owner
- Construction manager may act as owner's agent to extent delegated
- Negotiated professional fee for construction management services
- Negotiated professional fee for design services

FIGURE 1.6 Contractual Relationships under a Professional Construction Manager Contract.

One important distinction is that a "construction manager" under this concept is an organization, not a single individual. Thus the construction management firm may provide a staff of both field and office personnel, including a project manager, estimators, schedulers, accountants, construction coordinators, field engineers, quality control personnel, and others.

A **design–build** contract, illustrated in Figure 1.7, sometimes called **turnkey construction,** is based upon the owner entering into an agreement with a single firm to produce all planning, design, and construction with its own in-house capabilities. Some organizations recognize a further distinction between design–build and turnkey construction in that while both provide both design and construction by a single organization, or a joint venture, the turnkey contractor also assembles the financing package. Such design–build firms are generally licensed as both architect/engineers **and** as general construction contractors in those states that require it and offer a complete package deal to the owner. Its principal advantages, where its use is permitted, are the elimination of contractor claims against the owner resulting from errors in the plans or specifications and the ability to begin construction on each separate phase of a project as it is completed, without waiting for overall project design completion—the "fast-track" concept. It is in the design–build industry that fast-track construction was born.

There is one disadvantage in the system when public funds are involved in construction. Under the laws of many states, a construction contractor must be hired through a competitive bidding process where the lowest bidder gets the job. Usually, design firms and construction management organizations are selected on the basis of their individual expertise and previous experience in the type of work to be designed. Under this concept it is felt that the greatest savings and cost benefits to the owner will be obtained by careful planning during the design stage, and that the occasional cost savings that might result from competitively bidding the design responsibilities would be more than lost in the resultant higher construction cost that



- Combined designer and construction contractor
- Numerous subcontractors
- Fixed price, guaranteed maximum price, or cost plus fixed fee for design–build contract
- No separate fee for design services

FIGURE 1.7 Design–Build Contract Relationships (Similar to Turnkey Construction).

all too often follows a set of plans and specifications that had to be prepared in a hurry without checking.

Staff Assignments for Construction Quality Assurance/Control

The staff requirements for the construction management and quality assurance/control activities of a construction project vary from job to job and from one employer to another. Although there seems to be a lack of uniformity in the structuring of many owners' or architect/engineers' field forces during construction, the average contractor organization seems to be extremely well organized in this area. This is probably to be expected, as the contractor organization is performing its primary function at the site, whereas the owner or architect/engineer is often on less familiar ground during the construction phase, even though the contract may call for the architect/engineer performance of some construction management functions.

In an attempt to compare job assignments and titles of positions of comparable authority from one organization to the next, the numerous titles of the same job emphasize the difficulty of determining position by title alone. Figure 1.8 is a chart of the normal functional relationships under a design/construction management contract, which will be used to illustrate the problem.

An example of supervisory job titles of comparable authority is shown in the following table, which is based upon actual job titles used by some contractor and architect/engineer offices to designate the various levels of supervisory and management personnel utilized during the construction phase of a project. The levels indicated are those used in Figure 1.8.

All of these levels share in the responsibility of administering various provisions of the construction contract for their respective employers. In addition to the foregoing list of full-time personnel on the project site, numerous tasks remain to be performed by specialty inspectors and representatives

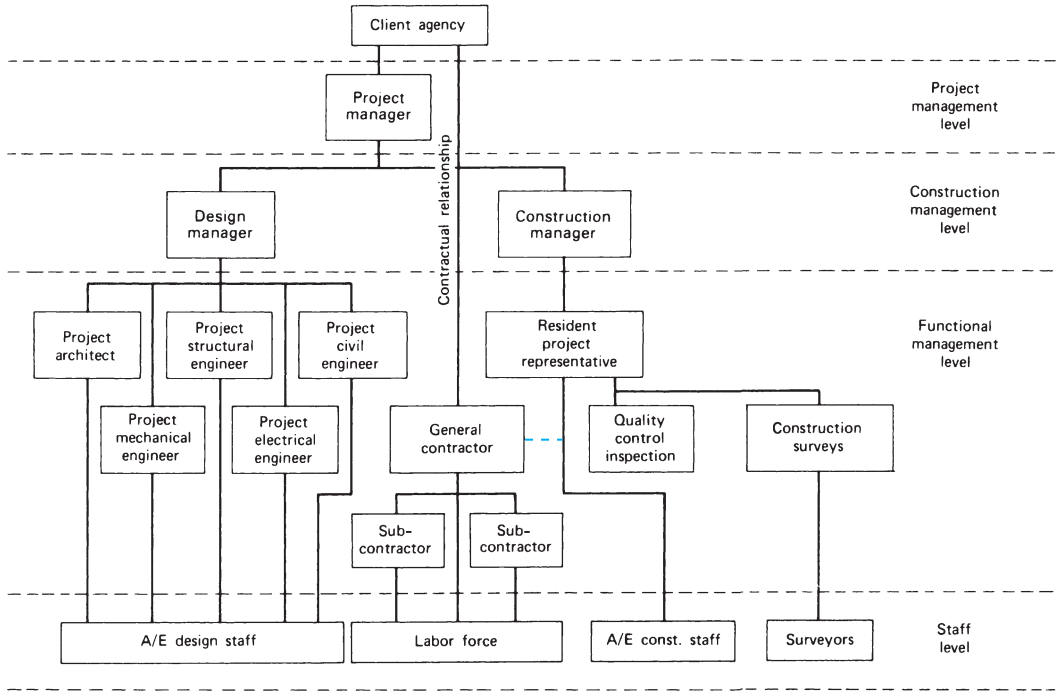


FIGURE 1.8 Functional Relationships under a Design/Construction Manager Contract.

of the various local government agencies having jurisdiction over the project. These include the following public and private specialty and code enforcement inspectors:

1. Local building department (code enforcement)
2. Soils inspectors
3. Inspectors of other agencies whose facilities are involved
4. Utility company inspectors
5. Specialty inspectors (concrete, masonry, welding, electrical, etc.)
6. Manufacturers' representatives (special equipment or materials)
7. OSHA safety inspectors

Each of the specialty and code enforcement inspectors is responsible only for its particular specialty task; thus, the overall responsibility for project administration and quality control falls on the shoulders of the Resident Project Representative of the owner or design firm or the contractor's quality control (CQC) representative.

Level	Owner or Architect/Engineer	Contractor
Project Management	Project Manager	Project Manager
	Project Engineer	
	Project Architect	General Superintendent
	Project Director	Construction Manager
	Contracting Officer	
Construction Management	Construction Manager	Construction Manager
	Resident Engineer	Project Engineer
	Resident Architect	Superintendent
	Construction Coordinator	
	Resident Manager	
Functional Management	Resident Project Representative	Project Engineer
	Project Representative	Superintendent
	Resident Engineer	Foreman
	Resident Inspector	CQC Representative
	Inspector	
	Quality Control Supervisor	