The Construction Specifications Institute

Construction Contract Administration

Practice Guide

- Takes an in-depth look at standard contract documents and their successful use in construction projects
- Delivers expert commentary on how various forms are used to document design decisions
- Discusses the roles and responsibilities of all parties concerned with construction agreements

The CSI Construction Contract Administration Practice Guide

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Construction Specifications Institute

John Wiley & Sons, Inc.

This book is printed on acid-free paper. ♾

Published by John Wiley & Sons, Inc., Hoboken, New Jersey
Published simultaneously in Canada

Library of Congress Cataloging-in-Publication Data:

The CSI construction contract administration practice guide / Construction Specifications Institute.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-470-63518-6 (pbk. : alk. paper); ISBN 978-0-470-94015-0 (ebk); ISBN 978-0-470-94016-7 (ebk); ISBN 978-0-470-94017-4 (ebk); ISBN 978-0-470-95125-5 (ebk); ISBN 978-0-470-95144-6 (ebk)
1. Buildings–Specifications–Handbooks, manuals, etc. 2. Construction contracts–Handbooks, manuals, etc. 3. Letting of contracts–Handbooks, manuals, etc. 4. Construction industry–Management–Handbooks, manuals, etc. I. Construction Specifications Institute.
TH425.C748 2011
692--dc22

2010031094

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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Preface

Introduction to the Practice Guide Series

Beginning with the publication of the first *Manual of Practice* (MOP) in 1967 continuing through the publication of its successor document, the *Project Resource Manual* (PRM), it has been the intent of the Construction Specifications Institute (CSI) that these publications embody accepted standards for the preparation of construction specifications and project manuals, and a detailed source of information on quality documentation for the life cycle of a facility.

Through these publications, CSI has sought to aid owners, designers, specifiers, contract administrators, contractors, construction product representatives, and facility managers in the performance of their jobs.

In 2008, CSI began an effort to update the knowledge formerly contained in the MOP and PRM to present it anew and ensure its continued relevance. As with the earlier collections of this knowledge, the intent is to provide an authoritative resource on the organization, preparation, use and interpretation of construction documents, encompassing the entire life cycle of a facility from conception through facility management.

To accomplish this update CSI established the Practice Guides Task Team. One of the task team charges was to organize the presentation of this information into modules to support areas of practice where CSI currently offers certificates and certifications, such as Project Delivery addressed by the Construction Documents Technology (CDT) certificate, Specifications, addressed by the Certified Construction Specifier (CCS) certification, Contract Administration addressed by the Certified Construction Contract Administrator (CCCA) certification, and Product Representation addressed by the Certified Construction Product Representative (CCPR) certification, as well as other areas of practice for which education and certification may be developed.

To keep current with changes in the industry, the Task Team also reviewed other CSI documents and standards, and updated references to them that appear in the Practice Guides. A similar effort was made to incorporate changes in contract documents produced by The American Institute of Architects (AIA) and the Engineers Joint Construction Documents Committee (EJCDC), and to introduce the new standard contract documents developed by the ConsensusDOCS Coalition.

The Task Team also recognized the growing impact of "green" or sustainable practices on the subject matter contained in the Practice Guides. Each Practice Guide now addresses the topic of sustainable practice to some degree while a more detailed examination of the topic is planned for a future Sustainable Practice Guide.

Two other topics that have had an impact on the Practice Guides are: Building Information Modeling (BIM) and Integrated Project Delivery (IPD). The growing impact of BIM on the practice of specification writing and its potential impact on quality documentation made a discussion of this topic imperative. Likewise IPD has grown in importance over the past several years and has had an impact on the way practitioners relate to the process of creating and interpreting construction documents.

The Practice Guide Series is not intended to be composed of static documents but to be a living set of guides with the capacity to change and be updated as the construction

industry changes around them. The input of users of this Series will be critical to the future updating of the Series and the authors and reviewers welcome feedback from users.

Description of The *CSI Construction Contract Administration Practice Guide*

The CSI Construction Contract Administration Practice Guide takes up where the introductory information presented in *The CSI Project Delivery Practice Guide* leaves off, providing a more detailed discussion of the process required to successfully deliver a construction project. Like the other Practice Guides in the Series, this Practice Guide addresses the roles of the various participants in the process and their relationship to one another in creating and executing the construction documents. As is also demonstrated in *The CSI Construction Specifications Practice Guide*, the key to a successful construction project is clear and concise communications. This Practice Guide also highlights the importance of a team effort in effective project execution and describes the role of each participant in achieving success. The responsibilities of team members are set forth in the contract documents and can differ depending on the method of project delivery selected for a project. A successful project also requires a commitment to coordination and cooperation by all team members and this Practice Guide provides the tools necessary to achieve success.

Additional CSI publications that complement the Practice Guides are available for download to purchasers of the Practice Guides. The following documents can be obtained at www.wiley.com/go/csipracticeguides:

- MasterFormat® numbers and titles
- UniFormat™
- SectionFormat™/PageFormat™
- Sample CSI Forms
- GreenFormat™ questionnaire
- Practice Guide Glossary
- Form letters in Word format

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Acknowledgments

No project of this magnitude can be accomplished single-handedly. In the best CSI tradition many people volunteered to write, review, and contribute to the production of the CSI Practice Guides. CSI wishes to recognize the following people who contributed in many ways to this project. If we omitted anyone's name it was inadvertent not intentional.

Ross G. Spiegel, FCSI, CCS, CCCA, FAIA, LEED AP BD+C
Chairman, Practice Guides Task Team

Author of *The CSI Construction Contract Administration Practice Guide*:
Paul W. Simonsen, RA, FCSI, CCS, CCCA, LEED AP, NCARB, SCIP
Jim Rains, CSI, AIA

Practice Guide Task Team Members:
George Wade Bevier, CSI, CCS, SCIP, LEED AP
Ellen Kay Crews, FCSI, CCS, FMP
Kathryn A. D'Andrea, CSI, CCS
Dennis J. Hall, FCSI, CCS, CCCA, FAIA, SCIP
Gregory J. Marking, FCSI, CCS, CCCA, AIA, NCARB, LEED AP
Wiley N. McMillan, Jr., FCSI, CCPR
Chris Pechacek, CSI, LEED AP
Jim Rains, CSI, AIA
James M. Robertson, FCSI, CCS, FAIA, NCARB
Walter R. Scarborough, CSI, CCS, CCCA, AIA, SCIP
Paul W. Simonsen, RA, FCSI, CCS, CCCA, LEED AP, NCARB, SCIP
Paul M. Sternberg, CSI, CCS, CCCA, AIA, LEED AP, NCARB

CSI Certification Committee Members 2008–2010
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Peter A. Baker, CSI, CCPR, RCI
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Sheryl L. Dodd-Hansen, FCSI, CCS, CCCA
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Raymond E. Gaines, FCSI, CCS, AIA
Richard G. Howard, CSI, CCS, AIA, NCARB, SCIP
Gregory J. Markling, FCSI, CCS, CCCA, AIA, LEED AP, NCARB
Wiley N. McMillan, Jr., FCSI, CCPR
Kay M. Melcher, CSI, CCS, LEED AP
Jonathan M. Miller, FCSI, CCS, CCCA, AIA, SCIP
Stephen E. Nash, CSI, CCS, CCCA, AIA, LEED AP
George Rosamond, FCSI, CCS, AIA, LEED AP
Marilyn G. Smith, CSI, CCS, AIA, SCIP
Robert B. Swan, CSI, CCS, CCCA, AIA
Robert W. Teller, FCSI, CCS, CCCA, LEED AP
J. Peter Tolson, CSI, CCS, CCCA

Lisa Turner, CSI, CCPR, LEED AP
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M. Keith West, CSI, CCPR
Laurence E. Wightman, III, CSI, CCPR, AHC

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Robert S. Weygant, CSI, CDT, SCIP

CSI Staff
Greg Ceton, CSI, CDT, Director of Technical Services

Chapter 1
Introduction to Construction Contract Administration

Construction is the execution of the work as required by the contract documents. Construction contract administration (CCA) involves the activities necessary to effect and determine the fulfillment of the contract requirements by the parties to the construction contract. The construction stage of the project follows the design and procurement stages and precedes the facility management stage in the life cycle of a facility. Construction is a team effort that includes the contractors, subcontractors, testing agencies, architect/engineer (A/E), consultants, owner, authorities having jurisdiction (AHJs), product representatives, and others, all working toward the common goal of delivering the completed facility ready for its intended use.

The participants in the construction stage can generally be divided into four teams: the contractor team, the design team, the owner team, and the supplier team. Depending on the project delivery method, the contractor may be an independent entity, a construction manager as constructor (CMc), or the design-builder. A construction manager as adviser (CMa) is a member of the owner team.

The basic responsibilities of those involved in the construction processes are stipulated in the contract documents. Depending on the project delivery method, the contract documents may have been based on standard documents published by the American Institute of Architects (AIA), the Engineers Joint Contract Documents Committee (EJCDC), ConsensusDOCS endorsed by several construction associations, the Design-Build Institute of America (DBIA), the Construction Management Association of America (CMAA), or based on nonstandardized documents created by an owner. Except when stated otherwise, this practice guide will focus on the most widely accepted CCA procedures as established by AIA and EJCDC as defining the basic rights, duties, and responsibilities of the various parties to the construction contract based on the traditional design-bid-build delivery method.

The procedures implemented during the construction stage encourage team commitment to the project. The team members' commitment to communication, coordination, and cooperation can greatly affect the attitude of project team members as they strive to achieve a successful project, constructed on schedule, within budget, and with no unresolved claims.

1.1 Construction

Construction is the coordinated effort of all those involved in providing the owner with a successful project.

When the construction stage is complete, the owner or the owner's facility manager takes over for the facility management stage of the life cycle. The owner may, in time, continue the facility life cycle through the process of renovation or alteration to accommodate new requirements. Construction contract administration begins when the agreement between the owner and contractor is executed and ends when final payment is accepted by the contractor. The construction stage includes the contractor's planning and scheduling activities, mobilization of equipment, material purchasing, fabrication of components, and construction. Primary decision makers during this stage are the A/E, owner, and contractor.

Construction activities can be divided into two broad categories:

Construction Contract Administration Activities related to administering the contract for construction, typically performed by the A/E

Contractor Project Management Activities related to managing the construction process, typically performed by the contractor. Contractor project management should not be confused with construction management. Construction management is a delivery method. Contractor project management is managing the construction process, whether by a contractor, a construction manager, a design builder, or other entity responsible for constructing a project.

1.2 Construction as a Team Activity

The construction of a facility is the culmination of the collective ideas, talents, and services of a large and diverse group. The main participants are:

- The owner that initiates the project
- The A/E who designs the facility or alterations to an existing facility
- The contractor who is awarded a contract for the construction

There are others involved in the project with one of the main participants. They include:

- Subcontractors, who perform portions of the work under the direction of the contractor
- Product representatives, who assist with submittals and furnish field services such as inspecting installed work
- Suppliers, who furnish materials or products for the project
- Manufacturers, who produce materials or products
- Consultants, who provide professional services to the A/E, contractor, or owner
- Testing laboratories and inspection agencies, which provide quality control (QC) services to the owner and contractor

- Financial advisers and institutions that arrange for the project financing
- Attorneys, who coordinate the legal and contractual issues of the project
- Insurance advisers and companies that provide risk coverage to the owner, contractor, and A/E
- Bonding companies, which ensure the performance of the contractor and subcontractors
- Authorities and regulatory agencies which have jurisdiction over the construction and that establish criteria in the form of codes, ordinances, and permits

The team member with the greatest number of project management responsibilities is the contractor; however, basic technical competence and workmanship is but a small part of the overall responsibility of the contractor. The contractor is responsible for maintaining and controlling project coordination; project schedule; subcontractor and supplier performance; payment procedures; safety, insurance, and bonding requirements; quality assurance and quality control tasks; submittals; and a multitude of other business management functions.

The responsibility for CCA oversight typically rests with the A/E. The A/E provides services to the owner through the design stage and usually continues to represent the owner during the construction stage, thereby allowing the A/E to maintain continuous involvement in both the design and construction processes.

1.2.1 Team Approach

The cumulative and coordinated efforts of the owner, the A/E, and the contractor, during design and construction, are the means that produce the end: the completed project, which is a facility. The success of the project is dependent on how well the participants understand their roles and responsibilities and those of the others, how well they carry out those roles, and how well they meet the expectations of the other participants. The success of the completed project is rarely the unilateral effort of a single team entity, but rather the conscious effort of the participants working as a team toward the common goal of a well-constructed project, completed on time and within budget.

The expectations that the owner, the A/E, and the contractor have of each other stem from responsibilities identified in the agreements, conditions of the contract, and specifications. Other expectations are based on a standard of care and basic moral obligations. Regardless of the source, these expectations affect the way the parties relate to one another during the construction process. If all participants acknowledge these expectations, then all should function as a team during the construction process.

1.2.2 Benefits to Working as a Team

There are many benefits to the project team's working together in harmony. These benefits may include:

- Better communication and coordination
- Increased productivity
- Reduced project costs
- Earlier project completion

- Improved project team morale
- Fewer claims and delays

When project participants work together as a team, the participants usually benefit from increased productivity. Increased productivity results from reduction in downtime while waiting for response to questions, resolution of disagreements, reduction in work that needs to be redone, and reduction in paperwork associated with claims and disputes.

Working together as a team may also result in reduced project costs for all participants. A cooperative approach by team members typically results in a reduction in the number of contract modifications and claims that occur. Reducing modifications and claims reduces the total cost of the project to the owner, reduces the labor and paperwork costs to the A/E and the contractor, and reduces the labor and material costs to the contractor by minimizing delays and confusion that reduce efficiency in advancing the work.

If delays and interruptions to the progress of the project are minimized, the contractor may be able to expedite project completion. Minimizing the number of conflicts and problems that need to be resolved allows the contractor to concentrate on scheduling and efficiency, which may facilitate the contractor's efforts to complete the project in the shortest time possible. The project develops a positive momentum. This benefits all team participants by reducing overhead costs and allowing them to move on to other projects.

When project participants feel that they are working together toward a common goal, rather than working against each other, the resulting positive attitude and sense of accomplishment can significantly improve the project. A positive outlook affects participants at all levels of a project. A positive outlook may result in better workmanship as workers are motivated to produce their best work, with a willingness among construction contract administrators and project managers to expedite the project progress, and encourage cooperation among trades in completing the work with fewer conflicts. High morale on a project team also promotes a sense of personal pride and a stake in creating a successful project.

On a project where the participants have a sense that they are working together for the common good, the participants are often willing to work together to resolve conflicts and develop creative solutions to the problems that inevitably arise. They are also far more likely to contribute to solutions than increase or create conflicts.

1.2.3 Obstacles to Working as a Team

There are obstacles inherent to every project. How the project team members manage these obstacles may affect how successful the project will be. These obstacles may include:

- Adversarial relationships/personalities
- Incomplete or inaccurate contract documents
- Unreasonable schedule requirements
- Unplanned or inordinate number of changes to the project scope
- Labor issues
- Delays in product fabrication or delivery
- Poor communications
- Delays caused by ineffective management

Each project brings together a different construction team, the members of which may not have worked together before. Personality conflicts may stand in the way of getting the project completed. It is important to maintain a professional demeanor at all times, removing personality differences and focusing on resolving issues to get the project completed. Sometimes this may require involving alternate people in the project to work through a specific problem.

Incomplete or inaccurate contract documents require additional time and effort on the part of project participants, and progress may be delayed while interpretations or revisions are being prepared. Contract modifications are typically required to resolve issues resulting from incomplete or inaccurate contract documents. The time and effort required to prepare and respond to the contract modifications may distract project participants from concentrating on the project. Negotiating price and time revisions often result in disagreement or conflict.

Unreasonable schedule requirements often result in conflict between project participants. If participants are not allowed a reasonable period of time to complete their work, they may incur costs and inefficiency because of increased crew size or overtime work, may cut corners to appear to maintain the schedule, and may utilize means and methods that produce the quickest result rather than the desired result. Proper work sequencing may be set aside to increase productivity in order to make up time. These occurrences may negatively impact the completed facility.

Unplanned, extensive, or an excessive number of changes to the project scope requested by the owner may result in incomplete or inaccurate contract documents and, when combined with unreasonable schedule requirements, may have a negative effect on project participants. The A/E's agreement with the owner is normally modified to include additional services necessary for design or redesign, modification of the contract documents, and extended or reduced CCA. Change orders for modifications to the contract price, contract duration, or both need to be processed. These changes also impact purchase orders and scheduling, and usually result in a higher cost to the owner than if the changes were originally incorporated into the contract documents.

Labor issues, including contract negotiations, walkouts, slowdowns, and strikes, may delay completion of a project. Depending on the nature and duration of the labor issue, the contractor may need to work overtime or double shifts to make up for time lost during a labor dispute. This significantly increases the contractor's labor cost. The owner may also be required to extend the contract time equivalent to the duration of a labor dispute. An extension of the contract time results in increased overhead costs and may reduce a participant's ability to begin or continue work on other projects.

Delays in product fabrication or delivery create challenges to project completion. If products cannot be fabricated because of the unavailability of a certain material, an alternate product may need to be considered. Product substitutions increase the risk that an inferior product may be furnished in lieu of the product originally specified or selected, and increases the potential for installation conflicts when other participants proceed with related work based on the originally selected product. When delivery dates are not met, expedited shipping may be required to keep the project on schedule. In addition to increased shipping costs, delivery delays may adversely impact the performance of related work. Proper sequencing of the work may again be affected.

Poor communications and poorly followed communication procedures inevitably result in conflicts. Project participants need to follow the communication procedures included in the contract documents. To minimize the potential for future conflicts, oral communications should be documented in writing, with copies sent to the parties involved.

Ineffective management may delay project progress and completion through reduced efficiency, incorrectly ordered materials, poorly scheduled deliveries and installation, and lack of coordination of dependent construction activities. Ineffective management on the part of one or more participants can significantly affect the working relationship of an entire project team. When a project is ineffectively managed, unanticipated work may result in significant additional effort and project costs.

1.2.4 Team Building and Collaborative Effort

All projects benefit when the owner, A/E, and contractor work together in a collaborative effort. A collaborative effort includes an expressed commitment to proactive cooperation during the execution of the project. Each of the parties actively works to:

- Understand the extent of their contractual rights and responsibilities and effectively carry them out
- Work fairly, efficiently, and swiftly to solve problems through communication
- Act in an ethical manner

One such collaborative effort is known as partnering. The AGC states in *Partnering—A Concept for Success* that it strongly believes that all participants in the construction process need to work as partners. One of the primary benefits of this partnering process is that it increases the perception of all parties to the contract that they have the same common goals. Other benefits include:

- Reduced exposure to litigation through open communication and issue resolution strategies
- Lower risk of cost overruns and delays because of better time and cost control over the project
- Increased productivity and lower administrative costs because of elimination of defensive case building
- Increased opportunity for innovation through open communication and the element of trust, especially in development of value analysis changes and constructability improvements
- Increased opportunity for a financially successful project

Another collaborative effort is "Integrated Project Delivery," which is addressed later in this chapter.

Partnering develops a team-building process that creates mutual trust and respect for one another's respective roles in the construction process and recognizes the risks inherent with those roles. The team concept changes the attitude from "I-win-you-lose" to a "win-win" for the entire project team.

The partnering process:

- Sets ground rules for communication
- Establishes how problems will be addressed
- Identifies critical decision makers from each of the parties to the contract
- Often includes a mission statement for the project
- Often includes a written and signed pledge to work to resolve problems without conflict

It is important to note that partnering does not change the terms and conditions of the contract. For partnering to be effective, each member of the project team needs to participate in the partnering process, jointly establishing the project mission statement and partnering goals, identifying the issue escalation process, and mutually agreeing to the issues that will be important to the project and team members. The partnering concept attempts to make all team members partners in the process of constructing the project.

1.3 Understanding the Documents

A prerequisite to executing the work is a basic understanding of the documents used in construction. A basic introduction to construction documents and contract documents is stated in the *CSI Project Delivery Practice Guide.* Construction documents are defined as the written and graphic documents prepared or assembled by the A/E for communicating the project design for construction and administering the construction contract. Various documents constitute the contract documents that are the basis of the contract. Other documents are for reference, such as geotechnical data and surveys, and others are generated to carry out the requirements, such as shop drawings and test reports. Certain requirements used in the procurement of the construction contract may no longer apply once the agreement is signed and the contract is formed. These documents include procurement solicitations, instructions for procurement, bid security, and procurement forms. The *CSI Construction Specifications Practice Guide* explains how these documents are prepared. Understanding how they are prepared will provide a greater understanding of how to benefit from their use. The following is an abbreviated description of typical documents used in construction.

1.3.1 Contract Documents

These documents are listed and enumerated in the agreement and referred to in the conditions of the contract for the work to be performed. They are the documents that are a legal part of the contract and describe the work. The contract documents describe the proposed construction (referred to as the *Work*) that results from performing services, furnishing labor, and supplying and incorporating materials and equipment into the construction. Contract documents consist of both written and graphic elements and typically include the following:

Contracting Requirements These include contracting forms (agreement) and conditions of the contract (general and supplementary conditions, or owner furnished general or special conditions) as well as various named attachments and forms. Revisions, clarifications, and modifications are changes applicable to the contract documents such as addenda issued during the procurement process or change orders issued during the course of the work.

Specifications These include specific written requirements for the work. Specifications define the quality requirements for products, materials, and workmanship upon which the contract is based and establish requirements for administration and performance of the project. They are generally written for each work result as sections and organized by divisions using *MasterFormat*®.

Contract Drawings These include large graphic illustrations of the physical form of the work to be performed. The drawings are graphic representations of the work upon which the contract is based. As the graphic documents usually contain more than plan views, the preferred term is *drawings* rather than *plans.* They show the quantitative extent and relationships of elements to one another.

The contractor signing the agreement with the owner has the responsibility of accomplishing the work in accordance with the contract documents. Therefore, the contract documents are addressed only to the contractor; however, owner and A/E responsibilities are also included within these "contract documents." Contracting requirements and specifications are usually bound into the *project manual.* Contract drawings are generally bound separately because of their larger size.

There are several types of drawings, reports, and specifications that may be utilized during construction but may not be included with the contract documents. These may include surveys, hazardous material reports, assessments, and geotechnical data.

1.3.2 Drawings

Various drawings represent information about the work to be performed. As indicated in *The CSI Project Delivery Practice Guide* they illustrate relationships between elements as well as quantities, locations, dimensions, sizes, shapes, and forms of the elements and assemblies in the project. Paper drawings are two-dimensional by their very nature. Certain types of specialized views can show elements in isometric or perspective views, but one cannot see every view possible. The current limitations of single views leave many portions of the work unseen. Communicating the information accurately may require multiple views. Understanding how drawings are prepared and the types of information shown is a major aspect of interpreting the information.

Plan views are drawings that show the horizontal layout, as if one is looking down on the subject. This view does not usually convey information about the vertical dimensions. Other views such as elevations, sections, and profiles give a view looking perpendicular to the horizontal plane. These basic types of views require the user to mentally compare the two views to understand what is happening in the three dimensions of space. It is somewhat difficult to understand how far an element extends if it does not appear at the plane in which the view is drawn.

Fitting the various views together is like doing a jigsaw puzzle. To further explain various conditions, details are drawn as if the element were sliced or viewed at a particular location. These details indicate more specific information and may be considered representative of unique conditions or typical of most conditions.

Understanding what exists in the space indicated by the drawings leads to a consideration of the sequence necessary to carry out the work. The means, methods, and techniques are in the contractor's control and the efficiency is a result of ingenuity and timing of each activity.

Various types of views and drawings prepared by various professional disciplines are associated with stages of the facility life cycle.

1.3.2.1 Resource Drawings

These are the drawings furnished during the procurement stage that generally show existing conditions such as roads, buildings, and current construction circumstances. These

may be drawings that were prepared for the construction of existing facilities. Drawings of this nature rarely show exact as-built conditions and may be record drawings from the previous contractor. Resource drawings are generally furnished for reference only and are not contract documents. Resource drawings may also include items such as owner-furnished and -installed equipment that requires utility rough-in locations or attachment requirements.

1.3.2.2 Contract Drawings

Contract drawings are those named in the agreement and can be supplemented by various forms of interpretations and modifications including small-size sketches. These drawings document the work to be performed. They may show work to be removed and work to be constructed. They help to establish the extent of the work and are complementary with the specifications. The contract documents are interrelated and they provide different types of information required to carry out the work.

1.3.2.3 Shop Drawings

These are drawings that are prepared by manufacturers, suppliers, subcontractors, and contractors to illustrate a portion of the work. Only shop drawings required by the specifications are normally reviewed and acted on by the A/E. These drawings usually illustrate proposed details and techniques to show compliance with the contract documents. Shop drawings may include dimensions obtained at the project site showing how the specialized work will be incorporated into the project. Shop drawings, regardless of approvals, are not contract documents and do not waive requirements of the contract documents.

1.3.2.4 Coordination Drawings

Information provided by various subcontractors and the contractor are brought together to coordinate utilization of limited space. Information on the contract drawings may be diagrammatic, with single lines indicating general locations. Coordination drawings are drawn with actual (scale) dimensions of the elements. These drawings help determine how elements will actually fit in the space available. Without coordination drawings, the installation of each element may require that the next element fit in the remaining space. Frequently, this creates a problem that is extremely difficult to rectify requiring elements to be repositioned. Coordination drawings, regardless of submission or approval by the A/E, are not contract documents.

1.3.2.5 Record Drawings

The contract documents may require record drawings. Often the contractor marks up the contract drawings to indicate changes and field conditions. The contract documents indicate the type of information required to be included on the record drawings. Concealed conditions and utility locations are the most common information required. These record drawings are submitted through the A/E to the owner as a permanent record of the actual conditions of the completed work.

1.3.2.6 Electronic Models

As technology continues to evolve, some traditional locations of facility information are changing. Building Information Modeling (BIM) uses computer programs to document

facility design, to simulate construction, and to simulate facility operation. BIM is more than 3D modeling of facilities and components with the traditional information typically found in contract drawings. A BIM database can be an intelligence-rich model that allows extraction of graphical and data information. BIM is beginning to incorporate some traditional specification and product-specific information into the model. For example, a BIM database may contain information on doors at the specific door location. The door may be identified by size, type (metal, wood, aluminum, and glass), fire rating, finish, and hardware set.

BIM allows design and construction team members to collaboratively embed intelligence into the model in order for personnel to concentrate on design and problem-solving tasks while allowing the computer to perform tasks such as quantity take-offs for cost estimating or product ordering, clash detection, scheduling, and quality assurance.

1.3.3 Specifications

Specifications, in general, can include various types of data; however, the specifications included as a part of the contract documents are the written description of the work to be performed by the contractor and are prepared by the A/E. The specifications may be simple notes on a drawing or more detailed descriptions bound in the project manual. The specifications are typically organized in accordance with the Construction Specifications Institute (CSI/CSC) *MasterFormat*® and the three-part *SectionFormat*™. *MasterFormat*® establishes the organizational structure for the documents and sections within a project manual, each with its unique number and title. A section is further divided into the three PARTs defined in *SectionFormat*™.

MasterFormat® is organized into 50 divisions. Division 00 contains procurement and contracting requirements. Divisions 01 through 49 contain the specifications. The specifications group of divisions is further divided into major subgroups. These include:

- General Requirements Subgroup—Division 01
- Facilities Construction Subgroup—Divisions 02 through Divisions 19
- Facilities Services Subgroup—Divisions 20 through 29
- Site and Infrastructure Subgroup—Divisions 30 through 39
- Process Equipment Subgroup—Divisions 40 through 49

Division 01 specifies the general requirements consisting of administrative, procedural and temporary facility requirements that apply to the entire project. Divisions 02 through 49 contain the "work results" sections generally consisting of materials, products, systems, or assemblies and their installation.

SectionFormat™ establishes a consistent structure for information, making it easy to locate and understand. The parts separate the information into groups that indicate general information, products, and the execution of work. Certain product specifications may be written in a proprietary or descriptive manner, while others are based on reference standards or performance requirements, or a combination of methods. These specifications, and not those of the manufacturer, are a part of the contract documents.

A good understanding of the structure of specifications and the individual sections greatly aids in administrating the work. For example, PART 1—GENERAL of the specification further defines and establishes administrative items that are related to Division 01—General Requirements. This part includes submittals and other items of procedural

matters. PART 2—PRODUCTS contains specifics about the products to be utilized, while PART 3—EXECUTION gives preparatory information and requirements for installation, application, or erection of the products specified in PART 2.

Other types of specifications and standards, not bound in the project manual, may include those of organizations such as ASTM International, American Association of State Highway and Transportation Officials (AASHTO), and National Electrical Manufacturers Association (NEMA). Specifications and standards by these organizations may be contract documents if they are incorporated into the contract specifications by reference to specific standards.

Manufacturers develop data sheets that give specifics about their products. These product data sheets may be required as a submittal to provide evidence of the kind and quality of products being furnished by the contractor. These data sheets are like shop drawings and are not contract documents. Manufacturers may also develop guide specifications specifically for their products to assist the A/E in preparing project specifications.

Record specifications are similar to record drawings in that they utilize contract documents, which are then marked by the contractor to indicate actual conditions such as the products provided during the construction stage.

1.3.4 Revisions, Clarifications, and Modifications

Precontract revisions include revisions made prior to signing the agreement. Addenda are written or graphic information issued to clarify, revise, add to, or delete information in the original procurement documents or in previous addenda. Typically, an addendum is issued prior to the receipt of bids or proposals. Other revisions may include bid or proposal revisions when permitted. Addenda items affecting the contract documents are contract document revisions and should be enforced during the administration of the contract.

Clarifications and proposals include documents initiating changes or clarifications that have not been incorporated into the contract by formal contract modifications. These documents include requests and proposals.

Contract modifications include modifications after the construction agreement has been signed and may include additions to, deletions from, or modifications of the work to be done. These are accomplished by change orders, change directives, and minor changes. These can be issued at any time during the contract period.

Revisions, clarifications, and modifications are addressed in greater detail in Chapter 8, “Interpretations and Modifications.”

1.4 Administering Construction Based on Delivery Methods

Although there are many similarities, the CCA and contractor project management processes vary with the project delivery method selected for the project. A comparison of CCA and contractor project management requirements based on project delivery method follows.

1.4.1 Design-Bid-Build and Design-Negotiate-Build Project Delivery

The most common form of construction contracting is the single prime contract. It involves negotiation or competitive bidding for a single construction contract, incorporating all work required to complete the project. Many people consider design-bid-build (D-B-B) to be the traditional method of construction contracting. Typically, an owner hires an A/E who designs the project with the help of consultants and makes the project available for bid. Contractors submit bids to construct the project, and generally the qualified bidder with the low bid is awarded the project. After the project is awarded, the contractor constructs the project. CCA services are typically performed by the A/E as part of the basic services agreement with the owner. Communications normally flow from the owner to the contractor through the A/E. Contractor project management is provided by one or more contractors, depending on whether a single-prime contract or a multiple-prime contract is used. Depending on the size and extent of the project, contractor project management services may be performed by a project superintendent, a project manager, or a team of personnel, each responsible for different aspects of the contractor's project management responsibilities. Standard AIA and EJCDC, document forms are frequently used for the D-B-B and design-negotiate-build (D-N-B) project delivery methods.

The A/E is typically responsible for:

- Representing the owner during the construction stage
- Observing the work for conformance with contract requirements
- Observing project progress for review of contractor applications for payment
- Preparing and recommending contract modifications
- Attending project meetings
- Inspecting the project to determine substantial and final completion

In addition to CCA services typically performed by the A/E, the owner is typically responsible for:

- Making periodic payments to the contractor
- Approving contract modifications involving changes to contract time or price

The contractor typically has a project manager on staff to handle contractor project management responsibilities. These responsibilities may include:

- Preparing applications for payment
- Administering subcontracts
- Purchasing
- Preparing, monitoring, updating, and revising project schedules
- Attending project meetings
- Communicating with the A/E and subcontractors
- Preparing proposal requests and responding to A/E issued contract modification proposals
- Preparing and implementing safety programs
- Requesting clarifications and interpretations of the contract documents
- Administering the submittal process

A variation of the design-bid-build project delivery method is the design-negotiate-build project delivery method. The main difference is that in the D-N-B project delivery method, the project is not put out for bids from contractors. The contractor still goes through the process of developing prices for the project, just as if bidding. Whereas the D-B-B project delivery method typically utilizes lump-sum or unit cost contracts, projects with D-N-B project delivery frequently use contracts with a cost of the work plus a fee and sometimes include a guaranteed maximum price (GMP). The administrative responsibilities of the owner, A/E, and contractor on projects with D-B-B and D-N-B project delivery are similar. If cost plus a fee or time and material pricing is utilized, the contractor is typically required to submit to the A/E and owner records of actual costs incurred with the contractor's applications for payment.

D-B-B and D-N-B project delivery methods usually involve a single contract but may involve administering multiple-prime contracts. Multiple-prime contracts are generally associated with the construction management project delivery method. If a construction manager is not involved, the owner may be required to administer and coordinate the contracts.

The size and extent of the project will affect how each contractor performs its contractor project management services. The number of other projects being constructed by the contractor will also affect how the contractor will perform contractor project management services. For each contract, the contractor may utilize a superintendent, a project manager, or a team of persons to manage its contractor project management responsibilities.

1.4.2 Construction Management Project Delivery

Construction management services are often provided in one of two basic forms: construction manager as constructor (CMc), sometimes known as construction manager at risk, and construction manager as adviser (CMa). The CMc is effectively the contractor and provides contractor project management services, guarantees the cost of construction, and signs subcontracts for most or all of the construction work. The CMa usually divides the project into multiple contracts for procurement and award of contracts. The CMa provides management services to the owner and usually includes consolidating applications for payment and coordination among contracts. A construction manager may also provide construction expertise, cost estimating experience, and scheduling services to the A/E during the design stage of a project.

When using the multiple-prime contracts, the owner (when CMa is used) or the construction manager (when CMc is used) enters into a separate contract with each prime contractor. CCA responsibilities for multiple-prime contracts may be very similar to those for a single-prime contract, except that the A/E is now administering several contracts. Record keeping and information processing increase with the number of separate prime contracts, as does the importance of coordination. The key to success in multiple-prime contracts is coordination among the prime contractors. The A/E needs to understand and ensure the performance of the responsible party to coordinate the contracts. Communication still flows from contractors through the A/E and CMa or CMc to the owner.

CCA and contractor project management in a construction management contract depends on the form of construction management to be provided. If the construction manager acts as an agent or adviser to the owner and does not perform construction, the construction manager provides certain CCA functions.

In CMa, the construction manager provides some of the CCA services typically provided by the A/E. These services may include:

- Representing the owner during the construction stage
- Observing project progress for review of contractor applications for payment
- Reviewing and approving contract modifications
- Attending project meetings
- Serving as the communication link between the A/E and the contractor

Refer to standard documents, such as AIA Document A232, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition.

In acting as the CMa, the construction manager provides all of the CCA services typically provided by the owner and may provide many of the CCA services typically provided by the A/E. With CMa, the contractor project management responsibilities and procedures are similar to those required for a D-B-B delivery method, except the contractor communicates with the owner and A/E through the CMa, rather than communicating directly with the A/E.

When the construction manager acts as the contractor, the owner may retain the A/E for CCA services. In CMc, contractor project management services provided by the construction manager are similar to the contractor project management services typically provided by the contractor. The CMc's responsibilities may include contracting, purchasing, and supervising of construction by guaranteeing the cost of the project and signing subcontracts, acting as the contractor rather than as an adviser. In a CMc project, contractor project management services are typically performed by a project manager or team, rather than by the project superintendent. Refer to AIA Document A133, Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the work Plus a Fee with a Guaranteed Maximum Price.

Unless clearly identified in the owner–construction manager agreement and the contract documents, the responsibility for administering the contract can be confusing. Standard AIA, EJCDC, ConsensusDOCS, and CMAA documents are frequently used for the construction management project delivery method. These standard documents define the responsibilities of each party and their lines of communication.

1.4.3 Design-Build Project Delivery

As project cost control and speed of delivery have become more important, the design-build (D-B) method of project delivery has become more popular. In the D-B project delivery method, the owner contracts with a single entity, the design-builder, to design and subsequently to construct the project. The design-builder may have a contract with an independent A/E for design services, or may provide A/E services as part of a D-B company. The significant difference is that the A/E services are provided for the design-builder, rather than the owner. Standard AIA, DBIA, ConsensusDOCS, and EJCDC contract document forms are frequently used for the D-B project delivery method.

The distinction between CCA services and contractor project management services may become blurred in a D-B contract because the design-builder may be providing both types of services. The owner (or its administration professional) typically retains some of the CCA responsibilities, such as verifying project progress prior to making periodic

payments to the design-builder, but many of the CCA responsibilities that would typically be performed by the A/E or construction manager are typically performed by the design-builder. The responsibility for performing CCA and contractor project management services may also vary depending on whether the design-builder is a single entity or a joint venture between a contractor and an A/E. The responsibility for performing CCA and contractor project management services needs to be clearly addressed in the agreement between the owner and the design-builder and in the agreements between the design-builder and the contractor (if applicable) and A/E. CCA and contractor project management services in a D-B contract are typically provided in one of the following two ways:

1. A member of the D-B team is assigned to administer the contract and is responsible to the design-builder. This member's duties may be significantly modified from the usual form of CCA under a single-prime contract.
2. An administrative professional may be retained by the owner to represent the owner's interests during construction. The agreement between the owner and design-builder stipulates the responsibilities of this administrative professional performing CCA so the design-builder knows how to conduct the design-builder's communications and process submittals during construction.

This delivery method provides the owner with one company to deal with from design through construction. However, because the A/E works for the design-builder rather than the owner, the owner may need to provide some of the CCA services that would be typically performed by the A/E on a D-B-B project. These services may include:

- Observing the work for conformance with contract requirements
- Observing project progress for review of design-builder applications for payment
- Reviewing contract modifications

Because the A/E's contractual relationship is with the design-builder rather than with the owner, the A/E may often be in the position of making recommendations to the design-builder rather than the owner. In addition to CCA services required by the A/E's agreement with the design-builder, the A/E is required to provide services as set by state licensing regulations.

A design-builder without a separate agreement with a contractor typically assumes responsibility for the contractor project management services. In addition, through the design-builder's agreement with the A/E or through A/E on staff, the design-builder is typically responsible to the owner for many of the CCA services performed by the A/E. Because management services of the contractor and administrative services of the A/E are being provided by the design-builder, these services may be performed more expediently and with fewer personnel.

1.4.4 Owner-Build Project Delivery

When the owner-build (O-B) project delivery method is utilized, the owner provides many of the contractor's project management services, and a layer of management is eliminated. Depending on the extent of the project, the owner may retain an A/E for design services and for obtaining required permits for the project. The A/E's CCA

services during the construction stage are at the direction of the owner. Depending on the level of participation desired by the owner and included in the owner-A/E agreement, the A/E might be very involved in the construction stage, even assuming responsibility for conducting the owner's communications with contractors and suppliers. At the opposite extreme, there may be no formal CCA at all, other than that required by A/E licensing laws. Typical documents for the O-B delivery method are owner specific and may not be based on standard documents such as those from AIA or EJCDC. These documents may be prepared directly by the owner or the facility manager.

The administrative procedures required when the O-B project delivery method is used may be greatly reduced from those required under the D-B-B or D-B project delivery methods. Because the owner is providing contractor project management services, this will likely reduce requirements for submittals, approvals, and similar activities. Procedures for addressing construction modifications are also greatly simplified. Standard AIA and EJCDC contract document forms can be modified for use for the O-B project delivery method.

1.4.5 Integrated Project Delivery

Integrated project delivery (IPD) requires early collaborative contributions during the design phases of what are traditionally late applications of expertise. Contractors, facility managers, subcontractors, manufacturers, and suppliers become involved with the design team in the design process. Decisions are usually made based on the appropriate solutions for the project and the owner's needs rather than solely on first cost. The early involvement of more "team members" creates synergy and allows the project to yield the highest potential of good design and construction solutions meeting the owner's requirements. As stated in the American Institute of Architects (AIA) and AIA California *Integrated Project Delivery: A Guide,* IPD practices

> … integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction.
>
> In the Construction phase, the benefits of the integrated process are realized. For architects under traditional delivery models, construction contract administration is considered the final stage of design—the last chance to address issues and achieve solutions. But in Integrated Project Delivery, the design and its implementation are finalized during the Detailed Design and Implementation Documents phases. Thus, construction contract administration is primarily a quality control and cost monitoring function. Because of the greater effort put into the design phases, construction under IPD will be much more efficient.

A collaborative effort in the IPD method allows for coordinated documents. Since much of the work that has been traditionally performed during construction has moved forward into the design phases, CCA should be simplified. For example, a particular manufacturer or supplier may have had input during design and their product information may have been incorporated into the documents. Therefore, review of submittals may be eliminated except to verify that an item that was documented in the documents is in fact furnished and installed into the project.

1.5 Construction Contract Administrator

CCA usually begins when the owner-contractor agreement is executed and concludes when final payment is accepted by the contractor. Under special circumstances, CCA services may begin during the procurement stage of a project, and may extend to the expiration of the correction period. The actual start and completion times of CCA services vary, depending on the specific requirements of the contracts between the A/E and the owner and between the contractor and the owner. The start and completion milestones of construction, as identified by the AIA and EJCDC documents, will identify the duration of CCA—that is, beginning with execution of the owner-contractor agreement and ending with acceptance of final payment by the contractor.

A construction contract administrator should:

- Be a team member and be able to effectively represent the interests of the owner, the A/E, and the A/E's consultants. In many ways the construction contract administrator is an extension of a good design team.
- Have good communications skills.
- Know the contents of the owner-A/E and the owner-contractor agreements.
- Know and understand the project forms to be used for the project, particularly the conditions of the contract, and the underlying principles of contract law upon which they are based.
- Have a working knowledge of construction materials, construction trades, means and methods, and the relationships between subcontractors, suppliers, and manufacturers.
- Understand the codes and regulations that govern the project.
- Be open-minded, fair, and responsive.

CCA services are usually provided as part of the A/E's basic services. The individual responsible for the CCA may be the A/E or a member of the A/E's staff, or, in the case of large firms or large projects, CCA may be provided by a full-time project representative. The term *A/E* is used when referring to a construction contract administrator because the service is most often provided by the A/E.

There are individuals who provide CCA as a specialty service. They work as consultants to the A/E when CCA is performed as part of the basic A/E services, or as a consultant to the owner when the owner has assumed responsibility for some or all of the CCA services. In some instances, CCA responsibilities may be split between the A/E and a CCA consultant. In either case, careful attention to the division of responsibilities and coordination between the A/E and the CCA consultant is necessary.

When the owner is a large corporation, a developer, or a governmental or public agency, CCA may be provided by the owner's staff, either to supplement or to replace the A/E. Because the A/E creates the contract documents, there should be a clear understanding of who will interpret those documents during construction and who is responsible for verifying conformance to the contract requirements. A/Es must understand their responsibilities under state licensing laws to ensure that they have not relinquished services that they cannot legally divest.

CCA services are sometimes provided by third parties. Lenders may have a contract administrator to ensure that the lender's interests are being protected. The lender's contract administrator's duties may consist of attesting to the quality of completed work and the quantity of work in place to substantiate monthly payment requests. A municipality may have a contract administrator on the site to document certain construction activities or ensure proper coordination with municipally owned infrastructure. Regardless of the variation employed, the agreements among the parties to the contract acknowledge the various roles and identify their responsibilities.

CCA is not the same as construction management. The construction manager is an added participant in the process, who may be employed by the owner for preconstruction services, construction services, or both. CCA, on the other hand, is usually an integral component of the basic services agreement between the A/E and the owner.

1.6 Contractor's Project Manager

A contractor's project manager should:

- Be a team member and be able to effectively represent the interests of the contractor, subcontractors, suppliers, and the contractor's consultants. The contractor's project manager has primary responsibility for compliance with the requirements of the contract documents.
- Have good communications skills.
- Know the contents of the owner-contractor agreement, subcontracts, and purchase orders.
- Know and understand the standard forms to be used for the project, particularly the conditions of the contract, and the underlying principles of contract law upon which they are based.
- Have a working knowledge of applicable safety regulations and understand the importance of maintaining the contractor's safety program.
- Have sufficient training in cost accounting, budgeting, and construction scheduling to be able to monitor and report the project's budget and schedule status.
- Have a working knowledge of construction materials, construction trades, means and methods, and the relationships between subcontractors, suppliers, and manufacturers.
- Understand the codes and regulations that govern the project.
- Be open-minded, fair, and responsive.

Many of the duties of the contractor's project manager are similar to those of the construction contract administrator. It is important to note, however, that the construction contract administrator represents the owner on the project, while the project manager represents the contractor. Each is responsible for contract compliance by its respective party to the contract.

It is advisable that personnel who serve in either of these capacities have appropriate training, supplemented by sufficient field experience.

1.7 Owner's Project Manager

An owner's designated representative is the individual identified by the owner in writing as having the legal authority to bind the owner to decisions being made during construction. The designated individual is often the owner's project manager, but may have different titles. The owner's project manager should:

- Be a team member and be able to effectively represent the interests of the owner.
- Have good communication skills.
- Know the content of the construction documents.
- Know and understand the project forms to be used for the project, particularly the conditions of the contract, and the underlying principles of contract law upon which they are based.
- Have a working knowledge of construction material, construction trades, means and methods, the construction process, and the relationship between subcontractors, suppliers, and manufacturers.
- Be open-minded, fair, and responsive.

The owner's responsibilities during construction will be defined in the agreement and also included in the conditions of the contract. Many owners have limited roles during construction. Typical responsibilities include:

- Making payments
- Signing change orders

However, sophisticated owners with experience in construction activities have more active roles. The owner's role in CCA is determined on a project basis, and there is not a "normal" role model.

Chapter 2
Roles and Responsibilities

The contract documents establish the roles and responsibilities for construction contract administration (CCA). The CCA and contractor project management processes require participants to:

- Know the documents used in construction
- Understand the role of each construction participant
- Be sensitive to the expectations each participant has of the others
- Communicate with each other
- Understand the effect various project delivery methods have on construction contract administration and contractor project management

Effective construction contract administration and contractor project management procedures provide:

- A system of documentation and monitoring of construction activities to assure the owner that the provisions of the construction contract are being reasonably fulfilled
- Continuity of architect/engineer (A/E) involvement in submittal reviews, document interpretations, and construction evaluation
- A structure for the contractor to organize contractor project management procedures and ensure a common understanding of the lines of communication among all participants

The contract documents identify the procedures for communicating during construction, but unless the parties to the contract fully understand their roles, the communication process will not be totally effective. The A/E, owner, and contractor are responsible for understanding the various roles, as identified in the general conditions or modified by the supplementary conditions, and for enforcing the communication protocol.

The procedures utilized by the project participants during the construction stage vary, depending on the project delivery method being utilized.

2.1 Owner

Whereas the owner typically places much of the CCA responsibility on the A/E, the owner also has several important rights and responsibilities during the construction phase. Refer to Figure 2.1. Some of these rights and responsibilities are described as follows:

- Provide information to the contractor.
- Pay for fees and charges associated with the work.
- Make payment to the contractor.
- Stop the work for good cause.
- Carry out the work on the contractors behalf should that become necessary.
- Perform construction with own forces if necessary.
- Award separate contracts and coordinate work between those contracts if necessary.
- Clean the project should that become necessary.
- Partially occupy the project if desired.
- Terminate the contract without cause should that become necessary.
- Terminate for cause.

Figure 2.1
Owner Responsibilities and Rights

Providing Information to the Contractor The contractor is entitled to several items of information only the owner can provide, such as a statement or affidavit indicating financial commitment to the project. By executing the agreement, the owner implies that financing has been arranged and the project is ready to begin. The owner may also be required to provide surveys, utilities, legal descriptions, and geotechnical investigations of the site. The owner's agreement with the contractor implies that the owner has responsibility for the site and the project can legally be constructed. In that same regard, easements and assessments are the responsibility of the owner during construction.

Payment of Fees and Charges Associated with the Work The owner is responsible for securing and paying for approvals, easements, assessments, and other charges required for the project and beyond those for which the contractor is responsible.

Making Payment to the Contractor Periodic and timely payments to the contractor are stipulated in the agreement between the owner and the contractor. Under certain circumstances, the owner also has the right to withhold payments.

Right to Stop the Work A significant right of the owner during construction is the right to stop the work for good cause. This responsibility cannot be delegated to the A/E.

Right to Carry Out the Work If the contractor defaults or neglects to perform the work according to the terms of the contract documents, or fails to commence work within a stipulated period of time, the owner has the right to terminate the contract and complete the project by other means.

Right to Perform Construction The owner may perform construction with the owner's own forces, but in such cases the owner is responsible for coordinating the work of the owner's forces with the contractor's work and schedule.

Right to Award Separate Contracts The owner has the right to award separate contracts. The owner is also responsible for coordinating the activities of the various contractors, unless this responsibility is contractually delegated to a construction manager or one of the contractors. However, the owner needs to be aware of potential impacts of engaging separate contractors that may result in jurisdictional labor disputes.

Right to Clean If the contractor does not maintain the project site free from waste materials and rubbish as required by the contract documents, the owner may, after written notification to the contractor, clean the site and receive reimbursement for the cost of the cleaning by adjusting the contract amount with a deductive change order.

Right to Partial Occupancy The owner may occupy a portion of the project if agreed to by the contractor and the authorities having jurisdiction (AHJs). However, partial occupancy does not constitute acceptance of work not complying with the contract documents.

Termination for Convenience The owner may terminate the contract without cause. Refer to the conditions of the contract for the procedures of termination.

Termination for Cause The owner may terminate the contract if the contractor fails to perform in accordance with the contract documents. Refer to the conditions of the contract for procedures of termination.

If the owner chooses to exercise any of the rights included in the preceding list, the owner should take care to adhere closely to the procedural processes outlined in the conditions of the contract, including requirements for proper and timely notification of the affected parties.

The owner's daily involvement in the project is influenced by several factors:

The Level of Involvement by the A/E's Construction Contract Administrator If the A/E has a project representative who is on-site daily, monitoring the work, then the owner may not need to visit the site on a daily basis.

The Type of Project Public works contracts often have an owner's representative on-site daily. This individual acts as an inspector, examining the contractor's work for compliance with the contract documents, monitoring and recording the work in progress, recording payment quantities, and performing a variety of other duties.

The Owner's Representative May Attend Project Meetings As the owner's representative, this individual may be able to answer questions raised by the contractor and presented to the A/E.

The Level of Authority that the Owner's Representative Has When On-site These responsibilities should not usurp those of the A/E and vice versa.

On some projects, the owner or A/E may have an individual who performs more of a monitoring function. This individual is often known as a *clerk of the works.* A clerk of the works does not typically make decisions on the owner's behalf, but rather, acts as an information conduit and reporter. The clerk may transmit correspondence to and from the A/E to the contractor, record the work that is done by the contractor each day, collect and record information for payment purposes, verify that buried items have been recorded on record drawings, and report to the owner and A/E occurrences that may impact the timely completion of the project.

Ideally, the facility manager is involved in the construction stage as part of the owner's team. Involvement in the construction stage of the project allows the facility manager to:

- Observe construction of the facility for which it will be responsible
- Become familiar with the means and methods employed by the contractor
- Become familiar with the location of concealed items, such as piping, conduit, cabling, and structural connections
- Participate in decision making regarding contract modifications

2.1.1 Role of Facility Manager

The facility manager's role and responsibilities are closely tied to project conception and planning for future facility needs. As a key member of the owner's strategic planning team, the facility manager is usually charged with long-term facility needs forecasting.

Facility managers are typically involved in the development of master plans for facilities and properties, as well as budget projections for proposed projects. They frequently serve as lease managers for the owner's rental properties and are charged with tenant relations. The facility manager's responsibilities might include space planning, utilization studies, and space inventory and allocations. The facility manager might also be the owner's designated representative in work with independent developers, development consultants, or real estate agents to meet the owner's facility needs. In addition, the facility manager might be in charge of minor capital projects in the same location as contracted work and services. It is not unusual to find architects, engineers, construction managers, and related professionals on the facility manager's staff. This presents a unique opportunity and challenge, as in-house expertise might be closely involved in the evaluation of project progress.

The facility manager might be assigned to manage support services in related areas such as security, mail service, telecommunications and information technology, parking, fleet management, and transportation.

2.1.2 Participants' Expectations of the Owner

The owner needs to understand that the contract documents are not perfect and that changes are to be expected during construction. It is important for the owner to provide a reasonable contingency fund in the project budget to cover such situations. The A/E and contractor expect full disclosure of all information as required by the contract documents so that they may perform their contractual responsibilities. The owner, or an authorized agent of the owner, is expected to be accessible for decisions or consultation. The owner is also expected to promptly process payments, modifications, and other documents requiring the owner's approval. The owner is expected to be reasonable and to not adversely affect the progress of the project or administration of the contract by making demands beyond the intent of the documents.

The contractor expects the owner to have the necessary financial resources to make prompt progress payments and to fund the costs of changes. The contractor also expects the owner to be reasonable and fair in the owner's interpretation of the scope of the work under contract as represented by the drawings and specifications. The owner is also expected to promptly process approvals and to understand that modifications to the contract documents may involve a consideration of both time and money. The contractor relies on the owner's information about the site. The contractor also expects the owner to understand the owner's responsibilities during a partial occupancy of the facility. The owner and A/E are expected to be reasonable in determining substantial and final completion.

2.2 Architect/Engineer

Most standard owner-A/E agreements require the A/E to administer the construction contract. Refer to Figure 2.2. Typical A/E responsibilities are to:

Represent the Owner. The A/E is the communication link between the owner and the contractor and will advise and keep the owner informed during the construction

- Represent the owner.
- Observe the work and be generally familiar with its progress.
- Certify/recommend the validity or contract compliance of an item or work.
- Interpret the contract documents.
- Resolve disputes.
- Modify the contract documents should that become necessary.
- Review submittals.
- Perform inspections of the work.

Figure 2.2
Architect/Engineer Responsibilities

process. The A/E has authority to act on the owner's behalf in matters specifically identified in the agreement. However, only the owner can commit the owner's funds. As an additional service, and only if required by the owner, the A/E may provide more extensive or full-time project representation. The role of a project representative is usually to represent the A/E, full-time, during the course of construction and typically involves many responsibilities beyond the basic services of construction contract administration described by standard general conditions.

Observe the Work The A/E is responsible for being generally familiar with the progress of the work and to determine, in general, if the work is being provided according to the contract documents. The A/E is responsible for observing the quality of the work and for protecting the owner from defects in the work. In that capacity, the A/E has the authority to reject work not conforming to the contract documents but does not have the authority to stop the work of the contractor.

The role of the A/E also applies to witnessing the tests, required by the contract documents, when A/E presence is specified. These observations are to be made on a timely basis when notified by the contractor. When authorized by the owner, the A/E may request additional tests. The A/E reviews the test certificates submitted by the contractor for compliance with the requirements of the contract documents.

An important distinction in the A/E's role as an observer is that the A/E does not have control over the work. Construction means, methods, techniques, sequences, procedures, project site safety precautions, and conformance to contract requirements are the sole responsibility of the contractor.

Certify/Recommend The legal ramifications of certifying are critical. To *certify* means to attest in writing or orally to the validity or contract compliance of an item, to assert as a matter of fact. There is an important distinction between standard American Institute of Architects (AIA) and the Engineers Joint Contract Documents Committee (EJCDC) documents on this point. The AIA documents require the architect to certify applications for payment and the date of substantial completion, whereas the EJCDC documents use the word *recommend,* which has a significantly different definition than does *certify.* To *recommend* is to commend to the favorable attention of another, such as the engineer's recommending to the owner to make payment to the contractor. To certify payment carries a higher level of responsibility.

Interpret Contract Documents The A/E is responsible for impartial interpretations of the contract documents and for interpreting and deciding matters concerning the owner or contractor under the terms of the contract. The A/E is also responsible for clarifying the contractual obligations of separate prime contracts. The decisions of the A/E are usually final for interpretations relating to aesthetic effect.

Resolve Disputes The A/E has traditionally been responsible for attempting to resolve disputes between the owner and the contractor under the terms of the contract.

Changes to the AIA Document A201 now allow the owner and contractor to designate an independent entity to be the "initial decision maker" (IDM) on claims. In the absence of a designated IDM, the A/E will retain this traditional role. All claims, even those alleging an error or omission by the A/E, need to be submitted to the IDM for action. The decision of the IDM may be subject to mediation or other means of dispute resolution under the terms of the contract.

Modify the Contract Documents The A/E has primary responsibility for the development of the contract documents and is usually responsible for initiating modifications to the contract. Modifications include review of product substitutions and the initiation of change orders, change directives, and minor modifications. Modifications are prepared and signed by the A/E, and dependent on the type of change, may be signed by the owner, the contractor, or both, and then become part of the contract documents.

Review Submittals Under the terms of the contract between the owner and the contractor, the A/E is responsible for reviewing certain submittals from the contractor. These submittals include shop drawings, product data, samples, test reports, and other types of informational submittals. At the conclusion of the project, the A/E usually reviews the record documents, operations and maintenance (O&M) data, and other closeout submittals before they are sent to the owner.

Perform Inspections As with *certify,* the term *inspection* has significant legal interpretations in construction and is distinct from construction *evaluation or observation.* The A/E usually conducts an inspection to determine the date of substantial completion and another inspection to determine final completion. Refer to Chapter 6, "Site Visits, Observations, and Inspections," for additional information.

2.2.1 Participants' Expectations of the A/E

The construction documents are prepared by the A/E, and an owner may expect them to be complete and without error—a difficult task given the complexity of today's projects along with time and budget constraints. From a practical standpoint, this is an unreasonable expectation and is not required by most owner-A/E agreements. The A/E is typically required to exercise reasonable care in preparing construction documents. During construction, the owner typically relies on the A/E for information on the progress and quality of the work. The A/E is expected to be knowledgeable and professional and to take a leadership role in the decision-making process. The owner relies on the A/E to design the project within a given budget and continue to be prudent during the construction stage to help complete the project within budget. The A/E is also expected to provide an evaluation of any proposed change orders to ensure that the extra costs are fair and reasonable.

The contractor expects the A/E to be fair and responsive in interpreting the contract documents. The contractor's ability to maintain the construction progress schedule depends heavily on the A/E's timely processing of submittals, applications for payment, modifications, and other items.

Subcontractors expect the A/E to process the contractor's applications for payment in a timely manner because their payment is often contingent on the contractor being paid. Subcontractors also expect the A/E to promptly process submittals and to communicate as well as act in a fair and timely manner when interpreting the contract documents.

Testing and inspection agencies expect the A/E to provide a clear definition of the services to be performed and to be present when tests are conducted if required by the

contract documents. Once the test results have been distributed, the testing agencies expect the A/E to promptly review the documentation and comment or request any further clarification or additional testing that is required.

The general public expects the A/E to protect the public health and welfare through the performance of normal services, including those provided during construction. Other participants, such as AHJs, sureties, and lending institutions, also have expectations of the A/E during the construction period. Some of those expectations are inherent in the contract documents, but others may be perceived responsibilities that the A/E should be careful not to assume. The A/E may be requested to inform sureties of the progress of a project, but do so only within legal limitations. Lending institutions may request the A/E to provide certifications that the A/E is not obligated to provide. The A/E should distinguish between items contractually required and those that others would like the A/E to assume. The A/E should resist assuming responsibilities beyond requirements of the owner-A/E agreement. Performing tasks that are not required by contract is not without liability.

2.3 Contractor

The contractor is responsible for accomplishing the work and for the contractor project management process. The conditions of the contract list the basic responsibilities of the contractor. Refer to Figure 2.3 for a listing of those responsibilities, and note the large number that relate to the contractor project management process. Standard owner-contractor agreements typically require the contractor to conform to the construction contract, including the following tasks:

- Review contract documents and notify the A/E of any errors or omissions as soon as they are observed
- Follow procedures for substitution of products as specified in the contract documents

The following list is an outline of the typical responsibilities of the contractor during construction. The list combines and condenses many responsibilities. Refer to AIA Document A201 or EJCDC C-700 for full descriptions.

- Review contract documents and notify the A/E of any errors or omissions.
- Follow procedures for substitution of products.
- Furnish competent supervision.
- Maintain accessible current construction documents for use on the project.
- Schedule and coordinate material deliveries and subcontractor's work.
- Indemnify and hold harmless the owner and the owner's agents.
- Furnish payment and performance bonds to the owner.
- Furnish contractor's liability insurance and workers' compensation insurance.
- Implement and enforce project safety rules and regulations. Comply with local, state, and federal safety requirements.
- Schedule and facilitate testing as specified in the contract.
- Implement and monitor quality control (QC) and quality assurance (QA).
- Promptly pay subcontractors and suppliers for work performed and materials provided.
- Furnish submittals and samples as required by the contract documents for review by the A/E.
- Schedule and obtain required inspections by AHJs.
- Furnish record drawings, O&M manuals, and other project data to the owner.

Figure 2.3
Contractor Responsibilities

- Furnish competent supervision, capable of representing the contractor in all matters relating to the construction of the project.
- Maintain accessible current construction documents (drawings, addenda, contract document modifications, record documents, etc.) for use on the project.
- Schedule and coordinate material deliveries and subcontractor's work in a manner that ensures the work will be completed in compliance with the contract documents and within the schedule constraints of the project.
- Indemnify and hold harmless the owner and the owner's agents from damage or loss resulting from the performance of the work.
- Furnish payment and performance bonds to the owner, ensuring the contractor's ability to complete the project, pay the contractor's subcontractors and material suppliers, and satisfy liens related to the project.
- Furnish contractor's liability insurance and workers' compensation insurance for all operations related to construction of the project, with coverage limits as specified in the contract, and on a form acceptable to the owner and A/E.
- Implement and enforce project safety rules and regulations; ensure compliance with local, state, and federal safety requirements.
- Schedule and facilitate testing as specified in the contract.
- Implement and monitor quality control (QC) and quality assurance (QA) in accordance with the contract requirements.
- Promptly pay subcontractors and suppliers for work performed and materials provided as prescribed by the contract, assure the owner that proper payments have been made, and procure lien releases as payments are made.
- Furnish submittals and samples as required by the contract documents for review by the A/E prior to incorporating materials and assemblies into the project. Facilitate the submission of submittal information to allow appropriate review time to coordinate with the construction progress schedule and to prevent a construction delay.
- Schedule and obtain required inspections by AHJs; properly document the inspection results for future reference.
- Submit record drawings, O&M manuals, and other project data to the owner, via the A/E, as required in the contract documents.

2.3.1 Participants' Expectations of the Contractor

Whereas the contract documents identify certain rights and responsibilities of the contractor, the other project team members have certain expectations that are to be fulfilled by the contractor as well. Most of these are incorporated in well-prepared contract documents.

The A/E expects the contractor to be knowledgeable of, and in compliance with, the contract documents for the actual construction and the administrative requirements of the project, and to be experienced in the type of construction specified. The A/E expects a qualified project superintendent who will be conscientious in constructing the project based on what is reasonably inferable from the contract documents.

The owner expects the contractor to be financially sound, to complete the project according to the contract documents, and to be reasonable in pricing modifications to the project. The owner also expects the contractor to accommodate the owner's use of the partially completed facility.

The subcontractors expect the contractor to properly schedule and coordinate the work, to enforce QC provisions, to get clarifications and interpretations in a timely manner, and to make prompt progress payments.

2.4 Subcontractors and Suppliers

Contractors typically employ subcontractors and suppliers to assist in accomplishing the work required by the contract. Because the terms of the contract cover all work related to performance of the contract, work performed by subcontractors and suppliers is bound by the same terms of the contract that bind the contractor. This is a requirement of AIA and EJCDC general conditions. When a contractor subcontracts a portion of the work to a subcontractor or supplier, it is important to include provisions that reference the contract, conditions of the contract, drawings, specifications, addenda, change orders, and other contract documents that bind the contractor. When a subcontractor or supplier participates in a project, the subcontractor or supplier needs to agree to be bound by the same terms and conditions that bind the contractor to the owner. If subcontracts and material purchase agreements do not include provisions referencing the conditions of the owner-contractor agreement, the contractor may be responsible for variations in contractual responsibilities.

2.4.1 Subcontractors

Subcontractors may or may not furnish materials but almost always furnish labor on the project as part of their subcontract work. A contractor often subcontracts segments of work that the contractor does not want to "self-perform." Often, subcontractors are specialized in their field of expertise. Subcontractors often include the required materials and supplies for their work, in addition to the installation labor. If the contractor is bound to pay prevailing wages for the project, subcontractors will be similarly bound. Several sets of standard subcontract forms are in wide use. Some of the more popular versions are available from the AIA, EJCDC, and ConsensusDOCS.

2.4.2 Suppliers

Suppliers typically do not furnish on-site labor. They furnish materials or supplies for installation by the contractor or subcontractors. There are, however, exceptions. A supplier may provide for a manufacturer's representative or product representative to visit the site and train, oversee, or assist in the installation of the supplier's product. A supplier may also provide for a manufacturer's representative or product representative to conduct an inspection of the installed product, provide a list of items requiring correction, and approve the installation for issuance of a manufacturer's warranty. This is often in the best interest of the manufacturer, as it helps ensure that the manufacturer's product was

installed correctly. The terms and conditions of the contract between the contractor and the owner also bind suppliers. Regardless of how many times the supplier's product is subcontracted from the contractor, it is important to maintain the terms and conditions of the owner-contractor agreement.

2.5 Consultants

A variety of consultants may be involved in the design, construction contract administration, and contractor project management processes.

Consultants frequently engaged by the A/E include:

- Mechanical engineers
- Electrical engineers
- Structural engineers
- Plumbing engineers
- Civil engineers
- Fire protection engineers
- Wetlands biologists
- Wildlife biologists
- Interior designers
- Landscape architects
- Acoustic engineers
- Sustainability professionals
- Vertical transportation specialists
- Life-safety specialists
- Estimating professionals

Consultants frequently engaged by the owner include:

- Geotechnical engineers
- Surveyors
- Traffic engineers
- Wetlands biologists
- Wildlife biologists
- Hazardous material abatement consultants
- Commissioning authority
- Sustainability professionals

Consultants frequently engaged by the contractor include:

- Erosion and sedimentation control engineers
- Surveyors
- Structural engineers
- Fire protection engineers

- Project schedulers
- Safety consultants
- Waste management consultants (for demolition and recycling)
- Sustainability professionals

Consultants are bound by the terms of their contracts with the A/E, owner, or contractor. Contracts for consultants engaged by the contractor should include *flow-down* language. This language ensures that the duties, rights, and responsibilities are properly delegated and the terms are consistent with the provisions of the agreement between the owner and the contractor.

2.6 Authorities Having Jurisdiction

The project type and location often determine which authorities have jurisdiction over a project. Often multiple agencies have jurisdiction over a project. For instance, a project located within the city limits may be governed by the city building department, but the county health department, state fire marshal, and state elevator inspectors may also have jurisdiction. The AHJs do not have contractual relationships with the project participants but have regulatory authority granted by the permit process and local, state, and federal regulations and laws. Partial or final occupancy of a facility usually requires passing multiple inspections by the authorities having jurisdiction over the project.

2.7 Testing Agency Inspectors

The types and quantity of tests and inspections that may be required on a project are typically determined by the facility type and extent, and materials and methods being utilized. Independent testing and inspections are often required by code and by the AHJs. In addition to required tests and inspections, the owner, A/E, or contractor may require additional testing as part of the owner's, A/E's, or contractor's QA and QC programs. Common testing requirements include soil and asphalt compaction, concrete strength, structural steel bolted and welded connections, critical structure inspections, fireproofing, and paint/coating thickness. Testing and special inspections are typically performed by specially trained personnel employed by an independent testing company. This company may work for the owner or the contractor; however, building codes require the owner to obtain the services of a special inspector for certain inspections. The requirements for providing independent testing and inspection, and identification of the party responsible, should be clearly identified in the contract documents.

2.8 Commissioning Authority

The commissioning authority may be hired by the owner to help ensure that the completed facility, or portions thereof, meet the owner's requirements. The commissioning authority may be involved in total project commissioning or may be limited to building

systems commissioning. With total project commissioning, the commissioning authority is already part of the project team when construction begins and is typically involved throughout the construction stage. With building systems commissioning, the commissioning authority typically becomes involved in the project near the end of the construction stage and is responsible for ensuring that systems are properly tested and will perform in accordance with the design. The commissioning authority's duties may include obtaining, reviewing, and approving O&M manuals. The commissioning authority uses measurement and verification equipment and procedures for monitoring optimum system performance. Commissioning may also include ensuring that provisions are made for future expansion or revisions to the facility. This may include reviewing and updating record documents and ensuring that the provisions for future needs (such as blockouts, spare conduit, and chases) are provided as required by the contract documents.

2.9 Product Representatives

Individuals and companies involved in the promotion and sale of construction products and systems are product representatives. Sales of products and systems drive a manufacturer's success and the manufacturer's ability to fund research on new technology and sustain the production of the many diverse materials used for construction. Product representatives are a critical component to the success of this process. Product representatives need to be aware of project requirements, including specified functional and performance criteria, submittal requirements, delivery dates, and procedures for requesting substitutions. The most effective assistance occurs when product representatives interact with members of the project team and review the construction documents to determine the requirements. Product representatives advise A/Es, owners, contractors, and subcontractors on products and systems to be incorporated into a project.

Many opportunities exist for product representatives to provide technical assistance during the construction process through the following methods:

- Project assistance (design phases)
- Submittals
- Field assistance (construction phase)
- Project closeout
- Postconstruction assistance

Product or manufacturer's representatives may be required to attend preinstallation meetings, train or assist applicators or installers, provide visual or testing samples or mockups, test work in progress, and provide field inspections and reports for completed work.

2.10 Communication

Construction contract administration, contractor project management, and communication during the construction stage are integral activities. The contract documents establish the lines of communication and might describe how the communication process is

to work. The basic lines of communication as identified in the AIA and EJCDC general conditions include the following:

- Between owner and contractor: Through the A/E
- To consultants: Through the A/E
- To subcontractors and suppliers: Through the contractor
- To separate contractors: Through the owner, construction manager, or coordinating contractor

In traditional agreements, the A/E and contractor have no contract with each other; however, their individual agreements with the owner and the conditions of the contract make it their duty to have certain communications. Throughout the construction process, communication among the participants is important. Although the owner and the contractor have a direct contract, the contract documents stipulate that communication between them flows through the A/E. Although the construction process encourages communication among the participants, it is important that participants follow the contractual lines of communication to ensure proper documentation and coordination. The communication roles may be different on design-build and Integrated Project Delivery methods.

Prior to the construction stage, product representatives may have been in direct communication with the A/E. During the construction stage, product representatives maintain communication with the contractor, subcontractor, or supplier holding the purchase order. Until a purchase order is received, product representatives may assist and supply technical service to the A/E. After the purchase order is executed, product representatives provide project-related information through the party receiving the purchase order.

2.10.1 Oral and Written Communication

Communications may be oral, such as telephone calls or field resolution of design or construction issues, but oral communications should be followed with written documentation confirming decisions or interpretations. After a meeting with several participants present, a copy of the minutes of the meeting should be sent to the attendees. An opportunity should be offered to each party to review and correct the documented information within a specified period of time. By adhering to the process of written communication, participants receive the same information, the integrity of the contract documents is preserved, and the documentation can be filed and retrieved as needed. In establishing the communication procedures to be used for a project, it is important to select forms of communication that are legally enforceable.

2.10.2 Electronic Communication

The use of electronic communication has become prevalent in construction. It includes faxes, electronic mail, digital photos, project web sites, text messaging, and voicemail. When electronic communications are integrated into a project, it is important to establish the following:

- Rules that clearly identify an official communication
- Types of communication that will be legally binding

- How distribution to other parties will be handled
- Record-keeping procedures

Most electronic communication is traceable and can be recreated. When a communication is created and the user hits the *send* button, whether it is a fax, e-mail, or text message, it becomes a matter of record. As with all official communication, messages should be factual and free of emotion and disparaging remarks.

The procedures for utilizing electronic communications are established by the construction documents or agreed to at the beginning of the project. The participants need to understand the forms of communication that will be considered legally binding, how they will be recorded, and how and to whom they will be distributed.

2.10.2.1 Faxes

This form of electronic communication is in decline. A variety of items may be faxed between project team members, including letters, specifications, drawings, solicitations, quotations, and even contracts. One disadvantage of faxes is that if the resolution of the original is not good, it will be lessened after faxing, and refaxing a faxed document will further deteriorate the copy quality. When a document to be faxed has shading or color, the clarity of the fax on the receiving end may be significantly reduced. For this reason, it may be advisable to prohibit or restrict faxing of product submittals, which often include copies of manufacturers' printed catalog information. An advantage of transmitting documents by fax is that faxes can be sent any time of the day or night over a telephone line and may not be dependent on a computer networking system. Some telephone systems allow an incoming fax to be converted to an electronic image file and delivered to the recipient's computer through the company's intranet system. Conversely, faxes may be sent from networked copiers.

2.10.2.2 Electronic Mail, Digital Photos, and Video

E-mail is the preferred method of communication for many people and is regularly used. E-mail can be sent at any time and is limited only by the need for a computer or a PDA (personal digital assistant) device with wired or wireless connection to the Internet or a data enabled mobile phone. E-mail can usually be traced and recreated, even after it has been deleted. Advances in technology continue to improve electronic communication by making it faster and interruptions in service less likely. E-mail also offers the capability of adding attachments, such as letters, specifications, drawings, scanned files, quotations, and a variety of other documents. When including an attachment to an e-mail message, it is important to verify that the recipient has compatible software to open and view or manipulate the attachment. Further, digital photos and videos can be taken of a project condition and sent as an attachment. Photos and videos can capture actual circumstances and be e-mailed to the A/E as a reference to a specific issue. This type of communication may preclude an unnecessary trip to the project site.

2.10.2.3 Project Web Sites

Project web sites, FTP (file transfer protocol) sites, or extranet sites, may be established for use in project communication. The cost of establishing the site may be borne by the owner, the contractor, the A/E, or a combination of several or all. Project web sites can be powerful tools when used correctly. They may be used for compiling correspondence logs

and for routing correspondence, requests for interpretations, A/E instructions, requests for changes, change orders, supplemental information, drawings, specifications, and nearly anything else that would normally be found in hard copy. Access can be controlled so that not all project team members have access to the entire site. Access privileges are typically determined based on the participant's level of involvement in the project. For example, the contractor typically has far greater access privileges than are given to a subcontractor or supplier. When establishing a project web site, determine access privileges and how copyrights will be handled. The drawings and specifications are examples of documents requiring copyright protection that may be posted on project web sites. A/Es need to protect their work so that it is used only on the project for which it is intended and does not get copied and redistributed without authorization.

2.10.2.4 Text Messaging

Text messaging is another form of communication using cellular phone technology. It involves simply using the cell phone keyboard to send a text message that can be read on another cell phone with a compatible display. These messages can be sent similar to the way e-mail is sent, so the phone does not have to be answered. Rules establishing what are considered a legitimate communication directive regarding text messaging will continue to change as this technology evolves.

2.10.2.5 Voicemail

Voicemail is another means of electronic communication. It is commonly used when the individual on the receiving end is unavailable to take the phone call. Many companies no longer take paper phone messages. Instead, calls are routed to the voicemail of the person the caller is trying to reach. There are limitations to the length of message that can be left, but there is usually enough time to leave a detailed message requesting the recipient to respond.

Chapter 3
Preconstruction

3.1 Contractor's Organization

The contract documents require many preconstruction activities. Other preconstruction activities are determined by good business practices, the contractor's organization, duration of the project, interaction with outside agencies, and interface with the project team. Preconstruction activities begin when the contractor has received an executed agreement or a notice to proceed. Occasionally, a "Letter of Intent to Award" may initiate this phase as well. Prior to starting preconstruction activities, the contractor should review the conditions of the contract and Division 01 for requirements that will impact the contractor's project management procedures including communications, submittals, meetings, sustainability requirements, contract modifications and interpretations, payment processes, and project closeout.

3.1.1 Estimating Pass-off

Upon receipt of the notice to proceed, the contractor has much work to do in a relatively short time frame. This usually begins with the estimator's passing off the project to the team that will be constructing the project. This team usually includes a project manager and a superintendent, and may also include a project engineer and an office manager. On a smaller project, the same person may fill more than one of these positions. The estimator usually goes through the entire estimate, explaining the items to the team that will construct the project. This explanation covers the following topics: any special permit requirements, outside agencies that need to be contacted, review of the prebid schedule (draft schedule used during bidding), critical submittals, and information gained from prebid meetings. During the pass-off, the estimator identifies major subcontractors and suppliers. Sometimes, the contractor allocates money for a given item, with no specific subcontractor or supplier selected to do the work. Another scenario may develop in which two subcontractors or suppliers quoting the same work are very close in the amount quoted, but there are differences in their scope of work. When this happens, the contractor may elect to put enough money in the estimate to cover either one of them, and then negotiate later to determine which subcontractor or supplier to select.

With the estimator's pass-off complete, the team takes over the project. The project manager takes the estimate and creates the original construction budget.

The contractor retains a copy of the original construction budget, which is established from the bid estimate. The original budget becomes the financial benchmark to which all construction activity is compared.

3.1.2 Buyout

Buyout is one of the contractor's preconstruction activities between award of the contract and the actual start of construction. Buyout can and often does extend past the start of construction, but the majority of these tasks are completed before it starts. During buyout, the contractor issues subcontracts, supply contracts, and purchase orders for the work to be done. Any final negotiating with suppliers and subcontractors is also done during buyout. There are several aspects to successfully negotiating with subcontractors and suppliers. Ethical and professional conduct is necessary to develop successful long-term relationships.

One common type of unethical practice is bid shopping or price shopping. *Bid shopping* is the term used to describe a contractor sharing sub-bid information with other sub-bidders in an effort to obtain a lower price. An example would be a subcontractor, having already submitted a bid to a contractor, calling and asking how the subcontractor's bid compares with other bids for the same work. This can be handled in one of two ways. Telling the subcontractor how the subcontractor's price compares with the others prior to bid makes both the contractor and the subcontractor party to prebid shopping and is extremely unethical. The other choice is to tell the inquiring party that, upon award of the subcontract, this information will be available. Another example of bid shopping would be a contractor calling a subcontractor or supplier after sub-bids are received, revealing to them what the lowest bid received for their work was, and then explaining to them that they will be awarded the subcontract if they beat that bid. Bid shopping is frowned on by the industry, and when contractors or subcontractors who participate in bid shopping are identified, the consequences can seriously affect their ability to obtain legitimate competitive pricing. Many subcontractors and suppliers are reluctant to submit bids to a contractor known for bid shopping. If they do, they may add a premium to their prices or wait until immediately before the bid time before submitting their price. Bid shopping damages long- and short-term working relationships. To reduce the potential for bid shopping, some procurement documents require that bidders list some or all subcontractors in their bids or within a short period after the bid opening.

After receipt of a signed agreement, the contractor does final negotiating prior to the end of the buyout stage. If prices received from two suppliers or subcontractors were very close in quoted price and the contractor did not list one of the subcontractors or suppliers in the contractor's bid, then the contractor can negotiate with each of them postbid. When doing this, the contractor should let each party know that negotiations are ongoing, but should not share anything learned from one party with the other. This ensures that each party puts forth its best effort and price.

Several items may be considered in selecting and negotiating with potential subcontractors and suppliers. Negotiated terms should be clearly spelled out in the subcontract or purchase order. Suppliers often offer an early payment discount, such as "2 net 10," which means a 2 percent discount can be taken if payment is made by the 10th day of the month. Other items to consider when negotiating with suppliers are:

- Responsibility for paying the cost of shipping products or materials to the site
- Inclusion of shop drawings and required submittals at no additional charge
- Price escalations for an ongoing commodity that will be provided over time on a project with a long duration
- Ability to meet the contractor's schedule

Depending on the contractor's size and organizational structure, the buyout process may be performed by a project manager, purchasing agent, project administrator, or a

combination of these. The buyout process is one of the most important preconstruction activities for the contractor because well-written subcontracts and purchase orders reduce misunderstandings and conflicts later in the project. It is important for the subcontract and purchase order documents to reference the contract documents. The contractor should not contract for services or goods that do not comply with project requirements. Problems can arise if the substituted product has not been approved through the proper procedures. If a purchase order or subcontract will be issued after approval of submittals, this could jeopardize project scheduling if approval is not successful.

Subcontracts and purchase orders must be clearly written and require compliance with the contract documents, to minimize questions that may arise later. The decision of whether to issue a purchase order or subcontract can be affected by several criteria:

- When on-site labor will be performed (such as site excavating and grading, placement of rebar, erection of structural steel, or application of finishes), a subcontract is appropriate.
- The contract requirements may indicate that an installer or applicator is required to be a licensed subcontractor or authorized agent of the manufacturer.
- The cost of the work to be performed may exceed certain monetary limitations placed on the use of purchase orders.
- The type of service to be provided may indicate which document to use. Sometimes short-term specialty work can be covered by a purchase order.
- A hybrid document may be more appropriate. A supply contract usually has more contractual detail and requirements than a standard purchase order, and in many ways resembles a subcontract, though it does not address on-site labor.

3.1.3 Award of Subcontracts

Subcontracts are contracts between the contractor and subcontractors. Each subcontract identifies the work required and is subject to compliance with the contract documents. Similarly, subcontractors can establish contracts with sub-subcontractors. Subcontract issues may include the number of mobilizations and demobilizations, required inclusions and exclusions, project schedule, special requirements for subcontracted work, testing requirements, submittals, and samples.

A variety of standard subcontract forms are available from organizations such as the American Institute of Architects (AIA), the Engineers Joint Contract Documents Committee (EJCDC), ConsensusDOCS endorsed by certain construction associations, and the Design-Build Institute of America (DBIA). In addition, many contractors have developed their own customized subcontract forms. Whether using a standard or a custom form, it is important for the subcontract to contain the flow-down language. This language ensures that the duties, rights, and responsibilities are properly delegated and the terms are consistent with the provisions of the agreement between the owner and the contractor. The entire package of contract documents should be referenced, not just those sheets or specification sections related to an individual subcontractor. Using standard subcontractor agreement forms compatible with the contractor agreement and conditions of the contract ensures that flow-down language is used.

One item that needs to be addressed while preparing subcontracts is when the subcontractor will receive payment from the contractor. Some subcontracts prescribe that the subcontractor will be paid within a certain number of days after the contractor is

paid by the owner. These are commonly referred to as "pay when paid" or "pay if paid" clauses. These, in essence, state that payment to the subcontractor is contingent on the contractor being paid by the owner. Many subcontractors insist that the "pay when paid" or "pay if paid" clause be excluded from their subcontract. Many subcontractors do not want to have payment by the owner as a prerequisite for their payment. For this reason, they may request that subcontracts state that they will be paid by the contractor when the subcontractor's work is complete, regardless of whether the contractor is paid by the owner. Some jurisdictions prohibit contractual provisions such as "pay when paid" or "pay if paid" clauses because they intrude on the privities of contracts.

When standard subcontract forms are used, it is important that the contract language specifically fit the work to be performed. This may mean modifying some of the standard language. Any time that a standard subcontract form is modified, legal counsel should review the subcontract and the conditions of the contract for the project. This can often eliminate problems later in the project.

Subcontracts typically include requirements for:

- Payment and performance bonds
- Liability insurance
- Workers' compensation insurance
- Certified payrolls and other required payroll reports
- Payment applications
- Submittals, samples, and mock-ups
- Warranties
- Record documents

3.1.4 Purchase Orders

Purchase orders are contracts for materials being purchased, reference the project specifications, and include pertinent terms such as discounts, cost escalations, submittals, certifications required, samples required, freight, taxes, delivery schedule, and quantities. The fewer ambiguities in the purchase order, the fewer the problems that will be encountered later in the project. Purchase orders reflect the terms of the supplier's quote: the quote was the offer; the purchase order is the acceptance in the contract process. Refer to *The CSI Project Delivery Practice Guide* for a discussion of the Uniform Commercial Code (UCC) and the purchasing of goods.

Purchase order forms can be standard or customized. Often, the standard terms and conditions are included on the back, or as part of the form, and project specifics remain the only information that has to be added. It is important to correlate the terms and conditions of the purchase order with those of the quote and the contract documents. If the terms of the purchase order conflict with those of the original quote or contract documents, conflicts may arise later. The potential for conflict will be reduced if both parties are in agreement that the terms and conditions of the purchase order accurately reflect the contract documents and the offer made in the quote. Purchase orders may include:

- Requirements for submittals, such as shop drawings, samples, and mockups
- Certifications and certificates of materials origin
- Testing requirements

3.2 Notice to Proceed

The project time limit provisions are normally established by the date of commencement stated in the agreement. The date of commencement may be established by a notice to proceed. The agreement for a design-build (D-B) project or a negotiated contract that has the contractor performing value analysis and constructability reviews during the design stage may not establish the construction start time or duration. In this case, the notice to proceed issued by the owner to the contractor establishes the construction start date and the construction duration.

The EJCDC recognizes the notice to proceed as a contract document. It is a significant document because the period of time between signing the owner-contractor agreement and the beginning of construction may vary, depending on how long it takes the contractor to obtain the insurance certificates, surety bonds, and other required documents. Once these documents have been received and accepted by the owner, the owner may issue the written notice to proceed. The notice to proceed establishes the beginning date of construction and directs the contractor to begin the project. The architect/engineer (A/E) may prepare the notice to proceed; however, it is signed by the owner because the owner's signature is required on contractual authorizations to the contractor.

The notice to proceed is a short document, addressed directly to the contractor and referencing the specific project, or portion of the project, for which the work is to be accomplished. Most important, it lists the date work is authorized to commence and occasionally the number of calendar days or date of substantial completion, all followed by the signature of the owner. Frequently, an integral part of public works contracts, the notice to proceed, is also often used in private work contracts. Contracts that contain liquidated damages or penalty/bonus clauses commonly use the notice to proceed to officially announce the start of construction and the beginning of the time allowed by the contract for the project. Because of the importance of this document, it should be delivered to the contractor by a method that documents receipt. Upon receipt of the notice to proceed, many of the contractor's activities begin. Figures 3.1 and 3.2 are examples of typical formats for the notice to proceed.

3.3 Contract Documents

The construction contract administration (CCA) and contractor project management procedures established by documents published by AIA and EJCDC have become standards of the industry in defining the rights, duties, and responsibilities of the various parties to a construction contract. Although ConsensusDOCS promulgated by several construction-related associations and some private companies and governmental agencies use other documents, the following information focuses on those published by the AIA and EJCDC.

3.3.1 Documents Used in Construction

The documents typically used in the administration of a construction contract include:

- Owner-A/E agreement
- Owner-contractor agreement(s)

Notice to Proceed

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Contractor:	
Contractor's Address: *[send Certified Mail, Return Receipt Requested]*	

You are notified that the Contract Times under the above Contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____ [(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ [*add other requirements*].

_____ _____
Owner

_____ Given by: _____
Authorized Signature

_____ _____
Title

_____ _____
Date

Copy to Engineer

Figure 3.1 Notice to Proceed EJCDC C-550

Source: Reprinted by permission of the Engineers Joint Contract Documents Committee (EJCDC). For more information about the EJCDC, please visit www.nspe.org.

Knowledge for Creating and Sustaining the Built Environment

NOTICE TO PROCEED

Project: _____ Date: _____

_____ A/E Project Number: _____

To: _____ Contract For: _____

_____ _____

You are hereby notified that the Contract Times stated for the Project will commence on _____ (Date) . On that date, start performing the obligations required by the Contract Documents.

Before commencing Work at the Project Site, deliver the certificates of insurance to the Owner as required by the Contract Documents.

Also before commencing Work at the Project Site, perform:

Authorized By: _____
(Owner)

_____
(Authorized Signature)

_____
(Title)

Accepted By: _____
(Contractor)

_____
(Authorized Signature)

_____
(Title)

_____
(Date)

☐ Attachments

Copies: ☐ Owner ☐ A/E ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 1.4A

Figure 3.2 Notice to Proceed

- Conditions of the contract
- Specifications
- Drawings
- Bid form or proposal, when attached as an exhibit to the agreement (EJCDC)
- Precontract revisions, including addenda with items relating to contract documents
- Notice to proceed (as required by most EJCDC contracts, and as required by some public- and private-sector projects utilizing standard or modified AIA contracts)
- Contract modifications, including change orders

These documents are related, and it is necessary that those responsible for CCA and contractor project management have a working knowledge of each of the documents that are included in the project's contracts. While the agreements are not usually shared among the project participants, the rights, roles, and responsibilities of the participants are covered in the conditions of the contract. The tendency to skim over apparent boilerplate provisions must be avoided, lest a seemingly insignificant detail escape the reader's attention, only to prove very important later.

Project participants need access to the contract documents in order to perform their work properly. At a minimum, this usually includes the agreement, drawings, specifications, conditions of the contract, modifications, and addenda. It may also be necessary to have access to standards and reference documents, as they are often incorporated by reference in the specifications. In signing an agreement, the party accepts an obligation to obtain the necessary contract documents. Often, contract documents are obtained from the A/E. The contractor may receive a supply of various printed documents such as drawings, specifications, and conditions of the contract at the preconstruction conference or at another time early in the construction process. It is becoming a good practice to issue documents electronically, which can be disseminated easily, without great cost, and in an environmentally friendly manner. It is the contractor's responsibility to issue all of the appropriate documents to subcontractors and suppliers.

It is very important for the contractor and all subcontractors to work with complete sets of documents. This means that addenda, revised drawings, minor changes, change directives, and change orders need to be added to the drawings and specifications by all participants. Problems can develop when incomplete documents are used for construction. Often, drawings or specifications reference other drawings or specifications within the set. If the set is not complete, information needed to correctly construct the project or a specific portion of the project may be missing or in error.

Posting addenda to the construction documents is an important function of CCA and contractor project management. The documents being used for construction should contain the most current information. Problems can arise when the participants are not working with complete and current information. Sometimes a conformed set incorporating changes and submittal information may be issued.

When standards are specified or referenced, they become an integral part of the construction documents and therefore the contract. Those constructing the project must know the content of these standards to avoid missing information necessary to complete the work.

3.3.1.1 Owner-A/E Agreements

Two owner-A/E agreements in common use are:

- AIA Document B101, Standard Form of Agreement Between Owner and Architect
- EJCDC E-500, Standard Form of Agreement Between Owner and Engineer for Professional Services

The typical owner-A/E agreement has several CCA provisions including:

The A/E's Basic Services A detailed listing of the duties and responsibilities the A/E has for CCA, such as:

- Advise and consult with the owner
- Interpret contract documents
- Observe the work
- Review and certify/recommend payments to contractor
- Review and approve submittals
- Prepare modifications
- Prepare updates and revisions to contractor's initial punch list (final punch list) and verify completion
- Inspect to determine date of substantial completion and final completion

Project Representation Usually, an additional service that provides the owner with more extensive or full-time on-site representation during construction. The owner may retain the A/E to provide this service.

Additional Services Activities that are related to CCA, but that are beyond the A/E's basic services, such as preparation of record documents and coordination of separate work awarded by the owner, including furniture, furnishings, and equipment as well as selection and placement of art.

Contingent Additional Services Such as reviewing substitutions during construction.

Owner's Responsibilities A listing that describes certain of the owner's responsibilities during construction, such as making progress payments to the contractor.

Some of the CCA procedures contained in other published documents may vary considerably from the AIA and EJCDC documents, so it is important to review each agreement closely.

3.3.1.2 Owner-Contractor Agreement

There are many kinds of owner-contractor agreements. They are characterized by the project delivery method, the number of contracts, and the basis of payment. Among the many agreement forms available, the following four are the most commonly used and are companion documents to the owner-A/E agreements:

- AIA Document A101, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum
- AIA Document A102, Standard Form of Agreement Between Owner and Contractor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price (commonly referred to as a GMP contract)
- EJCDC C-520, Suggested Form of Agreement Between Owner and Contractor, for Construction Contract (Stipulated Price)
- EJCDC C-525, Standard Form of Agreement Between Owner and Contractor, Cost - Plus

These contract references are not meant to imply that the CCA and contractor project management procedures, described therein, are limited to stipulated sum (lump-sum) or GMP projects. These procedures also apply to other basis-of-payment and project delivery methods such as design-build, Integrated Project Delivery (IPD), construction management, and owner-build.

The owner-contractor agreement typically includes articles relating to the following:

Contract Documents A detailed list of all written and graphic documents that are part of the contract. The individual responsible for CCA should ensure that all parties to the contract are referencing the same documents. The dates and titles of the documents and the number of pages in each need to be checked against the agreement to ensure the correct documents are being used.

Contract Time Start and completion dates or allotted calendar days for the project.

Contract Price The basis on which applications for payment will be made. Includes the listing of any unit prices, allowances, and accepted alternates.

Payment Procedures Identifies when the contractor will submit applications for payment and when payment by the owner to the contractor will be made. This article also includes the provisions for retainage.

3.3.1.3 Conditions of the Contract

The conditions of the contract consist of the general conditions and the supplementary conditions. The conditions of the contract mirror responsibilities dictated in the owner-A/E agreement and the owner-contractor agreement. Of all the documents used in construction, the conditions of the contract most clearly establish the responsibilities for CCA and contractor project management. The conditions of the contract identify the basic rights, procedural and contractual responsibilities, and relationships between the parties involved in the performance of the contract. Two widely used general conditions of the contract are:

- AIA Document A201, General Conditions of the Contract for Construction
- EJCDC C-700, Standard General Conditions of the Construction Contract

The conditions of the contract typically contain the following general topics:

- General provisions and definitions
- Owner's responsibilities
- Contractor's responsibilities
- A/E's responsibilities
- Subcontractors (definition and relationships)
- Construction by owner or separate contractors
- Changes in the work
- Contract time
- Payments to contractor and completion of work
- Protection of persons and property
- Insurance and bonds
- Correction, removal, or acceptance of defective work
- Miscellaneous provisions
- Suspension of work and termination of the contract
- Claims and disputes

The parties to the contract should be completely familiar with the terms of the conditions of the contract and how they relate to the other referenced documents. Standard published general conditions are normally modified for the specific project by the

supplementary conditions. The supplementary conditions may cover such subjects as performance, responsibilities of certain parties to the contract, insurance requirements, progress payments, wage rate requirements, equal employment opportunity requirements, and other project-specific items. The parties to the contract should understand their contractual responsibility to ensure their adherence to the provisions of the general and supplementary conditions. They should recognize the benefits to the entire construction process when all participants are in compliance.

3.3.1.4 Division 01—General Requirements

The general requirements in Division 01 of the specifications specify administrative requirements, procedural requirements, and temporary facilities and controls. Division 01 sections govern the execution of the work specified in Divisions 02 through 49. Division 01 requirements avoid the need to repeat these requirements in other divisions or sections of the specifications. Individual specification sections relate back to Division 01 for clarification. For example, specification requirements for the content of product submittals, shop drawings, samples, and mock-ups required for specific products are specified in PART 1—GENERAL of the applicable specification sections, while the procedures for submittal of this information are addressed in the appropriate Division 01 section. The parties to the contract need to understand the basic rights and responsibilities in the general conditions, including modifications by supplementary conditions and the relationship of the conditions of the contract to Division 01 General Requirements. Division 01 of the specifications often expands, amplifies, and customizes specific administrative and procedural issues on a project-specific basis. Refer to Figure 3.3 for Division 01 level 2 sections as listed in *MasterFormat*® and note that nearly all have direct application to CCA and contractor project management.

DIVISION 01—GENERAL REQUIREMENTS
01 00 00 General Requirements
01 10 00 Summary
01 11 00 Summary of Work
01 12 00 Multiple Contract Summary
01 14 00 Work Restrictions
01 18 00 Project Utility Sources
01 20 00 Price and Payment Procedures
01 21 00 Allowances
01 22 00 Unit Prices
01 23 00 Alternates
01 24 00 Value Analysis
01 25 00 Substitution Procedures
01 26 00 Contract Modification Procedures
01 29 00 Payment Procedures
01 30 00 Administrative Requirements
01 31 00 Project Management and Coordination
01 32 00 Construction Progress Documentation
01 33 00 Submittal Procedures
01 35 00 Special Procedures
01 40 00 Quality Requirements

Figure 3.3
Division 01—Sections as Listed in *MasterFormat*®

01 41 00 Regulatory Requirements
01 42 00 References
01 43 00 Quality Assurance
01 45 00 Quality Control
01 50 00 Temporary Facilities and Controls
01 51 00 Temporary Utilities
01 52 00 Construction Facilities
01 53 00 Temporary Construction
01 54 00 Construction Aids
01 55 00 Vehicular Access and Parking
01 56 00 Temporary Barriers and Enclosures
01 57 00 Temporary Controls
01 58 00 Project Identification
01 60 00 Product Requirements
01 61 00 Common Product Requirements
01 62 00 Product Options
01 64 00 Owner-Furnished Products
01 65 00 Product Delivery Requirements
01 66 00 Product Storage and Handling Requirements
01 70 00 Execution and Closeout Requirements
01 71 00 Examination and Preparation
01 73 00 Execution
01 74 00 Cleaning and Waste Management
01 75 00 Starting and Adjusting
01 76 00 Protecting Installed Construction
01 77 00 Closeout Procedures
01 78 00 Closeout Submittals
01 79 00 Demonstration and Training
01 80 00 Performance Requirements
01 81 00 Facility Performance Requirements
01 82 00 Facility Substructure Performance Requirements
01 83 00 Facility Shell Performance Requirements
01 84 00 Interiors Performance Requirements
01 85 00 Conveying Equipment Performance Requirements
01 86 00 Facility Services Performance Requirements
01 87 00 Equipment & Furnishings Performance Requirements
01 88 00 Other Facility Construction Performance Requirements
01 89 00 Site Construction Performance Requirements
01 90 00 Life Cycle Activities
01 91 00 Commissioning
01 92 00 Facility Operation
01 93 00 Facility Maintenance
01 94 00 Facility Decommissioning

Figure 3.3
(*Continued*)

3.3.1.5 Sections of Divisions 02 through 49, Specifications

Divisions 02 through 49 of the specifications have important CCA and contractor project management provisions within each section. Each of the three parts of a specification section (PART 1—GENERAL, PART 2—PRODUCTS, and PART 3—EXECUTION) has statements relating to fulfillment of the contract requirements. For example, the specifications within Divisions 02 through 49:

- Identify the specific requirements for each material or system along with relevant standards.
- Indicate submittal information required.
- Specify the QA and QC provisions.
- Indicate the requirements for product storage, handling, and installation.
- Indicate specific sequencing or scheduling requirements.
- Specify product warranties.
- Indicate requirements for preparation, installation, and protection of work.
- Contain other subjects specific to the material or system being specified.

Verifying the fulfillment of the obligations of each of these provisions is an important function of the A/E.

Refer to the *CSI Project Delivery Practice Guide* for a listing of the *SectionFormat*® articles, and note that nearly all have direct application to the administration of a construction contract. Refer to the *CSI Construction Specifications Practice Guide* for additional information on the organizational elements of the specifications.

3.3.1.6 Contract Drawings and Three-Dimensional Models

Drawings and three-dimensional (3D) models are graphic representations of the work. They show location, materials, dimensions, size, interrelationships of materials, details of connections, and shape and form. Understanding the relationship among drawings, specifications, and the other components of the contract documents is a responsibility of CCA and contractor project management.

Because drawings and specifications are complementary, the A/E needs to know the procedures for resolution of conflicts between those documents during construction.

3.3.1.7 Precontract Revisions Including Addenda

Precontract revisions include addenda, which are written or graphic instruments issued to clarify, revise, add to, or delete information in the procurement documents or in previous addenda. Addenda are typically issued by the A/E before the bid or final negotiation. As portions of addenda may affect the contract documents, it is imperative that participants to the construction process properly account for these changes by posting or documenting the appropriate addenda information in the affected areas of the drawings and specifications.

3.3.1.8 Modifications

After execution of the agreement, contract documents can be modified by change orders, change directives, or minor changes. Each of these documents actually modifies the contract, so it is important to understand the documentation procedures and the relationship

of the changes to the other contract documents. Refer to Chapter 8, "Interpretations and Modifications," for additional information.

3.3.2 Obtaining Copies of Contract Documents

Often, the procurement requirements state where copies of contract documents may be obtained. In a design-bid-build project delivery, the procurement documents distributed to bidders and plan centers during the bid period are typically returned to the owner, A/E, or printer, if a deposit was required, and these returned documents are then furnished to the contractor for the contractor's use. In a design-negotiate-build or design-build contract, the contractor typically purchases copies of the contract documents.

3.3.2.1 Distribution to Construction Team

It is typically the responsibility of each project team leader to distribute the construction documents to the leader's team members. The A/E is responsible for distributing contract documents to the A/E's consultants as well as AHJs, which typically occurs when documents are distributed for pricing. The owner is responsible for distributing documents to the owner's representative on-site, the owner's consultants, and contractors performing work under separate contracts. The contractor is responsible for distributing documents to the contractor's subcontractors, suppliers, and testing agencies.

3.3.2.2 Using Complete Sets

The importance of using complete sets of contract documents cannot be overemphasized. Drawings are commonly interreferenced and dependent upon one another. An electrical subcontractor may see the need to have only the electrical drawings, but mechanical units, alarm systems, and a variety of other items may interface with the electrical work. Often, a subcontractor or supplier asks for or is issued only the specific drawings and specifications that address the subcontractor's or supplier's work. When this happens, the contractor coordinates the subcontractor's or supplier's work with the complete documents to ensure that coordination with other elements of the project occurs. Improper coordination of the various trades or elements of the work is often the cause of improper installation and can result in additional work being required later.

3.3.2.3 Posting Addenda to Documents

It is very important to post addenda to the documents used on the project. The addenda may include new drawing or specification requirements and revisions. The contractor is responsible for seeing that these revisions are incorporated into the document sets used by the subcontractors and suppliers working for the contractor. This means that the affected subcontractors and suppliers should receive the necessary documents. It is good practice to incorporate the addenda in a permanent manner on the documents at the site. One way of doing this is to line through or draw an "X" across the drawing or specification requirement that is no longer applicable, and make a notation that refers the user to the addendum that has superseded it. Sometimes the section of the specifications or drawings is cut out and taped over the old document, so that there is no chance of misinterpretation. The revision may also be electronically posted on the contract documents, sometimes referred to as *conformed sets*.

3.3.2.4 Copies of Standards Referenced in Contract Documents

It is common practice for standards to be incorporated by reference in contract documents. It is important that project team members obtain access to these standards. The contractor needs to know what the standard says. Often, the standard includes very specific information about installation, tolerances, testing requirements, and inspections. Because of the length of many standards, it is impractical to include the text of a standard in the contract documents. References to specific standards or portions of standards accomplish the intended result. Common standards that may be referenced include ASTM International, American Association of State Highway and Transportation Officials (AASHTO), and National Electrical Manufacturers Association (NEMA) standards. Including a reference in the contract documents is referred to as *incorporation by reference* and therefore becomes a part of the contract.

3.4 Preconstruction Submittals

Generally, no work begins until required preconstruction submittals have been submitted by the contractor and reviewed by the A/E and owner. When the contractor receives the notice to proceed, preparation and delivery of the preconstruction submittals should begin as soon as possible. These submittals may include:

- Certificates of insurance and workers' compensation coverage
- Payment and performance bonds
- Proposed subcontractor and product lists
- Preliminary construction and submittal schedules
- Proposed use of the site and site logistics, including signage
- Erosion control plan
- Pollution control plan
- Traffic control plan

When assembling the preconstruction submittals, the contractor should carefully review the contract documents to ensure that the submittals comply with the requirements. Often, the contract documents will specify the required number of copies and related requirements. If the submittals do not comply with the contract requirements, it may cause unnecessary delays for the contractor. Incorrectly prepared and incomplete submittals are typically not justification for additional contract time or compensation.

The contract documents indicate whether bonds are required and amounts for insurance requirements. Often, this includes the specific type of documents to be used for these items and how the limits are to be listed. Payment and performance bonds and insurance certificates are typically among the contractor's first submittals.

Purchase orders and subcontracts typically need to be issued before product submittals and shop drawings are prepared. Product submittals and shop drawings are to be included on the submittal schedule. It is important to check contract requirements to ensure that the submittal schedule is complete and prepared correctly, to minimize the potential for related delays later in the project.

Many public works projects include requirements for the contractor to submit pollution, erosion, and traffic control plans. These plans may require approval by AHJs prior to beginning work on-site. Often, the pollution and erosion control plans include references to permits or other standards. Regular inspections are often required as part of these plans. Traffic control plans usually reference standards such as the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) or standard specifications and details adopted by the state highway department or the local AHJ.

3.4.1 Certificates of Insurance

The owner establishes the project requirements for insurance in consultation with legal counsel and insurance advisers. The general and supplementary conditions state the requirements. The *CSI Construction Specifications Practice Guide* includes a description of types of insurance.

Before beginning work at the site, the contractor and the owner provide each other with certificates of insurance verifying coverage. This is important in order to avoid duplication or omission of coverage. These certificates are submitted through the A/E to the other party. When obtaining insurance coverage, the contractor furnishes the insurer with a copy of the contract provisions covering insurance requirements. This reduces the possibility of misunderstanding by the insurer. It is also incumbent upon both the contractor and the owner to provide each other with certificates of renewal for all policies expiring during the time frame covered by the contract. The contractor may opt, or the contract documents may require the contractor, to prepay insurance premium costs to eliminate the potential for policy cancellation due to nonpayment. Payment of deductible amounts should be addressed and clarified between the owner and contractor.

The conditions of the contract or subcontracts may require subcontractors to submit certificates of insurance to the contractor. These certificates often provide coverage for workers' compensation, commercial general liability, and vehicle liability.

The A/E reviews the certificates of insurance only for conformance with administrative contract requirements, including proper form, dates of coverage, and required signatures. The owner, in consultation with legal counsel and insurance advisers, makes the final determination of whether the certificates meet the owner's requirements as stated in the general and supplementary conditions. The project manual normally dictates the form to be used. For sample insurance certificate forms, refer to Figures 3.4 and 3.5.

3.4.2 Surety Bonds

Bonding requirements, when required, are established by the owner, and necessary provisions are included in the general and supplementary conditions. The *CSI Construction Specifications Practice Guide* includes a description of bonds. The two basic types of bonds applicable to administration of projects are the performance bond and the payment bond (labor and material payment bond). These bonds are required to be delivered to the owner when the contractor delivers the executed owner-contractor agreement.

Bonds provide assurance that should the contractor become financially incapable of making payments, fulfilling the contract obligations, or completing a contract, a surety is available to fulfill these obligations. Bonds are not insurance. Advantages of bonding

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:
	PHONE (A/C, No, Ext): FAX (A/C, No):
	E-MAIL ADDRESS:
	PRODUCER CUSTOMER ID #:
INSURED	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A :
	INSURER B :
	INSURER C :
	INSURER D :
	INSURER E :
	INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	$
	COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	CLAIMS-MADE OCCUR						MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
							GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$
	POLICY PRO-JECT LOC							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS						BODILY INJURY (Per accident)	$
	SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident)	$
	HIRED AUTOS							$
	NON-OWNED AUTOS							$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DEDUCTIBLE							$
	RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						WC STATU-TORY LIMITS OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED?		N / A				E.L. EACH ACCIDENT	$
	(Mandatory in NH) If yes, describe under SPECIAL PROVISIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER	CANCELLATION
	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

ACORD 25 (2009/09) The ACORD name and logo are registered marks of ACORD

Clear All

Figure 3.4 ACORD. 25, Certificate of Liability Insurance

AIA® Document G715™ – 1991

Supplemental Attachment

for ACORD Certificate of Insurance 25-S

(This document replaces AIA Document G705, Certificate of Insurance.)

PROJECT *(Name and address)*:

INSURED _____

		Yes	No	N/A
A.	**General Liability**			
1.	Does the General Aggregate apply to this Project only?	☐	☐	☐
2.	Does this policy include coverage for:			
a.	Premises - Operations?	☐	☐	☐
b.	Explosion, Collapse and Underground Hazards?	☐	☐	☐
c.	Personal Injury Coverage?	☐	☐	☐
d.	Products Coverage?	☐	☐	☐
e.	Completed Operations?	☐	☐	☐
f.	Contractual Coverage for the Insured's obligations in A201?	☐	☐	☐
3.	If coverage is written on a claims-made basis, what is the:			
a.	Retroactive Date?			
b.	Extended Reporting Date?			
B.	**Worker's Compensation**			
1.	If the Insured is exempt from Worker's Compensation statutes, does the Insured carry the equivalent Voluntary Compensation coverage?	☐	☐	☐
C.	**Final Payment Information**			
1.	Is this certificate being furnished in connection with the Contractor's request for final payment in accordance with the requirements of Sections 9.10.2 and 11.1.3 of AIA Document A201, General Conditions of the Contract for Construction?	☐	☐	☐
2.	If so, and if the policy period extends beyond termination of the Contract for Construction, is Completed Operations coverage for this Project continued for the balance of the policy period?	☐	☐	☐
D.	**Termination Provisions**			
1.	Has each policy shown on the certificate and this Supplement been endorsed to provide the holder with 30 days notice of cancellation and/or expiration? List below any policies which do not contain this notice.	☐	☐	☐
E.	**Other Provisions**			

_____
Authorized Representative

_____
Date of Issue

Figure 3.5 AIA Document G715, Supplemental Attachment for ACORD Certificate of Insurance 25-S

include protection of suppliers and subcontractors from nonpayment, and protection of the owner against mechanic's liens on the project.

Standard forms generally included in the contract document include AIA Document A312, Performance Bond and Payment Bond, EJCDC C-610, Construction Performance Bond, and C-615A, Construction Payment Bond (interim performance bond). Other bond forms are also available from ConsensusDOCS or from the insurance industry, certain owners, and from AHJs. The A/E reviews bonds only for conformance with administrative requirements, such as form, dates, and signatures. As with certificates of insurance, bonds are reviewed and approved by the owner in consultation with the owner's legal counsel, lending institutions, and insurance advisers. Copies of the approved bonds are distributed to the A/E, the owner, and the contractor. In some jurisdictions, bonds also must be filed with the local jurisdiction in order to be valid.

3.4.3 Other Forms of Construction-Related Bonds

In addition to performance and payment bonds, several other types of bonds are sometimes required for projects. These bond types include maintenance bonds, lien bonds, retainage bonds, and license and permit bonds.

Maintenance Bonds These bonds provide the owner with assurance that, when required by the contract, the contractor will provide ongoing maintenance services for the required period of time. Prior to receipt of an occupancy permit, the owner may be required to provide maintenance bonds to the AHJs to ensure future performance related to compliance with mitigation agreements.

Lien Bonds Lien bonds indemnify the owner against the cost to remove liens filed against the facility by the contractor, subcontractors, suppliers, and their employees.

Retainage Bonds If agreeable to the owner, the contractor may choose to submit a bond to the owner in lieu of having the owner withhold retainage from payments to the contractor. The bond provides protection to the owner similar to the protection that withholding retainage offers.

License and Permit Bonds Many AHJs require contractors to post bonds before they are allowed to operate as contractors. Certain contractors, such as heavy construction, excavation, and underground utility contractors, are often required to post bonds to ensure that the disturbance to an existing public roadway will be replaced or repaired in the exact manner prescribed by the AHJ.

3.4.4 Subcontractor Lists and Product Lists

Standard AIA general conditions require the contractor to submit a list of proposed subcontractors. Some owners may require these to be submitted with the contractor's bid or proposal. In order for the owner and the A/E to verify acceptability, the lists are required before work begins. These lists are prepared by the contractor, submitted to the A/E for review, and forwarded by the A/E to the owner for final approval.

If the owner or the A/E objects to any of the proposed subcontractors, the A/E notifies the contractor of the objection in writing. Changes to the lists may entitle the contractor to changes in the contract sum if the contractor incurs additional costs because of

the changes. The standard AIA and EJCDC general conditions state that the contractor will not be forced to use subcontractors to which the contractor has an objection. Refer to Figure 3.6 for sample CSI Form 1.5A.

Product lists may also be required and are a means for the A/E to verify that the contractor will use only specified products or approved substitutions. They are also valuable to the contractor in verifying that suppliers and subcontractors use products that comply with the specified requirements. Product lists are not to be used to propose substitutions. Even the smallest project contains hundreds of products, and these lists can be extensive and time consuming to produce. Only critical products are usually important enough to be listed and verified, and the contract documents need to be clear about which products need to be included. The A/E distributes the approved lists to consultants, the owner, and the contractor. The contractor is responsible for distributing these lists to subcontractors and suppliers, if applicable.

3.4.5 Schedule of Values

Many standard conditions of the contract, including general conditions prepared by AIA and EJCDC, require the contractor to submit a schedule of values before beginning the work. It is prepared by the contractor for use as the basis of the contractor's applications for payment. The schedule of values breaks the work down into smaller, measurable portions that the A/E and owner are able to observe, measure, and use to determine the percent complete.

The conditions of the contract and Division 01 requirements usually specify how the schedule of values is to be prepared and may require a specific form for the preparation of the schedule of values. Often, the values are itemized by specification section. The itemization can follow any form that the A/E specifies or that aids the review of the information required by the contract documents and allows prompt and accurate processing of later applications for payment. Separation of work activities into separate labor and material categories makes for easier review that allows for easier processing. The AIA publishes a standard form for this purpose, AIA Document G703, Continuation Sheet. Refer to Figure 3.7 for a sample continuation sheet. It is coordinated with AIA Document G702, Application and Certificate for Payment.

The schedule of values includes all the contract amounts. It is important to establish whether the contractor's profit and overhead are included under each item or listed separately. Providing a "general conditions" line item is helpful. It should be equal to the contractor's daily "project operational cost" over the time frame of the project. This establishes a basis for the cost of time extensions should they be necessary. Allowance items included in the contract are identified on the schedule of values as separate items, and their corresponding values indicated. The A/E is responsible for review of the schedule of values. The schedule of values is submitted to the A/E and approved before work on the project begins or prior to submission of the initial pay application. A draft schedule is often submitted by the contractor to ensure that it contains sufficient detail to meet with the A/E's approval prior to the contractor preparing the final schedule of values. Amounts should accurately reflect the value of work. *Front-end loading* is a deceptive technique, raising the amount of mobilization costs, supervision, or early work activities to improve contractor cash flow. Before recommending payment, the A/E may have to request substantiating information from the contractor concerning amounts listed. As construction proceeds, the schedule is updated to include amounts authorized by change order.

Knowledge for Creating and Sustaining the Built Environment

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____

_____

To (A/E): _____

_____

From (Contractor): _____

Date: _____

A/E Project Number: _____

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Form Version: July 1994
CSI Form 1.5A

Figure 3.6 CSI Form 1.5A, Subcontractors and Major Material Suppliers List

AIA® Document G703™ – 1992

Continuation Sheet

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

Figure 3.7 AIA Document G703, Continuation Sheet

3.4.6 Schedule of Inspections and Testing

A separate schedule of the required inspections and testing may be prepared to further supplement the overall project schedule. As with some of the other schedules, this schedule provides more detail for specific tasks. It includes required inspections, prerequisites for those inspections, and tests to be performed as part of the inspections by the AHJs.

3.4.7 Submittal Schedule

A submittal schedule is a valuable component of a comprehensive construction progress schedule. The contract documents may require the submittal schedule to be incorporated into the construction progress schedule. The submittal schedule is typically assembled by the contractor in consultation with subcontractors and suppliers. Many A/Es include a list of required submittals in the project manual or furnish one when a contractor is selected. When the A/E does not provide a list, the contractor compiles one by reviewing each section of the project manual.

In most instances, materials and equipment cannot be ordered or fabricated prior to receiving approval from the A/E during the submittal review process. Important considerations the contractor includes when preparing a submittal are:

- Time frame when the product or equipment is needed at the project
- Time necessary to produce the product and deliver it to the site
- Lead time required to prepare submittal
- Time required for the contractor to review the submittal
- Time required for the A/E or the owner's consultants to review the submittal
- Number of subcontractors affected by the information contained in the submittal
- Time necessary to correct and resubmit if original submittal is not approved
- Grouping or bundling of related submittals

Each item that requires submittal preparation, review, and approval is included on the overall program schedule and in more detail on the submittal schedule. This includes shop drawings, samples, product data sheets, and mock-ups that require approval. Adequate time needs to be allowed for each step in the process: preparation, submittal, review, and return to the contractor. If the submittal is coming from a subcontractor or supplier, or requires review by one or more of the A/E's consultants, additional time needs to be allowed. The submittal schedule usually has much more detail on the status of any given submittal than is included in the overall construction project schedule. Submittals are prepared and transmitted to the A/E over a period of time to prevent an influx of submittals at one time. This helps both the contractor and the A/E avoid delays in processing the submittal. All of this information needs to be considered and coordinated when the construction progress schedule is developed.

3.4.8 Construction Progress Schedule

The type of schedule specified for a project depends on the project requirements. The type of project delivery, extent of the project, and its contracts usually govern the degree

of detail specified for the schedule. The following are some important aspects of construction progress schedules:

- Contract time
- Milestone events and dates
- Submittal review and approval dates
- Coordination requirements and interrelationship of activities
- Related construction activities
- Lead time necessary to obtain products and equipment
- Activity durations
- Frequency of updates
- Type of reports required
- Project cost and manpower loading (if required)

The contractor is responsible for preparing a construction progress schedule that shows the estimated start and completion dates of the major activities of the construction process. The schedule may take any of several forms. EJCDC C-700, Standard General Conditions of the Construction Contract, also requires the contractor to submit a preliminary construction progress schedule for review prior to preparation and submittal of the final construction progress schedule. The two most frequently used schedule formats are the bar chart and the network analysis diagram, more commonly referred to as the critical path method (CPM) chart.

A bar chart is a graphic display of major activities in the form of bars overlaid on a calendar. Refer to Figure 3.8 for a sample bar chart schedule.

A network analysis diagram consists of a time analysis of a network of activities that outlines the steps needed to complete a project. The critical path is the path that establishes the optimum sequence and duration of operations between the first and last events.

In reviewing the construction progress schedule, the A/E determines whether the schedule meets specified contract time requirements and whether sufficient time has been allowed for processing submittals. The A/E need not approve the schedule but reviews it to see that it generally complies with contract requirements. The owner determines whether the schedule meets the owner's requirements and expectations.

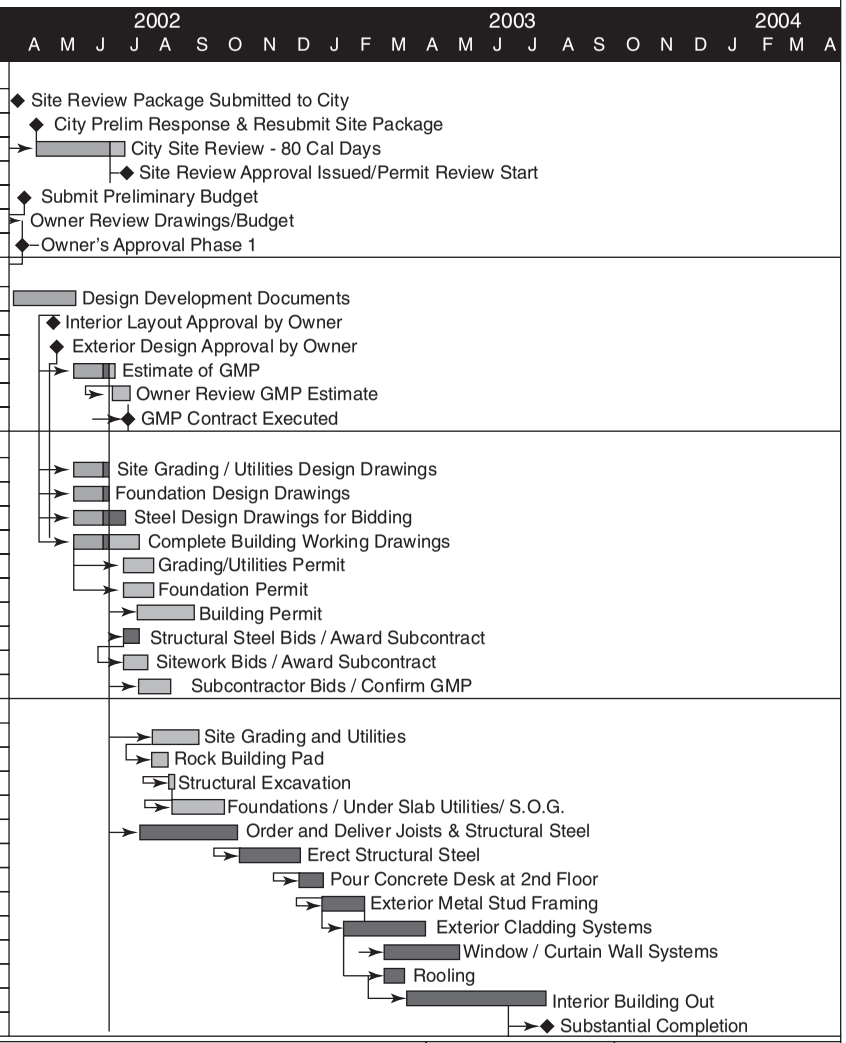
The schedule must be updated on a regular basis to account for work completed and modifications such as concealed and unknown conditions, delays, or other circumstances that affect the project. Monthly updating of the schedule is typical. It is especially helpful if the updated schedule is submitted along with the current month's application for payment. This may be specified as a prerequisite to approving payments. Because it is a coordination tool as well as a scheduling tool, the schedule is distributed to consultants, subcontractors, fabricators, and suppliers.

In some contracts, schedule revisions are allowed only by change order. If unanticipated conditions affect the project time, delay claims can be made following appropriate requirements and additional days may be added. However, if the project schedule falls too far behind, a "recovery schedule" may be required. This method requires, for example, work activities to shift so that multiple activities take place at the same time—activities that had not been originally planned that way. This allows time to be made up or recovered, thus getting the project back on track to maintain the original completion date.

Several different levels of construction progress schedules are used in projects. One or more of these schedule levels may be used in a single project. The more complex the project, the more likely that a combination of schedule levels will be used.

GUARANTEED MAXIMUM PRICE
PROJECT SCHEDULE

Act: ID	Description	Orig Dur	Rem Dur	Early Start	Early Finish
PHASE 1 - Schematic Design Studies					
205	Site Review Package Submitted to City	0	0		29MAR02 A
206	City Prelim Response & Resubmit Site Package	0	0		18APR02 A
210	City Site Review - 80 Cal Days	57d	10d	18APR02 A	08JUL02
220	Site Review Approval Issued/Permit Review Start	0	0		08JUL02
240	Submit Preliminary Budget	0	0	05APR02 A	
250	Owner Review Drawings/Budget	5d	0	05APR02 A	05APR02 A
260	Owner's Approval Phase 1	0	0		05APR02 A
PHASE 2 - Design Development Documents					
500	Design Development Documents	20d	0	29MAR02 A	24MAY02 A
501	Interior Layout Approval by Owner	0	0		03MAY02 A
505	Exterior Design Approval by Owner	0	0		07MAY02 A
510	Estimate of GMP	15d	4d	24MAY02 A	27JUN02
520	Owner Review GMP Estimate	10d	10d	28JUN02	12JUL02
530	GMP Contract Executed	0	0		12JUL02
PHASE 3 - Working Drawings, Specifications					
700	Site Grading / Utilities Design Drawings	20d	0	24MAR02 A	24JUN02 A
710	Foundation Design Drawings	20d	0	24MAY02 A	24JUN02 A
715	Steel Design Drawings for Bidding	20d	12d	24MAY02 A	10JUL02
720	Complete Building Working Drawings	40d	21d	24MAY02 A	23JUL02
730	Grading/Utilities Permit	20d	20d	09JUL02	05AUG02
735	Foundation Permit	20d	20d	09JUL02	05AUG02
750	Building Permit	35d	35d	24JUL02	11SEP02
755	Structural Steel Bids / Award Subcontract	10d	10d	11JUL02	24JUL02
765	Sitework Bids / Award Subcontract	15d	15d	11JUL02	31JUL02
770	Subcontractor Bids / Confirm GMP	20d	20d	24JUL02	20AUG02
PHASE 4 - Construction					
1000	Site Grading and Utilities	30d	30d	06AUG02	17SEP02
1020	Rock Building Pad	10d	10d	06AUG02	19AUG02
1025	Structural Excavation	3d	3d	20AUG02	22AUG02
1030	Foundations / Under Slab Utilities/ S.O.G.	35d	35d	23AUG02	11OCT02
1040	Order and Deliver Joists & Structural Steel	65d	65d	25JUL02	24OCT02
1050	Erect Structural Steel	40d	40d	25OCT02	20DEC02
1060	Pour Concrete Desk at 2nd Floor	15d	15d	19DEC02	10JAN03
1070	Exterior Metal Stud Framing	30d	30d	08JAN03	18FEB03
1110	Exterior Cladding Systems	55d	55d	29JAN03	15APR03
1120	Window / Curtain Wall Systems	50d	50d	07MAR03	15MAY03
1150	Rooling	15d	15d	07MAR03	27MAR03
1190	Interior Build Out	90d	90d	28MAR03	04AUG03
1200	Substantial Completion	0	0		04AUG03



Run date	25JUN02
Start date	29MAR02
Data date	24JUN02
Page number	1A
Page count	1A
Primavera Systems Inc.	

Early bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point

Figure 3.8 Sample Bar Chart Schedule

3.4.8.1 Overall Schedule

This is a comprehensive schedule that covers the entire project. This schedule is often a critical path schedule that starts at the inception of a project and concludes with final acceptance of the project. This schedule includes all major tasks as well as product submittals, reviews, approvals, and delivery dates. This schedule includes project closeout activities between substantial and final completion.

3.4.8.2 Short-Term Schedule

This is often the schedule that is most used during regularly scheduled project meetings. Although several different formats may be used, one of the most common is a short-term look-back and short-term look-ahead. A common duration is a four-week schedule, which may include one or two weeks looking back and two or three weeks looking ahead. This schedule differs from the overall schedule in that it is usually much more detailed, with emphasis on the interface between the various trades on the project.

3.4.8.3 Schedule Preparation

Preparation of an accurate and useful construction progress schedule is one of the most important preconstruction activities the contractor performs. Items to be considered include the following:

- The contractor sees the schedule as a road map, showing the beginning and completion points of the project. It is an extremely useful planning tool, which, when used properly, facilitates the smooth flow of work.
- To create an accurate and meaningful schedule, the contractor obtains schedules from all subcontractors and major suppliers. This information also includes submittals and the time required to prepare them.
- Milestones are included in the construction progress schedule to facilitate evaluation of interim progress.
- For a construction progress schedule to be used successfully, all parties must regularly attend schedule meetings, participate with active input, and abide by what has been agreed to.
- CPM is the most commonly used scheduling technique.
- The contract documents often set criteria to be addressed by the contractor's construction progress schedule. These may include:
  - Early start dates
  - Early finish dates
  - Late start dates
  - Late finish dates
  - Activity identification numbers
  - Activity descriptions
  - Float times
  - Resources
  - Interrelationships
  - Predecessing activities
  - Successing activities
  - Milestone dates
  - Actual start dates
  - Actual finish dates

3.4.8.4 Owner-Furnished, Contractor-Installed Items

When the contract includes owner-furnished, contractor-installed (OFCI) items, the schedule needs to include these items, showing required delivery and installation dates.

3.4.8.5 Work by Owner and Under Separate Contract(s)

If work is to be done by the owner and under separate contracts, which may impact the work of the contract, it should be reflected in the construction progress schedule.

3.4.8.6 Items Not in Contract

Items that are not in the contract (NIC) but are required in order to complete the project need to be included in the construction progress schedule. These items might be typically provided by the owner shortly prior to, or after, substantial completion. If these items have the potential to impact the contractor's project closeout activities, the contractor obtains accurate delivery and installation schedule information from the owner.

3.4.8.7 Submittal Processing Lead Times

As the contractor prepares the construction progress schedule, items that require submittals need to be included. To properly show this in the schedule, time is allowed for the subcontractor or supplier to prepare the submittal, the contractor to review and make any additional comments and changes, and contractor's delivery of submittals to the A/E. Adequate time for review or rejection by the A/E should also included in the schedule. Time is also allowed for revision and resubmission of submittals that are rejected by the A/E.

3.4.8.8 Order and Delivery Lead Times

When approved submittals have been received back from the A/E, fabrication and delivery of the materials to the site follow. Most contracts prescribe how long the A/E has to review submittals. Checking with the supplier determines how long to allow for fabrication and delivery. The combination of these provides the contractor with the information required for inclusion in the construction progress schedule.

3.4.8.9 Anticipated Weather Conditions and Potential Delays

The construction progress schedule should always include anticipated weather delays. In certain areas, it is reasonable to assume that heavy rain or snow may be encountered. This may affect activities such as excavation, concrete, masonry, and a variety of other tasks. In some contracts "weather days" are described so that only days in excess of those included can be granted as extensions to the contract. Weather should be taken into account at any rate.

One way of doing this is to include an activity or time allowance such as *weather delays* within the critical path, usually adjacent to the weather-sensitive activity. The weather activity has a duration assigned to it, based on the best historical meteorological information available to the contractor at the time of schedule preparation. As the work on this part of the project progresses, the weather activity needs to be updated constantly

to compare actual duration with planned duration. The difference in the two durations is the additional weather days or reduced weather days versus what was planned. When an activity is assigned to weather, it is important to correlate which specific work activities will be potentially delayed because of unsuitable weather.

If the contractor anticipates potential delays to specific activities that may delay the completion of the project, they are noted at the time the schedule is prepared and discussed with the project participants. As anticipated conditions change, the contractor identifies the potential for delay as early as possible to allow the A/E and owner an opportunity to take steps that may mitigate the impact of delays to the project.

3.4.8.10 Establishing the Project's Critical Path (Early Completion, Late Completion)

The *critical path* can be defined as "that head-to-tail path of sequential activities that requires the longest total time for accomplishment." A critical path schedule identifies those tasks whose completion dates cannot slip without affecting the completion date of the project. Submittals and the review of submittals are part of the critical path. It is important for the project participants to understand which items are on the critical path and prioritize those tasks. A critical path schedule identifies both an early and a late start date, as well as an early and a late completion date for a task. The late completion date needs to be compared with the contract completion date. If the completion date is later than the contract completion date, the contractor needs to consider options such as overtime, double shifts, increasing crew size, and changing the sequence of certain work to complete the project on schedule.

3.4.8.11 Establishing the Project Float

Float is the amount of extra time available to an activity when all activities begin as early as possible. Free float is uniquely available to an activity, while total float is the accumulation of the entire free float in a project. When preparing a schedule, it is important to determine who owns the float in a project.

The conditions of the contract or Division 01 of the specifications may specifically address ownership of schedule float.

3.4.8.12 Schedule Meetings and Updates

The duration of a project may dictate how often schedule meetings are held. Weekly schedule meetings are common for large and complex projects involving multiple trades. For small projects with a limited number of participants, weekly schedule meetings may be unnecessary and an every-other-week format may be more appropriate; or they may be integrated with the regular progress meetings. Regardless of the frequency of schedule meetings, the schedule must be updated constantly, reflecting the actual start and finish dates for activities and consequently the critical path. The contractor and owner need to constantly evaluate tasks on the critical path. When critical activities are affected, the completion date of the project is also affected. If claims result because of schedule delays, it is important that the schedule accurately report what really happened and time frames for activities. This benefits both the owner and the contractor by establishing an audit trail of the project.

Although the owner uses the schedule for planning and measuring work progress versus cost progress, it is the contractor's responsibility to keep the schedule updated and

current. Often, the contract prescribes regular update intervals. If these updates are not met, the owner may have the right to withhold the contractor's progress payments.

3.4.8.13 Contract Time

Contract time can be measured in several different ways. The contract states how contract time is to be measured. Working and calendar days are the two most common methods of establishing contract time. Typical general conditions from AIA or EJCDC indicate that calendar days are used unless modified by supplementary conditions. Preparation of the construction progress schedule needs to recognize which method of measurement will be used to keep track of contract time. The contract identifies what begins and ends contract time. Beginning contract time may be initiated by the signing of the contract by the last party or by issuance of a notice to proceed by the owner. Contract completion and contract time are two different items and the terms should not be used interchangeably. Contract time typically ends at substantial completion. Substantial completion is the date stipulated by the A/E as when the project has been completed to a stage where the owner may take beneficial occupancy and use the facility for the purpose for which it is intended. Contract completion is normally when all punch list items have been completed as verified by a final inspection and the contractor has received final payment. It is important to know the beginning and ending milestones for contract time and include all activities that affect them in the construction progress schedule.

3.4.8.14 Impact of Penalty and Bonus Provisions

Penalty and bonus provisions must be fully understood and evaluated when preparing the schedule. The contractor considers whether the amount of penalty exceeds the costs of overtime or double shifts. Penalties are not always limited to time, but may be a result of not meeting minimum requirements. Asphalt is a good example of this. For instance, if a minimum compaction specification is not met, the contractor may be penalized by a dollar sum proportionate to the percent of the compaction under the minimum requirement. Conversely, a bonus may be offered when a compaction range is exceeded. The contractor may receive a bonus for early completion of the project. Often, the owner has assigned a dollar amount to each day of available service. If the contractor can complete the project early, it may be of sufficient benefit to the owner to reward the contractor with a bonus payment. The contractor may choose to work overtime or double shifts or aggressively sequence the work if the bonus amount exceeds the extra costs to complete the project early.

3.4.8.15 Impact of Liquidated Damage Provisions

Many contracts that indicate "time is of the essence" also include liquidated damage provisions. This is the amount that the owner has determined it will cost to not have use of the facility. Liquidated damages are usually assessed for each day beyond the designated substantial completion date that the project is not completed. Liquidated damages apply to substantial completion delays (delays beyond the date established for owner to have beneficial occupancy of a project or designated portion thereof). The dollar amount of liquidated damages is identified in the contract. Maintenance of the critical path construction progress schedule audit trail is often an important factor in determining liquidated damages, especially for owner-caused delays. When owner-caused delays extend the completion date of the contract, the contractor is not assessed liquidated damages.

Conversely, when contractor-caused delays extend the completion date, liquidated damages typically apply. The contractor evaluates the amount of liquidated damages and weighs these against the cost of working overtime or double shifts to complete the project on schedule.

3.5 Permits and Regulatory Issues

Nearly every project requires that appropriate permits be obtained before construction can begin. The permit process begins when an owner or A/E submits a set of construction documents to the AHJ for review. For any given project, an AHJ may be a city, county, state, or federal agency. There might be more than one AHJ, which might involve several agencies. An AHJ reviews the documents and requests additional information or clarification if necessary, then issues the appropriate permits for construction. These permits usually include an overall building permit, supplemented by specialty permits for specific portions of the project such as temporary erosion control, surface water management, environmental mitigation work, traffic control, mechanical work, plumbing work, fire sprinkler system, electrical work, and fire alarm system.

3.5.1 Obtaining and Maintaining Permit Documents at Site

A variety of permit documents must be obtained and maintained at the construction site. Permits issued for the project are posted and accessible on-site. Permit documents reviewed and stamped by the AHJs need to be available for review by inspectors to avoid unnecessary delays or return trips. These documents need to be stored at the site in a manner that allows for ready access for use by AHJs but also protects the documents from accidental damage or removal from the contractor's temporary office area.

3.5.2 Resolving Outstanding Regulatory Issues from Code Review Process

Outstanding regulatory issues need to be resolved as early in the construction process as possible, preferably during the code review process. When plan review issues are not resolved at an early stage, additional costs and potential project delays may be incurred when construction has progressed to a point where resolution affects work already in place.

3.5.3 Regulatory Inspections and Approvals

Regulatory inspections and approvals are critical to the project proceeding on schedule. Inspections such as concrete, reinforcing, structural framing, insulation, elevator, mechanical, plumbing, fire protection, electrical rough-in, and others are included in the contractor's construction progress schedule so they are planned for and appropriate advance notice is given to the AHJs.

3.6 Preconstruction Meetings

Preconstruction meetings are important for establishing the ground rules for communication and for explaining the administrative process. In many cases, a single meeting is all that is required; however, large or complex projects may require more than one meeting. Typical preconstruction meeting types are addressed in Chapter 4, "Meetings."

3.7 Verification of Site Conditions

It is important to establish the site conditions prior to starting any construction activities, including mobilization. The documented conditions establish the existing circumstances in case damage occurs to existing facilities or adjacent properties, or if unknown or concealed conditions are encountered later in the project. When foundation work is required in a project, often geotechnical data such as boring logs will be part of the construction documents to help indicate the subsurface conditions. Boring logs represent the various materials, such as soils, clay, cemented gravels, sand, rock, and water that are likely to be encountered in the boring location during excavation or pile driving. These subsurface reports are typically furnished for "Informational Purposes Only." The geotechnical data and subsurface condition reports are not usually a part of the contract documents and should not be used as a basis for bid preparation concerning the site. Existing conditions may also include an existing facility and drawings previously prepared for the existing facility's construction. This information might be included as "Available Information" and not as contract documents or requirements for contractor conducted investigations may be included in Division 02–Existing Conditions. When the information is made available, it can reduce the likelihood of unknown or concealed conditions claims during the project.

3.7.1 Documenting Existing Conditions

It is prudent to take preconstruction photographs of existing facilities, surroundings, landscaping, and adjacent properties prior to moving onto the site. Photographs include the date taken and location, and a description of the subject. Preconstruction photographs may assist in resolving disputes later in the project. This can be especially important in renovation and remodeling projects.

3.7.2 Avoiding Disputes over Damage Caused by Construction Activities

If proper examination and documentation have determined preexisting site conditions, then disputes over damage caused by construction activities will be minimized. A related element, however, is damage to new work during construction. This happens when one type or element of work has been completed but is not sufficiently protected from other, subsequent work. Trades that follow each other must exercise care to protect work that

has been completed previously. As elements of the work are completed, inspection and documentation are performed to establish the condition of the work prior to subsequent work beginning. Again, photographs are a good way to document the condition of the work prior to the subsequent work commencing. If inspections and documentation are not handled correctly, disputes can arise related to determining who will bear the cost of repair or replacement.

3.8 Mobilization

The contractor's first activity on the project site is typically mobilization. Mobilization entails setting up the temporary facilities that the contractor will need to perform the work required by the project. Mobilization typically occurs after receipt of a notice to proceed and following a preconstruction meeting and a site mobilization meeting. The mobilization process has several elements that need to be carefully planned and followed.

3.8.1 Use of the Project Site

Details for use of the project site are addressed in the site mobilization meeting. These details identify entrances and access to the work, traffic, parking, and staging areas for various subcontractors and how materials and supplies will be received and unloaded. Mobilization might also involve protection of the landscape including trees, lawns, and site furnishings. Protection may include placing geotextile fabric and rock to prevent damage to the existing trees and slopes. Vehicular exits from project site may require provisions to prevent mud and other debris from being tracked off-site.

3.8.2 Project Site Security

Project site security measures have become a more important issue as the frequency of theft and vandalism at construction sites has continued to rise. The most basic project site security usually involves a temporary fence around the office, storage yard, or other facilities where tools, equipment, and products are stored. Lock protection devices designed to make it more difficult to cut a lock or break open a door may also be employed. The windows of some temporary offices are fitted with bars or security screens. Lights, video cameras, security guards, and burglar alarms are other means of increasing project site security. Project site security may also involve existing facilities and employee identification.

3.8.3 Temporary Facilities

Temporary facilities can include project office trailers; storage trailers for tools, equipment, and material; temporary testing laboratories, when required; and other storage facilities. Often, the temporary facilities are among the first items to be moved onto the construction site. On facility alteration projects, the contractor may be able to use portions of the existing building for office and meeting spaces for all or a portion of the project duration.

3.8.4 Temporary Utilities

Temporary utilities can include temporary sanitation facilities (portable toilets), temporary electric power drops, water hookups, and telephone and fax service. Temporary utilities may also include provision of temporary heating, ventilating, and lighting required to allow work on the project to progress. Provision and connection of the temporary utilities are usually scheduled as soon as possible after the temporary facilities are in place.

3.8.5 Temporary Controls

Temporary controls can include sediment or erosion control, pest control, or controlled access. This is by no means a complete list, as every project has different requirements. A common denominator of temporary controls is that they direct or eliminate undesirable issues during the project, but are removed when the work is completed.

3.8.6 Equipment

Part of the site usage plan typically addresses the type of equipment that may be used on-site, as well as where it is to be located. Because construction sites are often quite congested, parking space may be at a premium, which will limit how many vehicles or pieces of equipment can be kept on-site.

3.8.7 Environmental Protection Requirements

Often, before temporary facilities can be set up, environmental provisions must first be in place. This is especially true on infrastructure projects. These provisions might include silt fences, inlet protection, tree and plant protection, temporary seeding and mulching, slope netting, or a variety of other requirements. It is important to understand all permit requirements and ensure that environmental protection requirements are complied with from the beginning. Environmental protection requirements may also include restrictions on certain types of work at different times of the year, such as in-stream work and work adjacent to a waterway.

3.8.8 Project Site Safety

Safety is one of the most important components of a project. Project site safety concerns must be addressed and safety regulations complied with throughout the construction stage. Project site safety cannot be ignored by any of the parties to the contract. It is the contractor's responsibility to enforce project site safety and take necessary measures to correct unsafe conditions. During the preconstruction and site mobilization meetings, project site safety requirements and expectations should be clearly identified. Most construction companies have safety plans as well as safety personnel. Both should be utilized when available. The plans, typically written documents, should be available to construction personnel on site at all times.

3.8.9 Utility Locations

Before any type of construction work begins, including trenching to feed temporary utilities, the contractor needs to obtain existing utility locations. Most jurisdictions now make utility locating the contractor's express responsibility. If the contractor proceeds with work before having the existing utilities located, the contractor does so at the contractor's own risk and bears the liability for damage to and disruption of utilities.

It is important to understand the specific requirements after location of utilities has been completed. Often, there is language that stipulates a horizontal tolerance for the located utilities. For instance, the located utility line may be plus or minus one foot from the painted line. This is important to know before starting excavation work.

Overhead utility locations should also be documented. Site grade revisions may bring existing lines in close proximity to construction equipment and personnel.

3.8.10 Survey/Layout/Datum

Survey datum points are typically shown on the drawings. Typically, the preconstruction or site mobilization meeting agenda includes identifying where the survey datum points are located, as well as survey layout responsibilities. Typically, two or more survey data reference points are shown on the drawings. These points may indicate lot corners or elevations that have been established before the project begins. This information needs to be clearly communicated to the contractor, and the contractor needs to clearly communicate this information to appropriate subcontractors, so everyone is working from the same information and knows where to find the data points on-site.

Chapter 4
Meetings

Effective meetings are an important part of contractor project management and construction contract administration (CCA). They give the participants an opportunity to share information, exchange ideas, and make decisions. Meetings facilitate coordination of the work and resolution of issues and help to prevent or resolve problems. Effectively administered meetings have a PAL—a purpose, an agenda, and a time limit. Meetings with published agendas and on-topic discussions that convene and adjourn on schedule will contribute to a team approach in construction.

The type and frequency of meetings required for a project vary, depending on the project requirements and project delivery method. Responsibility for meeting administration and meeting participants also varies. On small design-negotiate-build (D-N-B) or owner-build (O-B) projects, meetings might be scheduled on an as-needed basis and be attended only by the owner, architect/engineer (A/E), and contractor. Meetings for a publicly funded design-bid-build (D-B-B) project might be scheduled on a weekly basis, administered by the A/E, and attended by the owner, consultants, the contractor, subcontractors, and material suppliers. Meetings on Building Information Modeling (BIM)-based projects, or on projects seeking certification based on a sustainable construction ratings system, may include additional representatives and occur on a variety of schedules during design and construction. Meeting administration might also be the responsibility of the contractor or construction manager. Design-build (D-B) project meetings might be scheduled on a periodic basis, administered by the design-builder, and attended by owner, design-builder, A/E, consultants, subcontractors, and suppliers.

4.1 Procedures and Administration

The specification sections in Division 01 typically identify the types of meetings to be held during the construction stage. The Division 01 specifications may also establish the administrative and procedural requirements for the meetings, including the frequency of meetings, the participants, meeting administration, topics for discussion, and the meeting facilities required. In addition, sections in Divisions 02 through 49 may also contain requirements for meetings, such as meetings required prior to installation of certain products and coordination meetings.

4.1.1 Location and Facilities

During construction, meetings usually take place at or near the site. The extent of the project often relates directly to the facilities needed for meetings. Requirements can range from large meeting rooms with tables and chairs to small meeting areas in a trailer at the site.

4.1.2 Schedule

Meetings should be scheduled and attendees notified in sufficient time for them to prepare for the meeting. All meetings should have a stated purpose and an agenda. The scheduled interval and duration should be appropriate for the purpose and complexity of the subject matter. The schedule for meetings should not be considered grounds for delaying decisions affecting the progress or process of the work. Special meetings may be called to resolve specific issues.

4.1.3 Participants

Effective meetings involve individuals appropriate for the issues on the agenda. Ideally, attendees have the authority to represent their respective interests because binding decisions may be required and agreements reached may have legal implications for the parties involved. All decisions and commitments should be recorded in the minutes.

4.1.4 Administration

One individual is designated to preside over the meeting to maintain focus and order. This individual is responsible for preparing the agenda, distributing the agenda to meeting participants prior to the meeting, convening and adjourning the meeting on time, and ensuring that minutes are distributed to participants in a timely manner. The contract documents normally establish who will perform this function.

4.1.5 Minutes

The subject matter of a meeting may make it difficult for the person conducting to also record the meeting minutes. However, one of the primary participants must be delegated the responsibility for the minutes. Minutes record the date, time, location, and weather conditions at the time of the meeting. Meeting minutes include a list of attendees with their respective company names and phone numbers. Fax numbers and e-mail addresses may also be included. This is easily accomplished by passing around a sign-in sheet. An indication of late arrivals and early departures should be noted. Minutes should follow the agenda and be in a format that allows easy identification of the actions required of each participant. Verbatim transcriptions are not necessary, but the essence of the subjects discussed, as well as decisions reached, should be documented. Timely distribution of minutes should be made to each participant as well as to others affected by the decisions made. Opportunity should be given for participants to respond to the accuracy of the minutes. If there are corrections or comments, these should be distributed in the same manner.

Interpretations of documents discussed during meetings are followed up with written documentation. Written minutes are not contract documents. Changes involving cost and time are required to be processed according to the contract documents.

4.2 Types of Meetings

Many types of meetings are convened during the course of a project, from preconstruction meetings through closeout meetings. Although some types of meetings are required for most projects, such as periodic meetings to review project progress related to processing the contractor's applications for payment, the meetings required for a project vary depending on the project extent and project delivery method.

4.2.1 Preconstruction Meetings

Preconstruction meetings are important for introducing the project team, establishing the ground rules for communication, and explaining the administrative process. In many cases, a single meeting is all that is required; however, large, complex, or multiple-prime contractor projects may require more than one meeting. A procedural meeting may cover administrative procedures, such as communication, submittals, testing, and inspection. A second mobilization meeting may address use of the site.

4.2.1.1 Procedural Meeting

This meeting (often referred to as the preconstruction meeting) is held before the start of construction. This meeting is important for establishing the desired attitude and direction for the entire construction process. The purpose of the procedural meeting is to review and clarify:

- Individuals who represent the parties to the contract
- Individuals who have contractual authority to sign change orders and make binding decisions
- Responsibilities of the parties to the contract
- Lines of communication
- Duties of project personnel
- Contract documents to be distributed
- Submission requirements for the list of subcontractors, materials, equipment, and named products
- Procedures for measurement and payment, including the schedule of values and applications for payment
- Procedures for contract modifications, including minor changes, change directives, proposal requests, and change orders
- Preliminary schedule, construction progress schedule, and submittal schedule
- Importance of complete, correct, and timely submittals, as well as scheduled dates
- Critical issues
- Long-lead items and their relationship to critical dates
- Procedures for requests for interpretations (RFIs)
- Submittal procedures for shop drawings, product data, and samples
- Requirements for quality control, quality assurance, and informational submittals
- Submittals required for closeout

- Product options and substitutions permitted, and explanation of the ground rules and procedures associated with them
- Procedures for field decisions and filing claims
- Procedures for testing and inspection, including timely notification when the work is ready for testing and inspection
- Responsibilities and limitations of authority of an inspection service or laboratory, and distribution of reports
- Maintaining construction tolerances
- Procedures for maintaining record documents
- Schedule for project meetings
- Date that the notice to proceed was issued and contract completion date(s)
- Use of partnering (a partnering session is often included in this meeting.)
- Procedural meetings for sustainable projects may include environmental requirements and procedures such as:
  - Solid Waste Management Plan
  - Indoor Air Quality (IAQ) Management Plan
  - Procedures for noise and acoustics management
  - Environmental Management Plan
  - Environmental Regulatory Requirements

The procedural meeting usually includes the owner, contractor, and A/E as well as support personnel involved in the construction stage, such as the consultants, testing agencies, and the contractor's project manager, superintendent, or foreman. The major subcontractors and major suppliers may also be represented. For design-build (D-B) or construction manager as adviser (CMa)/construction manager as constructor (CMc) project delivery, the design-builder or construction manager may schedule and administer the meeting.

4.2.1.2 Site Mobilization Meeting

On some projects, a site mobilization meeting may be held separately from the preconstruction meeting. Typically held at the project site, a site mobilization meeting addresses issues about site use. For sustainable projects trying to obtain credit for reduced site disturbance, the meeting should address allowable uses and limitations on site use. If the project involves remodeling, renovation, alterations, or an addition to an existing facility, use of the facility and adjacent facilities can be significant issues. If the owner or tenants will continue to use the existing facility or areas affected by the work, consideration for access and use by the public may be critical. Among the items that are considered are:

- Access to the site, such as construction entrance and egress locations, including access roads, parking restrictions, and site security
- Environmental controls such as silt fences, biobags, inlet protection, temporary seeding and mulching, and oil booms and containment systems when working over or near water
- Material storage areas and allocation of space for contractor and subcontractor field offices and trailers
- Identification of benchmarks and data, including survey and layout of work

- Use of site and existing facilities by contractor and owner, including access to buildings or areas, use of elevators, use of toilet facilities, and maintenance of fire exits. For public infrastructure projects, this might involve traffic control, detours, and barriers.
- Occupancy and use by owner, tenants, and public during the construction stage, including partial use and occupancy of completed work, and the related coordination of insurance requirements.
- Separation of work areas, barriers, environmental controls, and dust control.
- Maintenance of site, including traffic control, cleaning, trash removal, and snow removal, if applicable.
- Hours of work, including requirements for noise control.
- Protection of existing materials and equipment to remain in place.
- Use of existing utilities, consumption limitations, and prior notification of interruption of services or system operations.
- Project phasing or sequencing.

The site mobilization meeting typically focuses on the contractor, the subcontractors, and their use of the site, whereas the preconstruction meeting typically focuses on contractor project management and CCA procedures.

4.2.1.3 Utility Coordination Meeting

On a project including significant utility work, or where significant utility relocation work is required, it is prudent to have a utility coordination meeting. This meeting is usually held shortly after the preconstruction meeting. Participants may include representatives from the utility providers serving the project. Just as with the other meetings, a detailed agenda should be distributed ahead of time, so that the meeting participants can come to the meeting prepared to address utility issues related to the project.

Issues that may be addressed at the utility meeting include:

- Establishing that the contract documents accurately reflect the work required and that they meet the utility providers' stipulations
- Identifying the best time for each utility provider to perform its work
- Identifying the interface with other utility providers for work that must occur concurrently
- Establishing duration of each utility provider's work
- Identifying the primary contact person
- Establishing how much notification (lead time) each utility provider will require to mobilize
- Identifying whether there are related costs that have not been identified
- Determining or confirming who will do the locating work for each utility provider
- Identifying special inspection requirements

Regardless of the project extent, a utility coordination meeting might be required by utility providers as a precondition of future connection to utilities.

4.2.1.4 Authorities Having Jurisdiction

The authorities having jurisdiction (AHJs) may require preconstruction meetings. Participants may include the AHJs, owner, A/E, contractor, testing laboratory, inspectors, and consultants. Typical topics include:

- Required permits and fees
- Advance notice required for inspections
- Routing of test reports
- Supplemental information that must be on-site at the time of inspection
- Fees for reinspection if work is not ready for inspection
- Public safety and impact of the project on the public

As with any other meeting, someone should be assigned responsibility to prepare and distribute a detailed agenda and minutes to all meeting participants for review and correction if necessary.

As with utility coordination meetings, the AHJs may require these meetings prior to any work beginning at the site, so that all participants understand the requirements.

4.2.2 Progress Meetings

Progress meetings concern the progress of the work. They provide a forum in which matters pertinent to the timely completion of the work can be discussed. The frequency and length of progress meetings depend on the extent of the project and the project delivery method. For complex projects or projects of short duration, daily or weekly meetings might be necessary. Regular progress meetings facilitate coordination and administration of a project.

Progress meetings involving the A/E and the contractor typically occur prior to submission of an application for payment. Meetings to review applications for payment may also include the owner, design-builder, or construction manager. Progress meetings might also be scheduled when requested by a member of the project team.

Some of the participants commonly included in progress meetings are:

- Owner
- Construction manager, if applicable
- Design-builder, if applicable
- A/E
- A/E's consultants, as appropriate to the agenda
- Contractor's project manager
- Contractor's project superintendent or foreman
- Subcontractors, as appropriate to the agenda
- Suppliers, as appropriate to the agenda
- Testing and inspection services, as appropriate to the agenda

The agenda normally includes as many of the following subjects as are appropriate to the construction:

- Minutes of previous meeting:
  - Review and approval of minutes
  - Objections, exceptions, and amendments to minutes
  - Status of action items/old business
- Progress and schedule:
  - Progress since last meeting
  - Current activities
  - Critical activities
  - Construction progress schedule
  - Deviations from schedule/recovery plans
  - Schedule for next period
  - Items that could alter the construction progress schedule
  - Off-site fabrication and delivery schedules
  - Submittal schedules
  - Corrective measures to regain projected dates
  - Revision to construction progress schedule
  - Coordination of schedules
- Material and equipment:
  - Submittal dispositions
  - Substitutions
  - Status of ordering
  - Delivery issues
  - Storage and protection of materials and equipment, both on-site and off-site, if applicable
  - Maintenance standards
- Deficiencies:
  - Identification of items
  - Status of correction
  - Field observations, problems, and conflicts
- Requests for interpretations (RFIs): Status of clarification
- Progress payments/applications:
  - Percentages of completion
  - Monies withheld
  - Stored materials
- Changes and modifications:
  - Status of minor changes—supplemental instructions (American Institute of Architects [AIA]) or field orders (Engineers Joint Contract Documents Committee [EJCDC])
  - Status of proposal requests
  - Status of change orders
  - Pending changes
  - Effect of changes on schedules
  - Pending claims and disputes
- Record documents: Maintenance of documents
- Sustainable project items:
  - Solid Waste Management Plan

  - IAQ Management Plan
  - Procedures for noise and acoustics management
  - Environmental Management Plan
  - Environmental Regulatory Requirements
  - Commissioning
- Action items:
  - Identification of items
  - Assignment of tasks
  - Critical dates for completion
- Other new issues
- Date/time set for next meeting

4.2.3 Contractor/Subcontractor Meetings

Contractor/subcontractor meetings address the progress and scheduling of the work, coordination between the contractor and subcontractors, and coordination between two or more subcontractors. These meetings frequently address contract issues such as applications for payment, project site safety, RFIs, and contract modifications.

Contractor/subcontractor meetings may be incorporated into progress meetings with the A/E and owner or may be scheduled as separate meetings. Because these meetings typically address ongoing coordination issues between the contractor and subcontractors, they are scheduled on a regular basis. It might also be necessary to schedule contractor/subcontractor meetings outside of the regular meeting schedule.

A contractor/subcontractor meeting may be narrower in scope than other types of meetings, focusing on a particular trade or element of the work. As the focus becomes narrower, the subjects of discussion will be addressed at a greater level of detail than they would be in a progress meeting.

Some of the participants commonly included in a contractor/subcontractor meeting are:

- Contractor's project manager
- Contractor's project superintendent or foreman
- Subcontractors' project managers
- Subcontractors' superintendents or foremen
- Manufacturers' representatives, if applicable
- Owner, if applicable
- A/E, if applicable
- A/E's consultants, as appropriate to the agenda
- Testing and inspection personnel, as appropriate to the agenda

The agenda typically includes many of the subjects as progress meetings plus items appropriate to subcontractors such as:

- Progress payments/applications:
  - Documentation of deficiencies
  - Material certifications
  - Warranties
- Changes and modifications: Requests for more detailed documentation for proposed change order work or costs

- Coordination issues:
  - Clarification of issues related to overlapping contractor and subcontractor work
  - Identification of work sequence affecting more than one subcontractor

4.2.4 Preinstallation Meetings

Preinstallation meetings help to clarify installation procedures, phasing, and coordination of the participants and processes involved in the installation of a specific product or system. These meetings are usually specified to focus on specific concerns and do not relieve the contractor of the responsibility to coordinate the work.

The coordination of installation requirements is important and is a requirement of many aspects of the construction process. The requirement for a preinstallation meeting, stated in the specifications, is usually based on the nature of the installation, complexity, and interrelationship of the installation with other work. These meetings help the participants understand the complexities of the proper installation of certain materials and products according to the contract documents.

The preinstallation meeting is a form of quality assurance (QA) specified in PART 1—GENERAL of a specification section. These meetings are normally convened at least one week before installation. Earlier scheduling might be required for complex installations or to verify that supporting substrates or services are properly in place. Preinstallation meetings are commonly specified for paving, masonry, waterproofing, roofing, and certain finishes. In addition to the subcontractor or supplier furnishing and installing the product, subcontractors and suppliers who have an interrelated interest in the installation may be asked to attend a preinstallation meeting. For instance, the floor-covering subcontractor may be asked to participate in the preinstallation meeting for concrete floor slab curing and sealing. Participants normally required to attend a preinstallation conference include:

- Contractor
- Subcontractor (installer, applicator, or erector)
- Material or equipment supplier
- Manufacturer's technical representative
- Others directly affecting or affected by the work
- Design-builder, if applicable
- Construction manager, if applicable
- A/E
- A/E's consultants, as appropriate to the specified requirements
- Testing agency, if applicable
- Owner/facilities maintenance personnel

Because this is specifically a coordination meeting, the contractor's superintendent or foreman is typically responsible for scheduling the meeting. It is held at the site where the conditions of installation, preparation, and installation procedures can be reviewed and coordinated with related work. Necessary information such as approved submittals (shop drawings and product data) and installation instructions, the project manual, and drawings (with addenda marked as applicable), and any subsequent to the contract documents, such as additional drawings issued, should be readily available. Written documentation (minutes) of the meeting are recorded and copies distributed to all participants.

Preinstallation meetings are often conducted to:

- Ascertain access to the work
- Review conditions of proper installation and environmental conditions
- Identify conditions detrimental to the installation
- Review preparation procedures, including protection of adjacent work
- Verify installer's receipt and understanding of installation instructions
- Review submittals, installation procedures, and sequence
- Review coordination with other work such as substrates, connections, transitions, and existing and surrounding conditions
- Evaluate delivery schedule and progress schedule
- Observe a sample installation
- Convey required protection procedures
- Evaluate, document, and approve field samples and mock-ups

4.2.5 Closeout Meeting

The closeout meeting is used to review requirements for the completion of the contract and to obtain submittal of the necessary final documents. Separate meetings may be required for substantial completion, final completion, and warranty reviews. Review of closeout procedures at the initial progress meeting or preconstruction meeting is recommended. Many of the closeout documents are prepared during construction, even though their submission is not required until the project is nearing completion. These documents might include record documents, operations and maintenance (O&M) data, manufacturer certification of installations, and interim inspections and testing. As a project nears completion, a review of the requirements for substantial completion helps to facilitate a smooth conclusion. Issues likely to be addressed at a closeout meeting include:

- Starting systems
- Testing, adjusting, and balancing
- Demonstration and training
- Contractor's inspection of work
- Indoor air quality procedures
- Commissioning procedures
- Contractor's preparation of an initial punch list
- Procedure to request A/E inspection to determine the date of substantial completion
- Completion time for correcting defective work
- Inspections by AHJs
- Certificate of use or occupancy and transfer of insurance responsibilities
- Partial release of Retainage
- Final cleaning
- Preparation for final inspection
- Closeout submittals:
  - Record documents
  - Operation data

  - Maintenance data
  - Maintenance materials
  - Product warranties
  - Affidavits
  - Final application for payment
- Contractor's demobilization of site
- O&M

The closeout meeting is also the time to establish communication pathways for call-back and warranty-type issues, and setting the documentation protocol for notification and confirmation of corrective action being complete. This is typically a shift from all communication flowing through the AE to direct communication between the owner and the contractor (during the warranty period) or the appropriate manufacturer/product provider.

4.2.6 Other Meetings

Other meetings may be scheduled by the contractor, owner, A/E, construction manager, or design-builder on an as-needed basis. The contractor may schedule meetings to address internal management, organization, operation, coordination, and safety issues. The owner may schedule meetings to address coordination with separate contractors, select colors, or coordinate move-in plans. Special meetings may also be scheduled to coordinate sustainability issues. A design-builder may schedule meetings to address coordination between the contractor and the A/E. Special meetings scheduled for a specific purpose usually do not involve or require attendance of the entire project team.

Chapter 5
Submittals

During the construction of a traditional design-bid-build (D-B-B) delivery method for a project, the contractor is usually required by the contract documents to submit product data, shop drawings, samples, informational submittals, closeout submittals, and maintenance material submittals to the architect/engineer (A/E) for review. These submittals are not contract documents, unless specifically identified as such in the contract documents, and are not to be used by the contractor or the A/E to modify the contract. Submittals convey information about systems, equipment, materials, products, and administrative matters. They provide important information to the A/E and, through the A/E, to the owner. Submittals are also an important part of the quality assurance (QA) for a project. They indicate how the contractor, subcontractors, fabricators, and suppliers intend to fulfill portions of the contract document requirements. They also provide the owner with information on products and equipment incorporated into the facility. This information, in combination with operation and maintenance (O&M) data, is useful for facility management activities and when future facility modifications or replacements are being considered.

Submittals are not requests for substitution and are not to be used as such. Substitution items not submitted through the established substitution process are usually rejected. If an item is to be considered a substitution for a specified item, the item must be submitted and approved as a substitution prior to being reviewed as a submittal. Refer to Chapter 8, "Interpretations and Modifications," for more information on substitution procedures and a sample substitution request form. Three basic categories of submittals are common to construction projects: preconstruction submittals, construction submittals, and project closeout submittals.

In a nontraditional project delivery (e.g., Integrated Project Delivery [IPD]), some construction contract administration activities may shift from the construction phase to the design phase. Submittals are one of these activities. Submission review is blended into a design process that affects the drawings and specifications as they are being developed; hence, submittals are more like construction documents and become an integral part of the document development phase of a project.

5.1 Contract Documents

Administrative and procedural requirements governing submittals during the construction stage are contained in the conditions of the contract and Division 01—General Requirements. Standard general conditions, such as American Institute of Architects (AIA) Document A201, General Conditions of the Contract for Construction, and the Engineers Joint Contract Documents Committee (EJCDC) C-700, Standard General

Conditions of the Construction Contract, require the contractor to prepare, review, and forward various submittals to the A/E. The conditions of the contract also clarify the A/E's role in using professional judgment to review, approve, or take other appropriate action on the submittals.

Both AIA Document A201 and EJCDC C-700 require the contractor to submit a schedule of submittals coordinated with the construction progress schedule to allow for timely submission and adequate review time of construction submittals.

Supplementary conditions modify the general conditions to accommodate specific project conditions: owner's varying requirements, office procedures, or other unique aspects of the project. Division 01 specification sections expand on the general and supplementary conditions and specify more detailed administrative and procedural requirements for submittals required in Divisions 02 through 49 of the specifications.

The Division 01 submittal section will usually stipulate the amount of review time needed by the A/E to render professional judgment on submittals. The Submittal section also often states that the contractor should allow sufficient time in the submittal schedule for a review, rejection, resubmittal, and re-review of a submittal without causing delay to the project.

The submittal schedule should allow for timely flow of submittals to the A/E without causing overload situations of too many submittals with insufficient time for adequate review. Conversely, the A/E should review submittals as expeditiously as reasonably possible in accordance with the approved submittal schedule.

5.2 Preconstruction Submittals

Generally, no work should begin until required preconstruction submittals have been submitted by the contractor and reviewed by the A/E and owner. When the contractor receives the notice to proceed, preparation and delivery of the preconstruction submittals should begin as soon as possible. These submittals may include:

- Certificates of insurance and workers' compensation coverage
- Payment and performance bonds
- Proposed subcontractor and product lists
- Preliminary construction progress schedule
- Submittal schedule with dates coordinated with construction progress schedule
- Proposed use of the site and site logistics, including project identification signage
- Erosion control plan
- Pollution control plan
- Traffic control plan
- Sustainable project action plan

Preconstruction submittals and requirements are addressed in greater detail in Chapter 3, "Preconstruction."

5.3 Construction Submittals

Specified submittals relating to a portion of the work must be acted upon by the A/E before work on that portion begins. AIA Document A201 indicates that the contractor shall perform no portion of the work requiring submittal and review of shop drawings, product data, samples, or similar submittals until the respective submittal has been approved by the architect and that such work shall be in accordance with approved submittals.

The A/E may prepare a list of specified submittals for the A/E's internal use. The A/E usually compares this list with the submittal schedule submitted by the contractor to verify that all specified submittals are included on the contractor's submittal schedule. The submittal schedule generated by the contractor should indicate items needing early review in order to coordinate with the overall project schedule.

In the traditional D-B-B project delivery method, submittals are processed during the construction stage of a project. These submittals include:

- Action Submittals
  - Shop drawings
  - Product data
  - Samples
- Informational submittals
  - Quality assurance/quality control (QA/QC) submittals:
    - Design data
    - Test reports
    - Certificates
    - Manufacturer's instructions
    - Manufacturer's field reports
  - Construction photographs (preconstruction activities to establish existing conditions and during construction)
  - Sustainable design submittals
- Closeout Submittals
  - O&M data
  - Bonds
  - Warranties
  - Record documents
- Maintenance Material Submittals
  - Spare parts
  - Extra stock materials
  - Tools

In the IPD and some design-assist construction management project delivery methods, these same submittals are integrated earlier, during the design phase, and become construction documents.

The submittal process is not to be used by any participant to attempt to gain approval of nonspecified products or to modify the contract requirements without official written notice. Approval of submittals, including where nonspecified products or equipment were not specifically identified, does not relieve the contractor of the contractor's responsibility to fulfill the contract requirements. AIA Document A201

indicates that substitutions not properly approved and authorized may be considered defective. EJCDC C-700 states that any related work performed prior to engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of the contractor.

5.3.1 Action Submittals

Action submittals are submittals requiring responsive action by the A/E, normally review and approval. These include the following.

5.3.1.1 Product Data

Product data include illustrations, standard schedules, diagrams, performance charts, instructions, and brochures that illustrate physical appearance, size, and other characteristics of materials and equipment for some portion of the work. This information is helpful to both the contractor and the A/E. It is used by the A/E to determine whether the contract requirements are being met. It is used by the contractor in coordinating the work, verifying that the work is properly prepared, and ensuring that conditions are appropriate for the proposed products.

For ease of review and to avoid misunderstandings, it is important for the submittal to be free of inapplicable information. Because these data are often part of a manufacturer's standard catalog, it is important for the preparer to clearly indicate the data that are applicable to the project. Copies of individual catalog pages should be submitted rather than the entire catalog. Product selection tables must be clearly marked to indicate which product and which options are being provided.

A specification with a great deal of data on physical characteristics necessitates that the submittal include comparable data. This will help in evaluation of the product submittal and comparison with the specified criteria. If a product changes or a name change has occurred, an accompanying letter of explanation with the submittal is in order.

Related informational submittals also include samples of extended warranty language when the contract documents require extended product warranties. This allows for the review of the warranty terms concurrent with product submittal review and prior to contract closeout. Exclusions and nonrequired warranties may waive requirements and remedies of the contract documents.

5.3.1.2 Shop Drawings

Shop drawings are drawings, diagrams, illustrations, and schedules specifically prepared by the contractor to illustrate and depict more clearly some portion of the work. Typically, these are diagrams and instructions that are prepared by a manufacturer or fabricator for use in producing the item and as an aid to the contractor for integrating the item into the construction. They also assist the contractor and the A/E in determining how a certain portion of the project will be constructed and how this portion interfaces with adjacent construction. If manufacturer's standard details are submitted, they should be modified to reflect actual project conditions. To facilitate comparison, it is preferable to have shop drawings in the same general layout or orientation as the contract drawings. For example, custom casework shop drawings are prepared by the cabinet shop for use by the woodworker in the shop

to guide in the assembly of the casework. They are also used as a check on the rough opening for the proposed product, which will be prepared by a related subcontractor. Another example is the shop drawings prepared by the structural steel fabricator to indicate steel connections. Submittal of shop drawings is required so that they may be reviewed and approved by the contractor as complying with the contract requirements and by the A/E who designed the project. Copies of the A/E-prepared contract drawings should not be submitted as shop drawings. Required shop drawings should be prepared by the participant responsible for the fabrication or production of the product as an aid in determining how products will be incorporated into the project. Shop drawings typically show more detail for both the fabricator and the installer than do the contract drawings. Installation instructions or sequencing may also be shown on shop drawings. The conditions of the contract or Division 01 requirements may identify the number of copies of each drawing to be submitted, the format size, and whether any accompanying data are required.

5.3.1.3 Samples

Office samples show color, texture, and other appearance items. Samples and color selection items are physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work will be judged. Inclusion of a detailed color schedule with the construction documents helps to avoid delays, changes, and additional costs. In some cases the A/E may not specify colors in the project manual. Instead, the contractor is requested to submit samples from the manufacturer's standard line, or possibly custom-color samples, to be used by the A/E in selecting or approving colors. Color selections and sample submittals should be made at the same time to avoid delays.

The specifications establish the type and number of samples and color selection submittals required for the project. If the A/E selects a custom color when a custom color was not specified, the contractor may be entitled to a change order. The contractor should submit clearly marked color samples, noting color ranges or possibilities that are included within the contract price. It is also important to note that color availability may vary, depending on the supplier or manufacturer. If a particular manufacturer's color is selected and specified in the project manual, yet another manufacturer is also approved, it may not be possible to match the selected manufacturer's color exactly. If an exact color match is mandatory and a sole source required, this requirement could be stated in the specifications.

Assembling the color samples is the responsibility of the contractor along with subcontractors and suppliers. As color selections involve interrelated products, coordination of submittals is necessary to allow a coordinated selection. The contractor is required to verify that the samples comply with the contract requirements and then forward them to the A/E. It is the A/E's responsibility to obtain approval from the owner when required. If a color schedule is needed, the A/E may be responsible for preparing and sending it to the contractor for use by the contractor, subcontractors, and suppliers.

Product representatives should alert contractors of known lead times required to obtain a sample, so provisions can be made to accommodate the schedule. If the specified sample seems out of the ordinary, inquiries may be made to determine whether standard samples are sufficient. Likewise, product representatives should alert the contractor of known lead times to obtain custom-colored products, if selected, so schedule provisions can be made, should they be required or selected.

5.3.2 Informational Submittals

Informational submittals are submittals not requiring responsive action by the A/E. AIA Document A201 states that informational submittals upon which the architect is not expected to take responsive action may be so identified in the contract documents. This information deals for the most part with the verification and certification that the installed work or portion of the work meets the specified quality requirements. This information is used by the A/E to evaluate the performance and quality of project components. These may include design and delegated data, test and evaluation reports, manufacturer's instructions, manufacturer's reports, certificates, and qualification statements. Many of these submittals are processed as a record of the construction and do not require approval by the A/E or the owner.

Informational submittals are furnished to document the construction or to provide various kinds of information that the A/E needs to verify compliance with the construction documents. For example, the A/E does not need to approve test reports or manufacturer's installation instructions. The A/E reviews these submittals to verify compliance with contract requirements. The A/E notifies the contractor if the item covered by the information or test does not comply with the contract. When the submittal is found to comply with the contract, the A/E may elect to retain it or return it to the contractor with a note stating that no action was either taken or required. The contract documents should clearly differentiate between submittals that require A/E review and those that do not.

Informational submittals document information the A/E requires to verify performance and quality of project components, but do not require approval. They are also used as verification and certification that the installed work or portion of the work meets the specified requirements. Product representatives may have little or no involvement in the preparation of these submittals. Occasionally, the contractor may ask product representatives to assist in obtaining test reports, certificates of compliance, or manufacturer's instructions for inclusion in the submittal.

5.3.2.1 Coordination Drawings

Coordination drawings are usually prepared by or for the contractor to show how multiple system and interdisciplinary work will be coordinated. These are used to avoid coordination problems that can occur in the field when one subcontractor installs work before another subcontractor does without fully understanding the implications and restrictions the work may have on space requirements for subsequently installed work. Examples are conduit routing diagrams, duct layouts, utility coordination drawings, and sprinkler and ceiling system coordination drawings. The contractor distributes copies of coordination drawings to all affected subcontractors and suppliers. These drawings are for the contractor's coordination and may not require A/E responsive action.

Many projects are being designed using building information modeling (BIM) programs. Often, the A/E and design consultants will use different modeling programs. The contractor has the ability to accept the different models and integrate the models to run clash detection, also known as interference checks, to determine for example if a duct will fit under a beam and above a ceiling while still leaving room for light fixtures and fire suppression piping.

5.3.2.2 Certificates

Certificates may be required to certify quality or characteristics of materials, quality of fabrication, or quality of installation. Certifications may be required to attest to the performance and quality of a fabricated item or system. The specifications state the type of

certification required, who is acceptable to certify, and when certificates need to be submitted. In most cases, certifications are submitted after the work to be certified has been completed.

5.3.2.3 Design and Delegated Design Data

Specifications often require submittal of design data from manufacturers and fabricators documenting and affirming the design of products and systems. For example, the specifications might require the fabricator of a steel or wood truss member to submit engineering data stating loads transferred to other elements or a connection to a column, or the capacity of the system to resist the design loads. Another example is the requirement for drawings to be stamped by a licensed engineer, accompanied by the pertinent calculations for false work or large concrete forming systems used on bridges. In most cases, design data are submitted when the contract documents require the contractor to design and construct specific components of the project. The AHJs may require data or certification indicating that the design meets local codes or regulations. Product representatives are aware of requirements affecting the use of their products and have the documentation ready to include in the submittal.

5.3.2.4 Test and Evaluation Reports

Test and evaluation reports are submitted to the A/E to document required testing. For example, reports from a testing agency inspecting and testing shop welding of fabricated structural steel are routinely required. Other examples are concrete strength test reports, which are often required to confirm that the concrete has reached the required strength. Soils, subgrade, and asphalt may require test reports showing that compaction and density requirements have been met. These are statements of facts. Evaluation reports include reports generated by evaluation services to show compliance with the building or other code.

5.3.2.5 Manufacturer's Instructions

These include manufacturer-prepared instructions concerning the proper application or installation of a product or system. The contractor and A/E use this information to verify that the project is ready for installation and that the installation follows the recommendations of the manufacturer. An important part of the contractor's responsibility during construction is to supervise the work. The installation instructions provide a means for the contractor to verify compliance with the manufacturer's installation procedures. Failure to follow the manufacturer's instructions may transfer unwanted liability to the installer, may be grounds for rejection of the installation, and may void warranties.

5.3.2.6 Manufacturer's Reports

These reports document the testing and verification actions taken by manufacturer's representatives to verify compliance with manufacturer's standards or instructions. Field reports provide assurance that the entity in the best position to judge the integrity of the installation has made that determination. Field verification by a representative of the manufacturer is often required as a prerequisite for issuance of a manufacturer's warranty or guaranty.

5.3.2.7 Sustainable Design Reports

Submittals used for the purpose of achieving a certain level of sustainability based on a sustainable rating system are normally required to be separate from construction submittals. Sustainability submittals may be reviewed by a sustainability professional to verify that certain credits can be obtained. Sustainability submittals may duplicate some product information, but often contain information not needed for construction submittal review such as product origin, recycled content, volatile organic compound (VOC) content, and similar information. Separate submittals will prevent delaying construction submittal reviews by allowing independent reviews by different reviewers for different purposes and to isolate sustainable information that will be submitted to the rating organization. However, rejection of a product under the construction submittal review as noncompliant with the contract documents will also cause a resubmittal of the sustainable product information.

5.3.2.8 Qualification Statements

It is common for specifications to require qualification statements from fabricators, erectors, and installers. These statements are used by the A/E to determine that the company and the individual doing the work is qualified. These qualification statements may consist of a description of the company's experience, along with a list of past projects and references. The specifications may require certification by a material supplier or a certification organization that the installer has been trained and is qualified to install the particular material or system or that a particular individual has been trained in a certain professional manner (e.g., welding).

5.3.2.9 Construction Photographs

The specifications may require the contractor to record the progress of the work photographically. The specifications identify the type of photo, size, finish, orientation, and identification required. The photos become a visual record of the progress of the work and are often used to resolve disputes concerning the status of the completion of the work. They are an informational submittal and are not required to be reviewed and approved by the A/E.

5.4 Closeout and Maintenance Submittals

At or near completion of a project, a number of submittals are processed, including:

- O&M data
- Bonds
- Special warranties
- Record documents (shop drawings, record drawings and specifications, addenda, contract modification documents, construction photographs)
- Spare parts and extra stock materials (sometimes called attic stock)
- Keying

Closeout and maintenance material submittals and closeout submittal requirements are addressed in greater detail in Chapter 12, "Project Closeout."

5.5 Submittal Preparation

Submittals are normally prepared and assembled by suppliers, fabricators, and subcontractors for the contractor's submittal to the A/E. Division 01—General Requirements typically includes a section on submittal procedures containing information applicable to all submittals required for the project. In addition, specific requirements are included in the sections in Divisions 02 through 49. By referring to Division 01 and the specification requirements, the preparer can determine the extent of the submittal, the suggested format, how the submittal must be prepared, how it is to be identified, drawing size, the required number of copies, and distribution requirements. The total number of copies of each submitted item usually includes the copies retained by the A/E, the owner, and consultants, plus those required by the contractor, subcontractors, and suppliers. If the contract documents do not refer to a specific submittal form, product representatives should coordinate required information with the contractor prior to submittal. If the specified requirements are followed, the submittal can be processed easily.

5.6 Submittal Review

Submittals originate with the supplier of the product or system and are then transmitted to the buyer. Generally, the buyer is the subcontractor who will install the product. The subcontractor transmits the submittal to the contractor. Except for record documents or informational submittals, where action and a return are not required, the contractor reviews each submittal and stamps it to indicate the action taken.

Submittals are reviewed and approved by the contractor to ensure that contract document requirements have been met, to check dimensions, and to coordinate with subcontractors. In order to maintain proper lines of communication, the A/E receives submittals only from the contractor. Once approved by the contractor, they are submitted to the A/E for review and processing. The A/E's review is limited to determining whether the submittal is consistent with the design intent indicated in the contract documents. The A/E's review should not go beyond this basic responsibility. The A/E's review is not to determine accuracy and completeness of dimensions or quantities; these are the contractor's responsibility. The submittal review process may include the A/E's consultants. In some cases, submittals are also reviewed by the owner after they have been reviewed by the A/E. In those cases, the owner transmits the reviewed submittals back to the contractor through the A/E.

The action taken by the contractor, A/E, and consultants is typically one of the following:

Approved Work included in the submittal can proceed, provided the submittal complies with requirements of the contract documents.

Approved as Noted Submittal is approved, provided modifications noted are properly incorporated. Resubmission is not usually necessary.

Revise and Resubmit Modifications are required prior to approval. Work cannot proceed until the submittal is revised and resubmitted to the A/E for review and approval.

Rejected Work covered by the submittal is not complete or does not conform to the contract documents and cannot proceed. A new submittal needs to be made according to the notations and resubmitted for approval prior to fabrication.

No Action Taken or Required Used for record keeping and tracking informational submittals that comply with the contract documents.

Not Required for Review Used to inform the contractor that the submittal is not required by the contract documents and has not been reviewed.

If the A/E determines that the contractor has not properly reviewed and approved an item before submitting the item for review, the A/E returns the item to the contractor with a request that the item be properly reviewed and resubmitted. The rejection of a submittal for good cause is not a cause for a delay claim on the part of the contractor. The contractor should anticipate the potential need to resubmit incomplete or rejected submittals in the submittal schedule.

5.6.1 Incomplete Submittals

The contractor and the A/E accept unnecessary risk by reviewing and approving incomplete submittals. By sending incomplete submittals to the A/E, the contractor risks delaying completion of submittal review by submitting information that the A/E is likely to and should reject. If the A/E reviews an incomplete submittal, both the A/E and the contractor risk misunderstanding and having unacceptable materials delivered to the site for incorporation into the work. Incomplete submittals should be returned without further review and with a request to resubmit when complete. Similarly, submittals containing nonspecified items should be rejected.

5.6.2 Partial Submittals

Partial submittals are sometimes necessary to expedite the project. For example, on a fast-track project, the concrete reinforcement shop drawings might be submitted on a floor-by-floor basis. Systems may sometimes be broken down into components and separate submittals prepared for each of several items, such as an exterior pole and standard, luminaire, and base. Partial submittals should be identified as such. For the concrete reinforcement submittal, for example, if only floors 1 and 2 of a 10-story building are being transmitted, the drawings should be clearly marked “Partial Submission—Floors 1 and 2 Only.”

5.6.3 Bundled Submittals

Packages of submittals may be submitted in an effort to expedite review and to correspond with a subcontractor’s responsibilities on the project. For example, one subcontractor may be responsible for vinyl composition tile, carpet, wall base, and window blinds. Another example may be that multiple subcontractors are responsible for the exterior windows, storefront and entry doors. All three are within the same wall. Construction and installation of one relates to another. Concurrent review is essential, so a bundling for

review of these three submittals may expedite the ultimate construction and delivery of these products to the project. When bundled packages are submitted, it is the contractor's responsibility to prioritize these items in order to assist the A/E in ordering the review and return to best meet the project schedule needs.

5.6.4 Submittals Not Required by the Specifications

Occasionally, the contractor submits information to the A/E for review and approval when the submittal was not required by the specifications. The A/E should be careful in processing these because the review and approval of them may involve accepting more responsibility than the A/E intended. When an A/E receives a nonrequired submittal, all copies should be returned without review to the contractor, with an annotation that the submittal is "not required for review."

5.6.5 Submittal Stamps

EJCDC C-700 requires that each submittal bear a stamp or specific written indication that the contractor has satisfied contractor's obligations under the contract documents regarding review and approval of that submittal. It also states that the engineer will review and approve shop drawings and samples.

AIA Document A201 states that the contractor shall review, approve, and submit to the architect shop drawings, product data, samples, and similar submittals required by the contract documents. It also states that the architect will review and approve or take other appropriate action upon the contractor's submittals.

In some cases, these standard documents are modified to be more specific regarding the responsibilities of the contractor and the A/E in processing submittals. Some professional liability insurers dictate specific language to be used.

Though these standard documents do not require the contractor and A/E to specifically stamp the submittal, Division 01 sections that address submittals usually require the use of a submittal stamp to verify that the contractor and A/E have completed their obligations to review and approve the submittals. Submittal stamps with specific language are used by the contractor and by the A/E to identify the status of a reviewed submittal. In many cases the language on the stamp is suggested by a legal counsel or liability insurance company. The critical issue is that the contractor and A/E need to be responsible for processing submittals in accordance with the requirements stated in the contract documents.

The language on the submittal stamp used by the contractor should indicate that the contractor has reviewed the submittal, verified dimensions, coordinated the requirements of the item with the overall project, and determined that the submittal complies with the contract documents.

Sometimes vague language is used on the stamp in an attempt to limit liability. The submittal stamp is not a contract document and cannot be used to add to or deduct from requirements of the contract documents. The stamp is simply an affirmation by the contractor and the A/E that they have fulfilled their contract obligations. AIA and EJCDC documents require that the A/E and the contractor review and approve submittals. Language such as "reviewed" or "no exceptions taken" do not alleviate the obligation to "approve" a submittal unless that language was also modified in the agreements and the conditions of the contract.

AIA Document A201 states that by approving and submitting product data, shop drawings, samples, and other information, the contractor represents that the contractor has determined and verified products, materials, field measurements, and field construction related to these submittals. This is slightly different from EJCDC C-700, which states that before submitting each shop drawing or sample, the contractor shall have determined and verified all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and related information. The contractor shall also determine and verify all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the work. This review shall include all information related to the contractor's sole responsibilities for means, methods, techniques, sequences, and procedures of construction and safety.

AIA and EJCDC standard general conditions identify the A/E's responsibilities for reviewing and approving submittals. AIA Document A201 states that the architect will review and approve, or take other appropriate action on, the contractor's submittals, but only to check for conformance with the information and design concept expressed in the contract documents. EJCDC C-700 states that the engineer's review and approval of the contractor's submittals is only to determine if the items covered by the submittals conform to the information given in the contract documents and are compatible with the design concept of the completed project.

The A/E should stamp or mark each page of a submittal even though the submittal may be several pages long. In this way the A/E can later be certain that each page of the submittal is as originally reviewed and approved.

Submittal stamps save time and reduce mistakes in marking multiple copies of submittals. The stamp prepared by the contractor should include the following information:

- Name of company
- Purpose of submittal:
  - For approval
  - For information only
  - Resubmittal (with resubmittal number)
  - Date
- Initials of reviewer

The stamp used by the A/E includes the following information:

- Name of A/E firm
- Status of review:
  - Approved
  - Approved as noted
  - Revise and resubmit
  - Rejected/resubmit
  - No action taken or required
  - Not required for review
- Date
- Initials of reviewer

Some specifications require the use of a contractor's stamp that combines the contractor and A/E action and approval boxes in a single rubber stamp. If the owner is included in the review and approval of submittals, then the owner should also use a stamp that contains language stating the type of review the owner has provided and the extent of the owner's approval. Refer to Figures 5.1 and 5.2 for examples of review stamps.

Contractor Review:

Contractor has reviewed in accordance with contract requirements:

☐ Approved
☐ Approved as Noted
☐ Revise/Resubmit
☐ Rejected/Resubmit

By:_____ Date:_____

Contractor

Figure 5.1
Sample Contractor Submittal Stamp

A/E Review:

Approval is for conformance with information given and design concept expressed in contract documents. Approval does not authorize changes to contract documents.

☐ Approved
☐ Approved as Noted
☐ Revise and Resubmit
☐ Rejected/Resubmit
☐ No Action Taken or Required
☐ Not Required for Review

By:_____ Date:_____

A/E Firm

Figure 5.2
Sample A/E Submittal Stamp

5.7 Participant Responsibilities

Each member of the construction team has responsibilities in the processing of submittals.

Subcontractors and suppliers are responsible for:

- Reading and understanding the contract documents
- Knowing the construction progress schedule and allowing adequate time for contractor and A/E review
- Properly preparing submittals
- Submitting in a timely manner
- Using a transmittal form
- Reviewing other submittals and coordinating with them
- Maintaining records and current status

The contractor is responsible for:

- Reading and understanding the contract documents
- Establishing a realistic submittal schedule that allows for resubmittal
- Coordinating submittals including work by owner's separate contractors
- Reviewing submittals for compliance with contract documents, site conditions, dimensions, and construction means and methods
- Approving submittals before transmitting them to the A/E
- Using a transmittal form
- Distributing approved submittals to subcontractors and others
- Maintaining copies of all approved submittals at the site for reference
- Maintaining logs and tracking progress

The A/E is responsible for:

- Specifying reasonable requirements
- Reading and understanding the contract documents
- Verifying that the contractor has reviewed, stamped, and approved submittals
- Reviewing and approving submittals in a timely manner or taking other appropriate action
- Reviewing submittals for conformance with design intent
- Using a transmittal form
- Forwarding submittals to consultants and the owner
- Maintaining a copy of approved submittals
- Maintaining a submittal log and tracking progress

Consultants are responsible for:

- Specifying reasonable requirements
- Reading and understanding the contract documents
- Reviewing and approving submittals in a timely manner or taking other appropriate action
- Reviewing submittals for conformance with design intent
- Using a transmittal form
- Returning submittals to the A/E

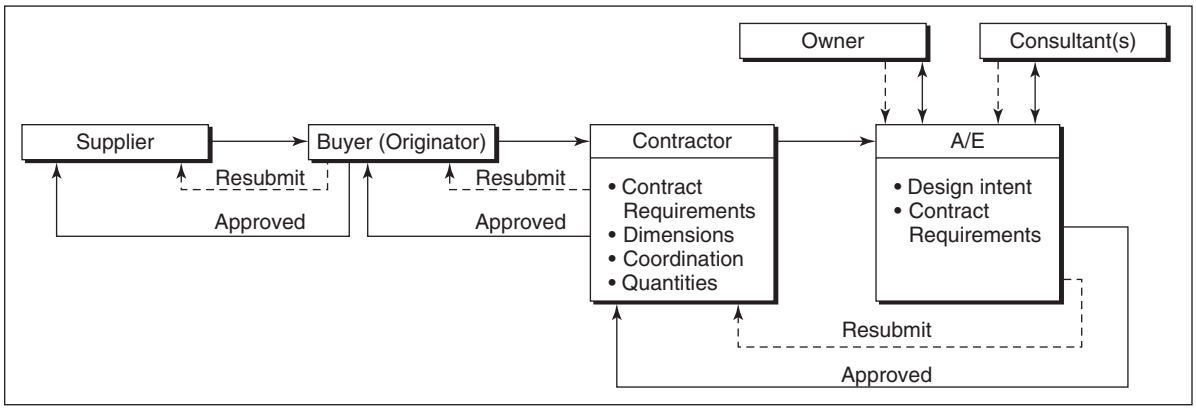


Figure 5.3 Diagram of Routing Submittals for Review and Approval

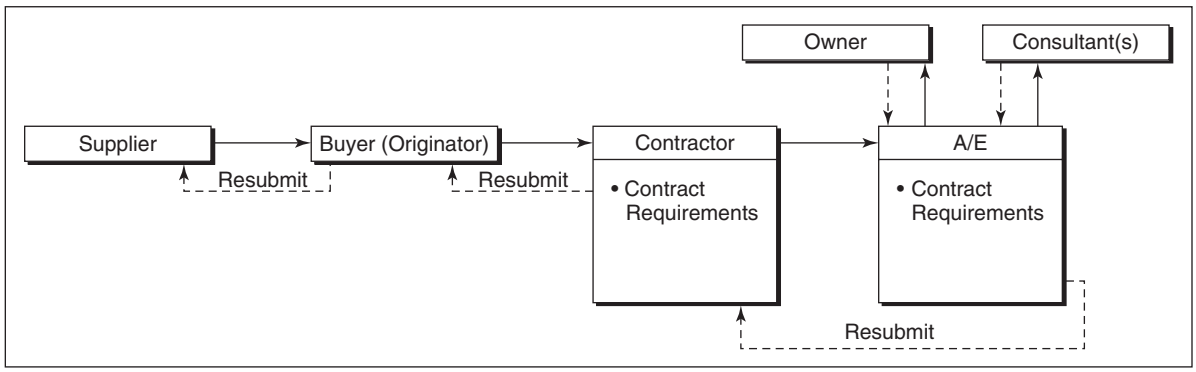


Figure 5.4 Diagram of Routing Informational Submittals

The owner is responsible for:

- Reading and understanding the contract documents
- Reviewing and approving submittals, when appropriate, in a timely manner
- Coordinating owner-furnished items that are to be installed by the contractor, including obtaining, reviewing, submitting, and processing of required submittals for coordinating this work
- Coordinating contractor-furnished items that may be installed by the owner or under a separate contract
- Coordinating work to be completed under a separate contract
- Using a transmittal form
- Allowing the A/E to comply with contractual obligations and responsibilities
- Following project requirements

Figures 5.3 and 5.4 indicate the typical routing of various types of submittals.

5.8 Record Keeping

Record keeping is a vital part of any project. A record of submittals is necessary for checking on the status of specific items and ensuring their timely review. The submittal process should be given high priority by each participant, whether it is preparation of submittals,

Knowledge for Creating and Sustaining the Built Environment

SUBMITTAL LOG (A/E)

Project: _____ A/E Project Number: _____

Owner: _____ Contractor: _____

SPEC. SECTION NO	NEW SUB	RESUBMIT	ITEM DESCRIPTION	SUBMITTAL NO.	DATE REC'D	CONSULTANT			DATE RET'D	ACTION						
						TO	DATE SENT	DATE RET'D		APP'D	APP'D AS NOTED	NOT SUB'T TO REVIEW	NO ACTION REQ.	REVISE/ RESUB.	REJECT/ RESUB.	APP'D AS NOTED/ RESUB.
	☐	☐														
	☐	☐														
	☐	☐														
	☐	☐														
	☐	☐														
	☐	☐														
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	☐	☐														
	☐	☐														
	☐	☐														
	☐	☐														

Form Version: June 2004
CSI Form 12.1B

Figure 5.5
CSI Forms 12.1B and 12.1C Submittal Log for A/Es and Contractors.

Knowledge for Creating and Sustaining the Built Environment

SUBMITTAL LOG (Contractor)

Project: _____ Contractor Project Number: _____

Owner: _____ A/E: _____

SPEC SECTION NO.	NEW SUB	RE-SUBMIT	ITEM DESCRIPTION	SUBMITTAL NO.	SUBCON-TRACTOR/ SUPPLIER	DATE REC'D	TO A/E		DATE RET'D	ACTION						
							DATE SENT	DATE RET'D		APP'D	APP'D AS NOTED	NOT SUB'T TO REVIEW	NO ACTION REQ.	REVISE/ RESUB.	REJECT/ RESUB.	APP'D AS NOTED/ RESUB.

Form Version: June 2004
CSI Form 12.1C

Figure 5.5 (*Continued*)

assembly of information, or review. A submittal log should be maintained by both the A/E and the contractor. Submittal logs contain the following information:

- Project name
- A/E project number
- Contractor project number
- Date submittal received
- Item description and sequential number
- Specification section reference
- Identity of originator: contractor, subcontractor, supplier
- Number of copies received
- Consultant:
  - Date sent
  - Date returned
  - Number of copies
- Action taken:
  - Approved
  - Approved as noted
  - Revise and resubmit
  - Rejected/resubmit
  - No action taken or required
  - Not required for review
- Date returned to contractor
- Note where copies sent:
  - Contractor
  - Owner
  - Consultant
  - Field
  - File

Refer to Figure 5.5 for sample submittal log forms.

5.9 Processing Procedures

Although there are numerous kinds of submittals common to projects, some standard processing guidelines can be followed. Submittals should be complete and accurate, in conformance with specified requirements, and consistent with project conditions. Only specified submittals should be processed. Submittals should be prepared, submitted, and reviewed in a timely manner according to the approved submittal schedule and the current construction progress schedule. Each submittal must clearly indicate project name, A/E's project number, date, specification section reference, drawing reference, and a sequential submittal number. Sequential numbering allows easy tracking. The preparer should specifically indicate any part of the submittal that does not conform to the contract requirements. Preparers should avoid submitting information that is not applicable to the project or required by the contract documents.

Knowledge for Creating and Sustaining the Built Environment

SUBMITTAL TRANSMITTAL

Project: _____ Date: _____

_____ A/E Project Number: _____

TRANSMITTAL A

To (Contractor): Date: Submittal No.

From (Subcontractor): By: ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule
☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL B

To (A/E): Attn: Date Rec'd by Contractor:

From (Contractor): By: Date Trnsmt'd by Contractor:

☐ Approved
☐ Approved as noted
☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL C

To (Contractor): Attn: Date Rec'd by A/E:

From (A/E): ☐ Other By: Date Trnsmt'd by A/E:

☐ Approved
☐ Approved as Noted
☐ Revise and Resubmit
☐ Rejected/Resubmit
☐ No Action Taken or Required
☐ Not Required for Review
☐ Provide file copy with corrections identified
☐ Reproducible copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL D

To (Subcontractor): Attn: Date Rec'd by Contractor:

From (Contractor): By: Date Trnsmt'd by Contractor:

Copies: ☐ Owner ☐ Consultants ☐ ☐ ☐ ☐ One copy retained by sender

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Figure 5.6 CSI Form 12.1A, Submittal Transmittal

5.9.1 Submittal Processing with a Transmittal Form

Use of a standard transmittal form reduces preparation time and aids in filing and retrieving information. A standard transmittal form should include the project name and project number, the date of submission, a description of the item submitted, a specification section reference number, number of copies, and any special action required. This will aid in tracking and filing submitted items along with their transmittal forms. Some forms have action boxes that are the same as the action boxes on the A/E and contractor submittal stamps. A/Es and contractors use computers to log and track submittals. Consecutive numbers are often assigned to submittals for ease of identification and more accurate tracking.

Refer to Figure 5.6 for a sample submittal transmittal form.

5.9.2 Prompt Processing

All submittals are reviewed by the contractor for accuracy, completeness, and compliance with the contract documents. When the contractor finds that submittals do not meet contract requirements, they should be returned to the originator. Submittals approved by the contractor are stamped and sent to the A/E. The A/E, the consultants, and the owner then complete their reviews. The A/E typically keeps file copies and returns the other copies to the contractor for distribution to the originators and others affected. It is important that the A/E and the contractor closely monitor the submittal process to avoid delays and errors resulting from attempting to process too many submittals in a short period of time.

AIA and EJCDC general conditions are not specific about the amount of time allotted to the A/E to review submittals. AIA Document A201 states that the architect's action will be taken in accordance with the submittal schedule approved by the architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the architect's professional judgment to permit adequate review. EJCDC C-700 states that the engineer will review and approve shop drawings and samples in accordance with the schedule of shop drawings and sample submittals accepted by the engineer.

The A/E's review time for submittals is usually stated as part of the contract documents in either Division 01 or the supplementary conditions. Prolonged or unreasonable review times can cause a delay for the contractor and extend the construction period. If the general and supplementary conditions and Division 01 do not stipulate specific time periods for the A/E to review the submittals, the A/E should be fully aware of the time allowed in the contractor's submittal schedule and avoid delaying the project, or alert the contractor if the review cannot be completed in a timely manner.

Chapter 6
Site Visits, Observations, and Inspections

All participants in the construction process have certain responsibilities for making observations and inspections. This process of monitoring the work is basic to quality control.

Dictionaries define *observe* as to perceive, notice, see, whereas *inspect* means to examine carefully and critically, especially for defects. In construction, the distinction between these two words has significance, and the individuals responsible for construction contract administration (CCA) and contractor project management need to be familiar with the two terms.

Most standard owner-architect/engineer (A/E) agreements and conditions of the contract indicate that the A/E will perform CCA and will periodically visit the construction site to (1) ascertain progress and quality of the work, (2) inform the owner of known deviations from the contract documents and defects and deficiencies observed in the work, (3) keep the owner informed of the progress of the work, and (4) conduct inspections to determine the dates for substantial and final completion. The responsibility for observations and inspections by the A/E varies, depending on the owner-A/E agreement and project delivery method utilized.

The standard agreements between owner and contractor require the contractor to visit the site prior to bidding or commencing work to correlate conditions and coordinate observations with the contract documents and report any discrepancies to the A/E. The contractor is responsible for directing and supervising the work and has control over means, methods, and techniques. The contractor is also responsible for continual inspection of the work to ensure that each portion is ready to receive subsequent portions and to arrange for inspections required by authorities having jurisdiction (AHJs). To achieve substantial completion of the work, the contractor is required to inspect the work and prepare a list (i.e., the punch list) of items required to be completed or corrected prior to final payment.

When all the participants work together for the benefit of the project, observation and inspection become an aid in the communication process.

The benefits of teamwork are as follows:

- Timely communication between the A/E and the contractor allows for interaction between the design and construction participants and helps to avoid misunderstandings.
- Good communication prevents small problems from escalating into claims or disputes and helps ensure accurate interpretation of the contract documents.
- Communication also provides necessary information when it is needed.
- Use of preconstruction and progress meetings helps establish good lines of communication, as well as a mutual understanding of the project roles, responsibilities, and contractual relationships.

A process of coordination, communication, and cooperation is advantageous to all participants, as well as being beneficial to the project. Proper coordination between design and construction helps transform the requirements of the contract documents into the completed facility. With proper coordination, communication, and interpretation of the contract documents, conformance with the contract documents becomes a more manageable task. Using these principles of coordination, cooperation, communication, and conformance, the owner, contractors, and A/E, working as a team, focus on project requirements, not on problems.

6.1 Contract Requirements

American Institute of Architects (AIA) agreements between owner and architect, and Engineers Joint Contract Documents Committee (EJCDC) agreements between owner and engineer for professional services, are coordinated with respective versions of general conditions of the contract for construction. In the same manner, agreements between owner and contractor are coordinated with the same respective general conditions, such as AIA Document A201, General Conditions of the Contract for Construction, and EJCDC C-700, Standard General Conditions of the Construction Contract. These agreements and conditions of the contract are similar for construction management but can be significantly different under design-build project delivery. It is important that the individuals involved in a project understand the responsibilities and limitations contained in the agreements and the general and supplementary conditions of the contract.

6.1.1 A/E Responsibilities under Contract with the Owner

Typical and traditional agreements require the A/E to consult with and advise the owner and act as an owner's representative during construction, as provided in the general conditions. The standard agreements also require the A/E to make site visits at intervals appropriate to the stage of construction and to become generally familiar with the progress and quality of the contractor's work. In addition to these requirements, the standard agreements and general conditions state that the A/E:

- Is the communicator between owner and contractor
- Has the right to reject defective work
- Conducts inspections to determine the date of substantial completion and to verify final completion

6.1.2 Contractor Responsibilities under Contract with the Owner

When the contractor is under contract with the owner, the contractor is required to supervise and direct the work. The contractor has complete responsibility for and control of means, methods, techniques, sequences, and procedures for all portions of the work

under the contract. The contractor is required to ensure that the work is done according to the contract documents. The typical provisions of the conditions of the contract require the contractor to:

- Observe conditions at the site affecting the work and correlate them with a review of the contract documents and report any errors, omissions, and inconsistencies to the A/E.
- Inspect each portion of the work prior to performing subsequent work.
- Inspect work performed by the owner or separate contractor if the contractor's work depends on that work.
- Prepare and submit a comprehensive list of items to be completed or corrected prior to final payment.

6.1.3 Owner Responsibilities

The owner is obligated to provide information about the physical characteristics, legal limitations, and utility locations upon which the contractor can rely, subject to proper precautions taken by the contractor to ensure safe performance. The owner also is obligated to furnish other information or services under the owner's control, upon request of the contractor. The owner is also responsible for work performed by the owner or separate contractors that will affect the work of the contractor performing subsequent dependent work and may be required to correct deficiencies reported by the contractor affected.

6.2 A/E Responsibilities

The owner-A/E agreement and the conditions of the contract stipulate the responsibilities for site observations. The agreement identifies the A/E's role and frequency of observations and for inspections at substantial and final completion. The frequency of observations may vary from none to periodic to full-time, or as otherwise agreed. Inspections are usually limited to substantial and final completion. The conditions of the contract usually contain specific A/E responsibilities during construction, and these should be in complete agreement with A/E responsibilities required by the owner-A/E agreement. If the owner-A/E agreement and the owner-contractor agreement are in conflict, the A/E is required to comply with the requirements of the owner-A/E agreement. On some occasions, the owner-contractor agreement may be negotiated between the owner and the contractor without the benefit of A/E involvement. On these occasions, there is a possibility of conflicting requirements. Conflicts should be reconciled before the start of construction.

Standard AIA and EJCDC general conditions state that the A/E is an owner's representative during construction. The A/E is not an agent of the owner. The A/E is empowered to act on the owner's behalf only to the extent provided in the contract documents. Therefore, it is important that the A/E advise the owner and keep the owner informed of activities at the site.

The A/E's consultants are normally required to be involved in CCA to the extent necessary for the specific discipline. For example, consultants are required to make periodic site visits to observe the progress of work related to their discipline.

6.2.1 A/E Site Visits

The AIA and EJCDC general conditions have similar requirements for A/E site visits. According to AIA Document A201, the architect visits the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed work and to determine in general if the work observed is being performed in accordance with the contract documents. However, the architect is not required to make exhaustive or continuous inspections to verify quality or quantity of work. On the basis of on-site observations, the architect keeps the owner reasonably informed of the progress of the work and advises the owner of any defects and deficiencies observed in the work.

Periodic A/E site observations help to ensure:

- Coordination between design and construction
- Timely communication between the A/E and the contractor
- Accurate interpretation of the contract documents
- Conformance with the contract documents

Construction site visits at "intervals appropriate" require the A/E to exercise professional judgment in determining the frequency and duration of the visits. Often, the owner-A/E agreement is amended to include more specific details about the frequency of A/E visits. Although these site visits should be conducted diligently, the A/E is not required to make inspections, except to determine substantial completion and final completion. Site visits are not intended to be exhaustive or to extend to every aspect of the work in progress, or to involve detailed inspections of the work; they are limited to spot-checking, selective sampling, and similar methods of general observation of the work. The term *inspection* as defined earlier requires closer scrutiny than observation. It is not intended that the A/E make comprehensive inspections of each construction component.

The person performing on-site observations should have a thorough understanding of the contract documents and the CCA process, and be capable of identifying nonconforming work. It is not appropriate to use inexperienced personnel to perform CCA unless they are under the direct supervision of a qualified person. Experience is important in determining the process that is followed during construction evaluation. It is generally useful to make more site observations during the early phases of construction to verify that the work on which subsequent work depends is constructed correctly. A small correction made early is better than major rework later.

It is also beneficial for the A/E to schedule more frequent site visits during critical construction activities. The A/E should determine the important milestones from the construction progress schedule and by communication with the contractor. A properly prepared construction progress schedule is an aid to both the A/E and the contractor. The A/E also uses site visits to evaluate the contractor's application for payment.

Site visits are documented in the form of a field observation report, with any observed deficiencies clearly noted. Keeping the owner informed of construction progress and events taking place on the construction site can be accomplished by sending copies of field observation reports to the owner.

6.2.2 Limitations of Responsibility

The standard agreement forms and general conditions also have limitations on A/E responsibility. These state that the A/E is:

- Not responsible for continuous inspection
- Not responsible for construction means and methods
- Not responsible for project site safety
- Not responsible for contractor's failure to perform
- Not authorized to stop the work of the contractor

AIA and EJCDC documents state that the A/E is not authorized, and does not have responsibility, to supervise, direct, or control the contractor's means, methods, techniques, sequences, or procedures of construction, unless otherwise required by the contract documents. The A/E should guard against directing the activities of the contractor. Also, the A/E is not responsible for coordinating the work of the contractor or subcontractors. The contractor is contractually obligated and in the best position to meet these requirements of the contract documents.

The standard conditions of the contract state that sole responsibility for safety at the construction site belongs to the contractor. The contractor is in control of site activities, and overlapping responsibility with the A/E could cause a breakdown in communication and safety measures. The A/E should not volunteer to become responsible for, nor make it a practice to seek out, hazardous conditions. The contractor has the contractual responsibility to control activities on the project site.

6.2.3 More Extensive Site Representation

There are occasions when an owner desires to have more extensive A/E representation on the project site. These occasions may include times when an owner is working on multiple projects and does not have the experience or the desire to spend time at the site. Site representation is often in the form of a full-time project representative. Many public-sector projects require a full-time A/E project representative. A/E project representation affords greater opportunity to protect the owner and enhances opportunities for communication with construction participants. EJCDC E-500 refers to the engineering site representative as the *resident project representative.* AIA Document B101 does not assign a title to the architect's field representative beyond the identification of on-site *project representation* services. Continuous or more extensive site representation by the A/E is in addition to the services called for in the standard owner-A/E agreement.

According to both the AIA and the EJCDC documents, the purpose of the project representative is to assist the A/E in providing more continuous observation of the project. The project representative keeps the A/E informed of construction progress; however, the project representative is usually not empowered to act on behalf of the A/E.

AIA Document B207, Standard Form of Architect's Services: On-Site Project Representation, addresses the duties and responsibilities of architect for on-site project representation. EJCDC E-500, Exhibit D, Duties, Responsibilities and Limitations of Authority of Resident Project Representative, is recommended when a resident project representative is required. When more extensive representation is required, it is suggested that the appropriate form be attached to the supplementary conditions. The project representative usually has the following duties and responsibilities:

- Observing the work progress and quality of work
- Monitoring the construction progress schedule
- Reviewing contract documents with contractor's superintendent

The resident project representative shall not:
- Authorize any deviation from the contract documents or substitute materials or equipment.
- Exceed limitations of engineer's authority.
- Undertake any of the contractor's responsibilities.
- Control, direct or advise on construction means, methods, techniques or sequences.
- Control, direct or advise on owner or contractor safety programs.
- Personally conduct tests.
- Accept submittals from anyone other than the contractor.
- Authorize owner occupancy of the project.

Figure 6.1
Limitations on Project Representative

- Reviewing the contractor's request for interpretation and changes
- Attending project meetings
- Observing tests
- Maintaining records
- Keeping a diary or logbook
- Assisting in reviewing shop drawings
- Reviewing applications for payment
- Reviewing punch lists
- Assisting in the final inspection
- Reviewing record documents periodically
- Reviewing partial occupancies to minimize claims for damage

The experience of project representatives may vary, depending on the requirements of the project. The main qualification of the project representative is the technical ability to determine whether the construction is in compliance with the contract documents. EJCDC E-500, Exhibit D, places certain limitations on project representatives. A listing of these limitations is provided in Figure 6.1.

6.2.4 A/E Inspections

The standard AIA and EJCDC documents limit the number of inspections required of the A/E to two. These inspections are to determine the dates of substantial and final completion, which are part of project closeout. A/E inspections help to determine:

- When the project, or a portion of the project, is sufficiently complete to allow the owner beneficial use
- Which items are incomplete or not in compliance with the contract documents
- When the project is complete and when the contractor is entitled to final payment

Substantial completion is the date established by the A/E when the project, or a portion of the project, is so nearly complete that the owner may use the project for its intended purpose. Final completion occurs when the contractor has completed the contract requirements, the A/E has inspected to determine completion, the owner has made final payment to the contractor, and the contractor has accepted final payment.

6.3 Contractor Responsibilities

The standard AIA and EJCDC bidding requirements and general conditions require the contractor to visit the site to become familiar with existing conditions and to study and compare the contract documents. The contractor is required to carefully study and compare the contract documents with each other and to report to the A/E any conflicts, errors, ambiguities, or discrepancies discovered by the contractor. The document review and site visit to evaluate existing conditions, performed in a timely manner, provide another opportunity for quality improvement by ascertaining that the documents reflect actual conditions and provide another chance to correct any misunderstandings.

6.3.1 Contractor Supervision

The contractor is responsible for construction of the project in conformance with the contract documents. The standard general conditions of the contract require the contractor to supervise and direct those who are performing the work and to be responsible for construction means, methods, techniques, sequences, and procedures. The contractor is also responsible for acts and omissions of the companies working under the contractor's supervision. The A/E is usually restricted to periodically observing and evaluating the work in progress. The contractor, however, has full-time direction and control of all work on the project.

6.3.2 Contractor Inspections

The standard owner-contractor agreements require the contractor to make inspections and to arrange for certain other inspections. The contractor:

- Inspects portions of work already completed to ensure that they are ready for subsequent work
- Obtains necessary inspections required by AHJs
- Prepares the initial punch list for substantial completion

AIA Document A201 requires the contractor to be responsible for inspection of portions of the work already performed to determine proper conditions for subsequent work. These inspections are important to ensure success of the project. For example, finish materials applied to unsatisfactory substrates may necessitate removal of both the finish material and the deficient substrate.

Both AIA and EJCDC general conditions require the contractor to assume responsibility for arranging and obtaining inspections required by AHJs. Unless otherwise noted, the contractor is required to pay for these inspections.

6.3.3 Contractor Punch List

The contractor is required by the AIA general conditions to prepare a list of incomplete or nonconforming work, commonly referred to as a *punch list.* The general conditions state that when the contractor considers that the work, or a portion thereof that the owner agrees to accept separately, is substantially complete, the contractor shall prepare and submit to the A/E a comprehensive list of items to be completed or corrected.

EJCDC requires the contractor to notify the owner and the engineer in writing that the project is substantially complete except for items specifically listed by the contractor as incomplete. The owner, contractor, and engineer make an inspection of the work to determine the status of completion. If the engineer considers the work to be substantially complete, the engineer delivers a tentative certificate of substantial completion to the owner with a "list of items to be corrected or completed before final payment."

It is best for the contractor to prepare the initial punch list because the contractor is in control of the construction and of the subcontractors, and is also familiar with the conditions of the project. The punch list is based on the contractor's comprehensive inspection of the project. A casually assembled punch list may cause the A/E to suspend the A/E's inspection and request the contractor to assemble a more comprehensive list of items to be completed. The A/E usually appends additional items that the A/E considers not complete to the contractor's list; together, these items form the final punch list. If the punch list is too long, or if there are items that affect the owner's ability to occupy the project, the A/E may determine that the project is not substantially complete. When substantial completion is not achieved, the causes for denial are required to be corrected by the contractor in a timely manner, and the A/E must be requested to reinspect the corrected portions in order to obtain substantial completion. Supplementary conditions may include provisions for the A/E to be paid additional fees for multiple inspections, and the cost paid by the owner may be charged to the contractor.

6.4 Owner Responsibilities

Depending on the knowledge, experience, and capability of the owner and the complexity and extent of the project, the owner may have full-time, periodic, or no on-site personnel. Many public-sector projects have full-time owner representatives.

Neither the AIA nor EJCDC standard documents require the owner to perform site observations. In most instances, the owner relies on the A/E for these services. Some owners have experienced staff to perform site-related activities. Usually, these activities are not intended to replace the A/E site observations, but only to supplement them. When the owner performs site activities, clear lines of responsibility and communication need to be established to prevent erroneous presumptions by any entity performing construction-related activities. These responsibilities are usually incorporated into the conditions of the contract, but it is helpful to reiterate the responsibilities at the preconstruction meeting.

6.4.1 Special Inspections

Applicable codes may require the owner to provide special inspections and testing for certain portions of the project. The owner may rely on the A/E for assistance in securing names and proposals for these services from independent testing laboratories and inspection agencies. The A/E may need to monitor these testing and inspection services to verify that required tests and inspections are taking place in a timely manner and that communication and reporting among the contractor, the testing agency, and the owner are taking place.

An example of a code requirement for an owner-arranged inspection is engineered masonry. American Concrete Institute (ACI) 530, Building Code Requirements for Masonry Structures, has been adopted by some model codes for use with engineered

masonry. ACI 530 references and requires use of ACI 530.1, Specifications for Masonry Structures, which specifies certain tests and requires the owner to employ an independent agency to perform the required testing and inspection services.

It is typical for independent testing and inspection agencies to make required tests and inspections on behalf of the owner and to submit certifications of compliance with the contract documents and governing codes to the AHJs. Some areas that may require special tests and inspections include:

- Concrete and concrete reinforcement
- Foundations
- Structural framing
- Earthwork, including excavation and fill
- Fireproofing
- Fire sprinklers and alarms
- Elevators

6.4.2 Owner Observations

On occasion, an owner may wish to perform all CCA without aid from the A/E. Certain owners, such as hotel chain developers who create multiple projects similar in nature, have the expertise and personnel to perform the CCA activities. In this instance, the A/E may not be responsible for field observations or for any other CCA role, except those required by individual state licensing laws.

6.5 Authorities Having Jurisdiction

Federal, state, county, and city authorities oversee the safety and welfare of the public they serve. In doing so, they verify that code and ordinance requirements have been met. The AHJs usually perform reviews of the contract documents before issuing permits. They verify that the regulatory requirements are being met by performing building, mechanical, electrical, elevator, fire, life safety, health, zoning, accessibility, and critical structural inspections at the project site.

If the authorities discover work not in compliance with code requirements during a site inspection, they will not approve the work. The noncomplying work must be corrected by the contractor and approved by the AHJs. The contractor is not required to ascertain that the contract documents comply with applicable regulations and code. If the rejected work conforms to the contract documents, the contractor may be entitled to a change order to correct the defective work. However, the contractor may be responsible for correcting, at no additional cost, work the contractor knew to be contrary to applicable regulations and codes.

AIA and EJCDC general conditions state that unless otherwise provided for in the contract documents, the contractor shall secure and pay for construction permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the work. EJCDC C-700 has similar requirements for the contractor to make arrangements for tests, inspections, and approvals with the appropriate AHJ and usually requires the contractor to pay all related costs.

6.6 Working Relationships

A good working relationship among the owner, the A/E, and the contractor, with the primary focus on the quality of the construction, helps to resolve problems and conflicts quickly. The owner, the A/E, and the contractor must work together to construct a facility that complies with the requirements of the contract documents. The A/E should insist that the requirements be met, but allow the contractor some latitude in the methods of obtaining that quality. The A/E's obligations during administration of the contract should be met within the time limits stipulated in the contract documents and as agreed to in the construction and submittal schedules.

Timely responses by the A/E help prevent delays or hardships for the contractor. Often, a clarification or modification can help the contractor without affecting the design or the intent of the contract documents.

Contract document interpretations by the A/E must be impartial. Quick judgments and decisions by the A/E should be avoided unless it is certain that the decision is correct. Only the contractor has a construction contract with the owner. The contractor is responsible to the owner for performance of that contract. Communications to subcontractors from the A/E, the owner, and their consultants should always pass through the contractor. The A/E should not give instructions to the contractor's employees. Instructions should be in writing and directed to the contractor's project manager or the superintendent who will direct the construction personnel. Informal oral communication should be documented in writing.

6.7 Conduct at the Project Site

All participants should exhibit proper conduct at the project site. Proper conduct includes:

- Maintaining professional demeanor
- Being polite and courteous
- Showing respect
- Following proper lines of communication
- Adhering to the contractor's procedures for visitors

The owner, the contractor, and the A/E should follow established procedures and lines of communication. Each member of the project team should keep the other members apprised of relevant concerns, questions, and decisions. Site communications between the A/E and the contractor should be documented. A form for this documentation is addressed later in this Guide.

6.8 Project Site Safety

The standard general conditions clearly establish the contractor as being responsible for planning, maintaining, and supervising construction safety measures and programs. Contractors' safety is addressed in Chapter 9, "Executing the Work."

The issue of construction safety cannot be ignored by the owner and the A/E. The owner and the A/E are responsible for the safety of their employees at the project site. Therefore, it is important that the owner and the A/E educate the personnel who will be visiting the project site about procedures that are to be followed. Although the owner and the A/E do not participate in the planning of the contractor's safety program, they are to follow the safety procedures established by the contractor.

The A/E should not seek out hazardous conditions, review the contractor's safety plan, or attend the contractor's safety meetings. However, if the A/E observes a condition that may not be safe, the A/E should bring the condition to the attention of the contractor and also notify the owner in writing. The A/E should not suggest methods to correct unsafe conditions, nor should the perceived unsafe condition be placed on an A/E follow-up list. It is the contractor's responsibility to assess the situation and determine whether the situation needs correction and, if so, how to correct it. If the A/E observes that the contractor has failed to correct an unsafe condition, the owner should be informed of the situation and the A/E should recommend that the owner take immediate action to make sure corrective action is taken.

Because of the nature of construction activities, accidents occasionally occur. If an accident happens, it is the responsibility of the contractor to conduct an investigation. In the case of imminent danger, measures must be taken to protect personnel first, and then property. Once the danger has passed, the accident scene should not be disturbed until a proper investigation has been completed.

6.9 Defective and Nonconforming Work

Every project has the potential for including work that may not conform to contract document requirements. The AIA and EJCDC general conditions have provisions that require the contractor to allow the A/E to have access to the project. The standard general conditions also state that if work is concealed contrary to the written request of the A/E, the A/E has the right to request that the work be uncovered. Reinstallation may be at the contractor's expense.

The A/E has the authority to reject work that does not conform to the requirements of the contract documents. However, the authority for rejecting work is not a required duty or responsibility of the A/E for the benefit of the contractor. AIA Document A201 states that work not conforming to the requirements of the contract documents may be considered defective. Only the owner can accept nonconforming work; the A/E is not authorized to do so. The A/E, upon discovery of nonconforming work, should document the deficiencies in a field observation report and present copies to the contractor and the owner. A specific document in the form of a Notice of Nonconforming Work is an aid in documenting and tracking nonconforming work and the remedy. Figure 6.2 is an example of a nonconforming work notice. The contractor has the obligation to promptly correct nonconforming or defective work. The contractor is responsible for the cost of corrective work, including the costs for additional testing and inspection. The contractor is also responsible for removing the defective or nonconforming work from the project site. The A/E should follow up on deficient work to verify that the deficiency is corrected and that work is proceeding according to the contract documents.

Knowledge for Creating and Sustaining the Built Environment

NONCONFORMING WORK NOTICE

Project: _____ Report Number: _____

_____ From: _____

To: _____ Date Observed: _____ Date Reported: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Section: Paragraph: Drawing Reference: Detail:

Nature of Nonconformance:

Signed by: Date: Date Response Needed:

Proposed Correction (Response):

Amount of Time for Correction:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ A/E ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ File

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Figure 6.2 Nonconforming Work Notice

The A/E, after consulting with the owner, may require additional testing or inspections of suspect work. Generally, the cost for the additional inspections or tests is paid by the contractor if the work fails the inspection. However, the owner usually pays for the inspection if the suspect work passes the inspection or testing.

6.9.1 Owner's Decisions on Defective Work

If the contractor refuses to correct nonconforming work within a reasonable time period, the owner has the right, after written notice to the contractor, to correct or remedy the defective work and to charge the cost of the remedy to the contractor. A change order is used to deduct the costs of the remedy from the amount remaining on the construction contract. If the cost of the remedy exceeds the balance of the contract amount, the contractor is obliged to pay the difference to the owner.

In some instances, the owner may choose to accept nonconforming or defective work. When the owner chooses to exercise this right, the owner is usually entitled to an appropriate decrease in the contract amount.

6.9.2 Stopping the Work

Forcing a contractor to stop work on a project is a severe action that can have ramifications on both cost and time. The standard general conditions do not give authority to the A/E to order the contractor to stop work. The standard general conditions stipulate that if a contractor fails to correct work that is not in compliance with the contract documents, the owner may order the contractor to stop work until the reason for the stoppage has been eliminated.

The contractor has the right to stop work if the owner has failed to pay the contractor within the time stipulated in the contract documents. AIA and EJCDC documents allow the contractor the right to terminate the contract if work has stopped, through no fault of the contractor, for a stipulated period of time. The conditions of the contract describe the conditions under which the contractor can stop work or terminate the contract and the procedures the contractor must follow when doing so.

6.10 Delivery, Storage, and Protection of Products

6.10.1 Delivery

The contractor is responsible for receiving, unloading, and handling products delivered to the project site. An exception may be for delivery of owner-furnished products, the owner may be required to accept at the site. The contractor schedules deliveries and arranges for the delivered products to be suitably stored at the time of delivery. Products should be inspected for damage upon delivery. Damage discovered during unloading should be noted on the delivery ticket and reported to the carrier immediately.

6.10.2 Storage

Products are often stored at on-site and off-site locations before being incorporated into the project. The contractor's use of the site for storage and construction operations may be confined to certain areas identified in the contract documents. The standard general conditions prohibit the contractor from unreasonably encumbering the site with products and equipment.

On-site storage must be coordinated with the sequence of construction to ensure environmental conditions are appropriate for the products. Weather protection as well as temperature control may be critical to protect products from damage. Products stored off-site are required to be stored at a location mutually agreed upon, usually in a bonded warehouse.

Products stored off-site must be available for the A/E to verify their location, as well as to confirm they are the correct products, in the correct quantity, and that they are secure, properly protected, and covered by insurance. The products should be clearly identified as being for the particular project. All of the A/E's verifications should be completed before payment requests that include payment for stored products are approved. A bill of sale prepared by the contractor should be presented with the contractor's request for payment for materials or equipment stored off-site. Once payment is made, title to the goods passes to the owner, and if the contractor defaults, ownership of the goods cannot be disputed. The contractor also needs to provide verification that insurance coverage exists while the goods are being transported from the off-site storage facility to the project site.

6.10.3 Protection

The contractor is responsible for adequately protecting stored products. Requirements may vary depending on the manufacturer's requirements, industry standards, and common sense. The A/E normally reviews stored products to verify that they are adequately protected. The manufacturer should submit material safety data sheets (MSDS) to the contractor for those products deemed by the manufacturer to contain hazardous substances. These sheets describe the proper storage and handling instructions for these products. The contractor should send copies of these sheets to the owner. Protection requirements for stored products are usually specified in PART 1—GENERAL of individual specification sections. PART 3—EXECUTION of a specification section may have protection requirements for installed work. Certain reference standards used in a specification may contain protection requirements for specific products, and those referenced requirements are a part of the contract documents. The contractor and the A/E should be aware of requirements included in reference standards. Manufacturer's requirements for protection are normally followed to ensure that products are not damaged and that warranty provisions will not be voided.

6.11 Progress Schedule Review

The contractor is required to submit construction progress and submittal schedules. The A/E reviews these schedules before making site visits. Review of the construction progress schedule assists the A/E in determining the percentage of project completion. If the A/E observes activities at the site significantly different from those indicated on the construction progress schedule, the contractor should be notified and requested to create a project

recovery schedule delineating how these discrepancies will be addressed to put the project back on schedule or to revise the construction progress schedule to reflect the actual percentage of completion and the anticipated construction activities. An accurate construction progress schedule is essential when payment requests on lump-sum projects are evaluated.

Review of the construction progress and the submittal schedules helps the A/E to recall the status of submittals and to anticipate when products will be arriving at the site. The schedules are effective as a point of reference during site visits to help the A/E observe areas that will soon be concealed. To be an effective tool, the submittal schedule must be revised periodically to reflect anticipated submittal dates. The submittal schedule should also be coordinated with the construction progress schedule.

6.12 Record Keeping and Reporting

Documentation created by CCA is effective for communication as well as for a historical record of the construction stage activity. These records serve as an aid in future recollection of construction activity. Construction documentation should be well prepared and include important transactions arising from the construction process. The documentation should be maintained in a format that can be easily retrieved.

6.12.1 Project Record Keeping

Use of both hard copy and electronic media is helpful for documenting construction activities. Printed copies of reports and correspondence are necessary for distribution to others and for record-keeping purposes. Electronic media ease the task of searching for specific activities, thanks to the ability to electronically search for and retrieve documents. There are commercially available software packages to accomplish the same tasks.

During construction, there is an ongoing stream of information among the participants involved in the project. Timely responses to inquiries are crucial to the successful completion of the project with a minimum of difficulties. Use of standardized forms facilitates and expedites the documentation process. Standard forms with project information already on the forms, such as project name and number, contractor's name, A/E's name, and a distribution checklist, save time and avoid errors. Use of form letters for standard correspondence also saves time. The A/E maintains records of many items during the construction of a project. These include:

- Field observation reports
- Correspondence
- Meeting minutes
- Communication reports (telephone and meeting)
- Submittals
- Test reports
- Payment requests and certifications
- Schedules
- Requests for interpretation, clarification, or information
- Proposal requests and change order requests
- Contract document modifications

6.12.2 Field Observation Reports

The A/E's record of site visits consists basically of site observations and communications. The use of a recording device during site visits is an aid to ensure accurate documentation and recall when preparing written field observation reports. Having the previous site report in hand while performing the new observation provides continuity as well as an opportunity to update and close open items. These reports are for the benefit of the A/E and may be used as a means of communication with the owner and the contractor. AIA Document G711, Architect's Field Report, is a useful format. CSI Form 9.1A, shown in Figure 6.3, is another example of a field report form. Field observation reports include the following standard information:

- Project name
- A/E project number
- Date of visit (including day of week)
- Report number
- Weather (clear, overcast, rainy, misting, foggy, hot, warm, cold, windy, etc.)
- Approximate temperature range
- Site conditions (clear, muddy, dusty)
- Time and duration of visit
- Others present during the visit
- Remarks:
  - Status of project, work in progress, work completed
  - Products delivered/stored materials onsite
  - Items discussed
  - Deficiencies noted
  - Contractor comments/queries
- Signature and date of report

A field observation report should be written within a day or two of the site visit, preferably on the same day as the visit. The report must be objective, factual, and complete. It contains general observations about work in progress and includes specific notes on how work is or is not in compliance with the contract documents. The A/E should develop a method for informing the contractor of work rejected for nonconformance with the requirements of the contract documents—for example, oral notification of immediate concern followed by a written communication. The notice should include a time limit for correcting rejected work. Follow-up on previously documented rejected work should be included. The report also documents pertinent remarks offered and oral instructions given by any of the participants. It is also helpful to inquire whether there are unreported claims being considered by the contractor. Documentation of potential claims brings them to the consciousness of all participants so they can be quickly resolved. Field observation reports should not contain extraneous information, supposition, hearsay, conjecture, or other nonfactual judgments.

6.12.3 Project Representative's Documentation

A full-time project representative normally keeps a daily log (journal) in which important events that transpire on the project site are recorded. The log should contain only facts related to the project. In addition to information addressed earlier for the field reports, the daily log contains:

Knowledge for Creating and Sustaining the Built Environment

PERIODIC FIELD OBSERVATION REPORT

Project: _____ Report Number: _____

Owner: _____ Date: _____ Time: _____

Re: _____ A/E Project Number: _____

Weather			Site Conditions		Day	
☐ Clear	☐ Snow	☐ Warm	☐ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy	☐ _____	☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	☐ _____	☐ Temperature Range _____		☐ Wednesday	☐ _____

Persons Contacted:

Work Observed:

Items Discussed:

Remarks:

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 9.1A

Figure 6.3 CSI Form 9.1 A, Periodic Field Observation Report

- Work performed, start or completion of any unit of work
- Delivery of products
- Construction problems and remedies
- Documentation of significant delays
- Documentation of oral instructions and questions
- Observation of nonconforming work and actions taken
- Visitors to the site
- Inspections performed, tests taken
- Signature and date of report

Logs should contain sequential entries with no gaps. Weekends and holidays should be accounted for even if a "No Work" entry is required. Each entry can be separated by a line and date or time. An entry made in error should not be erased but crossed out with a single neat line. Logs should not have the appearance of information inserted or removed at a time other than when the original entry was made.

The A/E's project representative may be required to complete and distribute weekly and monthly reports. Figures 6.4 and 6.5 show examples of a daily and a weekly/monthly report form. The weekly/monthly reports summarize the daily log and specifically address important issues that remain unresolved. The report also addresses important activities that occurred during the report period. These reports give an overview of construction activity and progress in relation to the construction progress schedule. Attention should be drawn to items that may impact the schedule or the construction cost.

6.12.4 Additional Documentation

Documentation in addition to field observation reports is also important. Oral conversations, including owner directives and meetings that affect the project, should be documented. Minutes of meetings and telephone conversations should be recorded and distributed to the affected participants, including the owner. Documenting the oral exchange of information allows the participants to review what was said and to revise or object to the recorder's understanding of the discussion. No objection to the documented discussions usually means acceptance. In this way, future misunderstandings and faded memories of discussions are avoided. Refer to Figures 6.6 and 6.7 for sample communication record and memorandum forms.

6.12.5 Use of Photographs and Video

Photographs and videos provide a visual record of construction. Photographs taken at periodic intervals may be required by the specifications to show construction progress. Several views are sometimes required, and the A/E normally gives instructions for the required views. The specifications usually state the size of prints, the number of copies, whether the copies are black–and-white or in color, who owns the negatives (if any) or digital images, and requirements for use of film or digital photographs. Photographs or video recordings taken during site visits are also a valuable companion to field observation reports. Photos referenced in a field observation report should be secured to or digitally incorporated in the report in a manner that will prevent accidental separation and

Knowledge for Creating and Sustaining the Built Environment

DAILY FIELD OBSERVATION REPORT

Project: _____ Report Number: _____

Owner: _____ Date: _____ Time: _____

Re: _____ A/E Project Number: _____

Weather
☐ Clear ☐ Snow ☐ Warm
☐ Overcast ☐ Foggy ☐ Hot
☐ Rain ☐ Cold ☐ _____

Site Conditions
☐ Clear ☐ Dusty
☐ Muddy ☐ _____
☐ Temperature Range _____

Day
☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ _____

Persons Contacted:

Work Observed:

Items Discussed:

Materials Delivered:

Requested Revisions or Interpretations:

Nonconforming Work Reported this Date to Contractor:

Remarks:

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 9.3A

Figure 6.4 CSI Form 9.3 A, Daily Field Observation Report

Knowledge for Creating and Sustaining the Built Environment

WEEKLY / MONTHLY PROGRESS REPORT

Project: _____ Report Number: _____

Owner: _____ Report Date: _____

Contractor: _____ A/E Project Number: _____

Contract Completion Date/Time: _____ Approved Time Extensions (Days): _____

Date Construction Started: _____ Contract Completion Date/Days: _____

Revised Completion Date: _____ Percent of Project Completion: _____

Percent of Time Used: _____ Days Elapsed: _____

Is Project on Schedule: _____ If not, why? _____

Summary of Construction Activities Since Last Report:

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 9.4A

Figure 6.5 CSI Form 9.4 A, Weekly/Monthly Progress Report

COMMUNICATION RECORD

Project: _____ Date: _____

_____ A/E Project Number: _____

To: _____ ☐ Letter Dated: _____

_____ ☐ Fax Dated: _____

From: _____ ☐ Telephone Call Dated: _____

Re: _____ Contact: _____

This confirms and records our interpretation of the understanding reached concerning matters indicated. Unless notified in writing within seven days of the date below, we will assume that the following interpretation or description is complete and accurate.

☐ Attachments

Signed by: Date:

Copies: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 7.0A

Figure 6.6 CSI Form 7.0 A, Communication Record

Knowledge for Creating and Sustaining the Built Environment

MEMORANDUM

Project: _____

_____

To: _____

_____

Date: _____

A/E Project Number: _____

From: _____

Re: _____

☐ Attachments

Signed by: Date:

Copies: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 6.0A

Figure 6.7 CSI Form 6.0 A, Memorandum

be given an identifier that ensures the photos can be reassociated with the report if they are inadvertently separated. Visual documentation before work is concealed is helpful to document the condition and the products being used. Photographs or video recordings are also valuable for documenting work not conforming to the contract documents. Whereas the work at the construction site must remain in place, visual documents are transportable. Representations of the actual conditions allow later analysis and review away from the site by other concerned individuals.

Regardless of the media used or by whom visual images are taken, the time, place, and date should be recorded for each image. Close-ups may require a familiar object such as a pencil, scale, or ruler to give the photo a sense of scale. A pencil is also useful to point at a specific object or condition being photographed.

6.12.6 Use of Forms and Log Forms

Use of standardized forms speeds up the documentation and written communication processes. Clear communication keeps parties informed and helps prevent problems. Written communications on standard forms also help to avoid misunderstandings. Refer to Figure 6.8 for a list of standard forms integrated with the suggested construction contract administration filing system. The CSI forms use this file numbering system. In addition to the forms produced by the AIA and EJCDC, it is beneficial for the A/E to develop in-house forms. CSI sample forms include:

- Allowance Authorization
- Change Order Request (Proposal)
- Clarification Notice
- Communication Record
- Daily Field Observation Report
- Feedback
- Field Order
- Meeting Minutes
- Memorandum
- Nonconforming Work Notice
- Notice to Proceed
- Periodic Field Observation Report
- Proposal Worksheet Detail
- Proposal Worksheet Summary
- Punch List
- Request for Interpretation
- Stored Material Summary
- Subcontractors and Major Material Suppliers List
- Submittal Checklist
- Submittal Transmittal
- Substitution Request—During the Bidding/Negotiation Stage
- Substitution Request—After the Bidding/Negotiation Stage
- Weekly/Monthly Progress Report

Construction Contract Administration Filing System & Standard Forms

CATEGORY	TYPES OF FORMS
1.0 Project Contracts	AIA Document B101 *Standard Form of Agreement Between Owner and Architect*
1.1 Copy Owner – A/E Agreements	EJCDC E-500, *Standard Form of Agreement Between Owner and Engineer for Professional Services*
1.2 Copy A/E – Consultant Agreements	AIA Document C401 *Standard Form of Agreement Between Architect and Consultant.* EJCDC E-570, *Standard Form of Agreement Between Engineer and Consultant for Professional Services*
1.3 Copy of Extra Services Agreements	AIA Document G802 *Amendment to the Professional Services Agreement*
1.4 Copy of Owner-Contractor Agreement	AIA Document A101 *Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum* EJCDC C-520, *Suggested Form of Agreement Between Owner and Contractor, Stipulated Price*
Notice of Award	EJCDC C-510, *Notice of Award.*
Notice of Proceed	EJCDC C-550, *Notice to Proceed.* CSI Form 1.4A, *Notice to Proceed.*
1.5 Procurement Information	
Bid Form	EJCDC C-410, *Suggested Bid Form for Construction Contract.* CSI Form 1.5B, *Subcontractor/Supplier Bid Form.*
Bid Tabulation Form	
Alternates Substitutions	CSI Form 1.5C. *Substitution Request – During the Bidding/Negotiating Stage.*
Additions	AIA Document G705 *List of Subcontractors*
Subcontractor List	CSI Form 1.5A, *Subcontractors and Major Material Suppliers List.*
1.6 Bonds	AIA Document A310, *Bid Bond.*
Bid Bond	EJCDC C-430, *Bid Bond – Penal Sum Form.*
Performance Bond	AIA Document A312, *Performance Bond and Payment Bond.*
Payment Bond	EJCDC C-610, *Construction Performance Bond.* EJCDC C-615A *Construction Payment Bond (Interim Performance Bond).*
1.7 Certificates of Insurance	AIA Document G715, *Supplemental Attachment for ACORD Certificate of Insurance 25-S.*
2.0 Cost Information	
2.1 Schedule of Values	
2.2 Payment Requests and Log	AIA Document G702, *Application and Certificate for Payment.* AIA Document G703, *Continuation Sheet for G702.* AIA Document G736 *Project Application and Project Certificate for Payment, Construction Manager as Advisor Edition*. EJCDC C-620 *Contractor's Application for Payment*. CSI Form 2.2B, *Payment Request Log.*
2.3 Change Order Log with Listing of Costs	CSI Form 2.4A, *Allowance Authorization.*
2.4 Allowance Disbursements	CSI Form 2.4B, *Allowance Disbursement Log.*
2.5 Stored Material	CSI Form 2.5A, *Stored Material Summary.*
2.6 Consent of Surety	
Reduction or Release of Retainage	AIA Document G707A, *Consent of Surety to Reduction in or Partial Release of Retainage.*
Final Payment	AIA Document G707, *Consent of Surety to Final Payment.*
2.7 Contractor's Affidavits	
Release of Liens	AIA Document G706A, *Contractor's Affidavit of Release of Liens.*
Payment of Debts and Claims	AIA Document G706, *Contractor's Affidavit of Payment of Debts and Claims.*

Figure 6.8 Standard Forms Integrated with the Suggested Construction Contract Administration Filing System

Construction Contract Administration Filing System & Standard Forms (cont.)

CATEGORY	TYPES OF FORMS
3.0 Personnel Information	
3.1 Project Directory	AIA Document G807, *Project Team Directory.*
3.2 Contractor List	
3.3 Subcontractor List	AIA Document G705, *List of Subcontractors.*
3.4 Product/Manufacturer/Supplier List	CSI Form 1.5A, *Subcontractors and Major Material Suppliers List.*
4.0 Chronological Information	
4.1 Procurement Dates	
4.2 Notice of Award Date	EJCDC C-510, *Notice of Award.*
4.3 Construction Start/Notice to Proceed Date	EJCDC C-550, *Notice to Proceed.* CSI Form 1.4A, *Notice to Proceed.*
4.4 Progress Schedule	
4.5 Submittal Schedule	
4.6 Original Substantial Completion Certificate	AIA Document G704, *Certificate of Substantial Completion.*
4.7 Copy of Final Payment	
4.8 Project Data	AIA Document G808 *Project Data.*
CORRESPONDENCE AND WRITTEN DOCUMENTATION	
5.0 Correspondence	
5 1 A/E: To and From	AIA Document G810, *Transmittal Letter.*
5.2 Consultants: To and From	
5.3 Owner: To and From	
5.4 Contractor: To and From	
5.5 Postcontract Information	
6.0 Memoranda	CSI Form 6.0A. *Memorandum.*
6.1 A/E Memos	
6.2 Interdiscipline Design Team Memos	
6.3 Other	
7.0 Communication Reports	CSI Form 7.0A, *Communication Record.* CSI Form 7.0B, *Communication Log.*
7.1 A/E Telephone Reports with Log	
7.2 Interdiscipline Design Team Telephone Reports with Log	
7.3 Owner Telephone Reports with Log	
7.4 Contractor Telephone Reports with Log	
7.5 Other with Log	
8.0 Meeting Reports	CSI Form 8.0A, *Meeting Minutes.*
8.1 Preconstruction	
8.2 Construction	
8.3 Postconstruction	
9.0 Field Observation Reports	
9.1 A/E Periodic Field Observation Reports	AIA Document G711, *Architect's Field Report.*
9.2 Consultant Field Observation Reports	CSI Form 9.1A, *Periodic Field Observation Report.*
9.3 Site Representative Daily Field Observation Reports	CSI Form 9.3A, *Daily Field Observation Report.*
9.4 Site Representative Weekly Reports	CSI Form 9.4A, *Weekly/Monthly Progress Report.*
9.5 Site Representative Monthly Reports	
9 6 Project A/E Photos	CSI Form 9.6B, *Project Photo Log.*
9.7 Project A/E Videos	CSI Form 9.7B, *Project Video Log.*
9.8 Nonconforming Work Reports	CSI Form 9.8A *Nonconforming Work Notice.*
10.0 Test and Inspection Reports	
10.1 Civil	
10.2 Architectural	
10.3 Structural	
Soil	
Concrete	
Steel	
10.4 Mechanical	
10.5 Electrical	
10.6 Other	

Figure 6.8 (*continued*)

Construction Contract Administration Filing System & Standard Forms (cont.)

CATEGORY	TYPES OF FORMS
11.0 Project Specific Information	
SUBMITTALS	
12.0 Shop Drawings, Product Data Samples, Certificates Etc. (File by Division or Specification Section Number)	
12.1 Submittal Transmittal	AIA Document G712, *Shop Drawing and Sample Record.* CSI Form 12.1A. *Submittal Transmittal.*
Submittal Log	CSI Form 12.1B. *Submittal Log (A/E).* CSI Form 12.1C. *Submittal Log (Contractor).*
12.2 Submittal Checklist	CSI Form 12.2A. *Submittal Checklist.*
12.3 Progress Photos	
CORRESPONDENCE AND WRITTEN DOCUMENTATION	
13.0 Contract Document Interpretations and Modifications	CSI Form 13.0B, *Supplemental Drawing Log.*
13.1 Substitution Requests and Log	CSI Form 13.1A, *Substitution Request – After the Bidding/ Negotiating Phase (2 pages).* CSI Form 13.1B, *Substitution Request Log.*
13.2 Requests for Interpretation and Log	CSI Form 13.2A, *Request for Interpretation.* CSI Form 13.2B, *Request for Interpretation Log.*
13.3 Clarification Notice and Log	CSI Form 13.3A, *Clarification Notice.* CSI Form 13.3B, *Clarification Notice Log.*
13.4 Supplemental Instructions/ Field Orders and Log	AIA Document G710, *Architect's Supplemental Instructions.* CSI Form 13.4A, *Field Order.* CSI Form 13.4B, *Minor Change/Field Order Log.*
13.5 Proposal Requests and Log	AIA Document G709, *Work Changes Proposal Request.* CSI Form 13.5B, *Request for Proposal Log.*
13 6 Change Order Requests and Log	CSI Form 13.6 A, *Change Order Request (Proposal).* CSI Form 13.6B, *Change Order Request Log.* CSI Form 13.6C, *Proposal Worksheet Detail.* CSI Form 13.6D, *Proposal Worksheet Summary.*
13.7 Change Directives	AIA Document G714, *Construction Change Directive.* AIA Document G714/CMa, *Construction Change. Directive – Construction Manager-Adviser Edition.* EJCDC C-940. *Work Change Directive.*
13.8 Change Orders and Log	AIA Document G701, *Change Order.* AIA Document G701/CMa, *Change Order – Construction Manager-Adviser Edition.* EJCDC C-941, *Change Order.* CSI Form 13.8B, *Change Order Log.*
14.0 Construction Closeout	
14.1 Contract Completion (Punch) Lists	CSI Form 14.1 A, *Punch List.*
14.2 Substantial Completion Certificate	AIA Document $G704_t$ *Certificate of Substantial Completion.* AIA Document 0704/CMs, *Certification of Substantial. Completion – Construction Manager-Adviser Edition.*
14.3 Release of Liens	EJCDC C-625. *Certificate of Substantial Completion.*
14.4 Project Closeout Information Operation Data Maintenance Data Record Documents Warranties	
14.5 Copy of Final Payment Certificate	
15.0 Project Specific Information	
FEEDBACK	
16.0 Feedback Forms	CSI Form 16.0A, *Feedback.*
16.1 Civil 16.2 Architectural 16.3 Structural 16.4 Mechanical 16.5 Electrical	
POSTCONSTRUCTION SERVICES	
20.0 Postconstruction Site Visits	

Figure 6.8 (*continued*)

Log forms are used to record the status of various construction-related documents. AIA Document G712, Shop Drawing and Sample Record, is a submittal log form. Some forms are limited in usefulness because they are not available in electronic form. Log forms that take advantage of electronic media have the benefit of enabling information storage. A database can be searched for a submittal by date or submittal number and can list submittals that have not yet been processed or even received. Useful A/E in-house log forms include:

- Allowance Disbursement Log
- Change Order Log
- Change Order Request Log
- Clarification Notice Log
- Communication Log
- Minor Change/Field Order Log
- Payment Request Log
- Project Photo Log
- Project Video Log
- Request for Interpretation Log
- Request for Proposal Log
- Submittal Log
- Substitution Request Log
- Supplemental Drawing Log

6.12.7 Filing and Retrieval of Documentation

A filing system for easy and quick retrieval of information should be established. Each type of documentation is filed separately, in sequence, with the most recent document on top. The documents may be filed in folders or in binders, but may need to be removable for reproduction when necessary. Clearly identify the contents of folders and binders; when multiple volumes are necessary, the beginning and ending dates should be visible.

Use of computer programs for logging information can save time later during searching and retrieval. The time and cost invested in setting up an electronic information system is usually offset by the time saved in sorting and searching the data. Separate files may be established for:

- Project contracts, amendments, and fully executed change orders
- Cost information:
  - Schedule of values
  - Payment requests
  - Consent of surety
  - Contractor's affidavits
- Project directories and lists
- Construction progress schedule
- Correspondence and written documentation:
  - Correspondence
  - Memoranda

Construction Contract Administration Filing System

1.0 Project Contracts
- 1.1 Copy Owner-A/E Agreement
- 1.2 Copy of A/E-Consultant Agreement
- 1.3 Copy of Extra Services Agreements
- 1.4 Copy of Owner/Contractor Agreement
  - Notice of Award
  - Notice to Proceed
- 1.5 Procurement Information
  - Bid Form
  - Bid Tabulation Form
  - Alternates
  - Substitutions
  - Additions
  - Subcontractor List
- 1.6 Bonds
  - Bid Bond
  - Performance Bond
  - Payment Bond
- 1.7 Certificates of Insurance

2.0 Cost Information
- 2.1 Schedule of Values
- 2.2 Payment Requests and Log
- 2.3 Change Order Log with Listing of Costs
- 2.4 Allowance Disbursements
- 2.5 Stored Material
- 2.6 Consent of Surety
  - Reduction or Release of Retainage
  - Final Payment
- 2.7 Contractor's Affidavits
  - Release of Liens
  - Payment of Debts and Claims

3.0 Personnel Information
- 3.1 Project Directory
- 3.2 Contractor List
- 3.3 Subcontractor List
- 3.4 Product/Manufacturer/Supplier List

4.0 Chronological Information
- 4.1 Procurement Dates
- 4.2 Notice of Award Date
- 4.3 Construction Start/Notice to Proceed Date
- 4.4 Progress Schedule
- 4.5 Submittal Schedule
- 4.6 Original Substantial Completion Certificate
- 4.7 Copy of Final Payment
- 4.8 Project Data

Correspondence and Written Documentation

5.0 Correspondence
- 5.1 A/E: To and From
- 5.2 Consultants: To and From
- 5.3 Owner: To and From
- 5.4 Contractor: To and From
- 5.5 Postcontract Information

6.0 Memoranda
- 6.1 A/E Memos
- 6.2 Interdiscipline Design Team Memos
- 6.3 Other

7.0 Communication Reports
- 7.1 A/E Telephone Reports with Log
- 7.2 Interdiscipline Design Team Telephone Reports with Log
- 7.3 Owner Telephone Reports with Log
- 7.4 Contractor Telephone Reports with Log
- 7.5 Other with Log

8.0 Meeting Reports
- 8.1 Preconstruction
- 8.2 Construction
- 8.3 Postconstruction

9.0 Field Observation Reports
- 9.1 A/E Periodic Field Observation Reports
- 9.2 Consultant Field Observation Reports
- 9.3 Site Representative Daily Field Observation Reports
- 9.4 Site Representative Weekly Reports
- 9.5 Site Representative Monthly Reports
- 9.6 Project A/E Photos
- 9.7 Project A/E Videos
- 9.8 Nonconforming Work Reports

10.0 Test and Inspection Reports
- 10.1 Civil
- 10.2 Architectural
- 10.3 Structural
  - Earthwork
  - Concrete
  - Steel
- 10.4 Mechanical
- 10.5 Electrical
- 10.6 Other

11.0 Project Specific Information

Submittals

12.0 Shop Drawings, Product Data, Samples, Certificates, Etc.
(File by Division or Specification Section Number)
- 12.1 Submittals Transmittal and Log
- 12.2 Submittal Checklist
- 12.3 Progress Photos

Construction Contract Procedures

13.0 Contract Document Interpretations and Modifications
- 13.1 Substitution Requests and Log
- 13.2 Requests for Interpretation and Log
- 13.3 Clarification Notice and Log
- 13.4 Supplemental Instructions/Field Orders and Log
- 13.5 Proposal Requests and Log
- 13.6 Change Order Requests and Log
- 13.7 Change Directives
- 13.8 Change Orders and Log

14.0 Construction Closeout
- 14.1 Contract Completion (Punch) List
- 14.2 Substantial Completion Certificate
- 14.3 Release of Liens
- 14.4 Project Closeout Information
  - Operation Data
  - Maintenance Data
  - Record Documents
  - Warranties
- 14.5 Copy of Final Payment Certificate

15.0 Project Specific Information

Feedback

16.0 Feedback Forms
- 16.1 Civil
- 16.2 Architectural
- 16.3 Structural
- 16.4 Mechanical
- 16.5 Electrical

Postconstruction Services

20.0 Postconstruction Site Visits

Figure 6.9 Construction Contract Administration Filing System

  - Communication reports
  - Meeting reports
  - Field observation reports (daily, weekly/monthly, periodic)
  - Test and inspection reports
- Submittals
- Clarifications and proposals
- Contract modifications
- Project closeout:
  - Punch list
  - Substantial completion certificate
  - Release of liens
  - Warranties
- Feedback

Refer to Figure 6.9 for a sample CCA filing system.

6.13 Establishing a Field Office

The specifications may include requirements for a structurally sound, weather-tight structure equipped with heating, air-conditioning, electrical and data communication outlets, and lighting for the A/E's and contractor's field offices. This is normally accomplished through the use of portable facilities. When an existing facility is being renovated or the project is on a restricted site such as a downtown location, it may be possible to establish field offices using designated space within an existing facility or to lease space within an adjacent facility. The specifications may require that the field office be equipped with a telephone, a computer with Internet connection, and a fax machine to expedite communications.

On projects without full-time or more extensive project representation, the A/E and the owner may share space with the contractor. However, the specifications usually require the contractor to provide a separate, self-contained space for both owner and A/E project representatives. A project representative's office is usually equipped with desks with lockable drawers, chairs, lockable file cabinets, a drafting table with stool, and a plan rack. The project representative's field office usually has a telephone, computer and Internet connection, photocopier, and fax machine.

The contractor is usually responsible for establishing a mailing address for receiving correspondence. When permanent, newly constructed portions of the project are enclosed and have operable utilities, the field offices may be relocated into them upon written approval of the owner. Removal of the temporary field offices includes removal of all foundations, debris, and other items that were in place to support the temporary facilities.

6.13.1 Documents at the Site

The contractor is normally required to keep various documents and submittals at the site. These include:

- Approved permit sets for use by AHJs
- Project manuals
- Drawings

- Addenda
- Change orders, supplemental instructions, field orders, revised drawings, and other modifications to the contract
- Approved shop drawings, product data, samples, and similar required submittals
- Approved substitutions
- Reports of inspection and testing agencies
- MSDS and safety reports relevant to the work
- Postings as required by various government agencies including the Occupational Safety and Health Administration (OSHA)
- Inspection certificates
- Contractor's daily log
- Manufacturers' certificates, manufacturers' instructions, and reports of manufacturers' field observations

AIA Document B207 states that the project representative shall maintain records at the construction site in an orderly manner. This includes correspondence, contract documents, change orders, construction change directives, reports of site meetings, shop drawings, product data, and similar submittals; supplementary drawings, color schedules, and requests for payment; and names, addresses, and telephone numbers of the contractor, subcontractors, and suppliers. In addition to these project documents, it is beneficial for the project representative to have access to codes and standards that affect the project.

6.14 Record Documents

Record documents are kept in the field office and are used to record actual construction. The contractor is required by both AIA and EJCDC standard general conditions to maintain record documents. Division 01 specification sections specify the procedural requirements for record documents. The contractor usually obtains one set of drawings for recording changes and modifications. These documents are stored in the field office apart from the documents used for construction. The record documents should be labeled and filed according to the specification section number. Each item should be labeled "RECORD DOCUMENT" with a stamp or in printed letters. The documents should be maintained in a clean, dry, and legible condition and should not be used for construction purposes. Information should be placed on the record documents concurrently as construction progresses. The record documents should be available for review by the A/E and the owner during the entire construction stage. AIA Document B207 requires the project representative to observe the contractor's record copy of the drawings, specifications, addenda, change orders, and other modifications at intervals appropriate to the construction and notify the architect of any apparent failure by the contractor to maintain up-to-date record documents.

The specifications normally require the contractor to maintain record drawings to record actual construction, and to include:

- Measured depths of elements of the foundation in relation to the first floor datum elevation
- Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements

- Measured locations of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of construction
- Field changes of dimensions and details
- Details not in the original contract drawings
- Changes made by addenda, change orders, supplemental instructions, or other written modifications
- References to related shop drawings and other similar detailed modifications

The record set of the project manual is normally required to legibly show modifications issued by addenda, change orders, and other modification procedures, as well as to be a record of actual construction. It should include:

- Manufacturer, trade name, and model number of each product actually installed, including approved substitutions
- Other information not originally specified

The complete set of record documents is submitted by the contractor to the A/E during project closeout. The A/E transmits the record documents to the owner.

6.15 Review, Analysis, and Evaluation

Regular feedback based on actual project experience is valuable for the improvement of future documentation and project procedures. Feedback should occur during each stage of a project, especially during the construction stage. It is during the construction stage that lessons learned should be documented, in writing, in order to improve the project team's corporate memory and quality management programs. During large or complex projects, feedback to the project team should be continuous rather than periodic.

It is usually helpful to briefly record the history of the construction stage as a prelude to a thorough review of the project upon its completion. This history includes:

- Successful product uses and techniques, as well as those that need improvement
- Successful coordination and communication situations, in addition to those requiring refinement
- Successful techniques in handling difficult situations
- Details of construction
- Interface of products and systems
- Identification of problems, delays, and conflicts
- Identification of construction-related factors that could be useful on future projects
- Subcontractor and vendor performances
- Review of approved change orders to analyze the reasons for these changes
- Review of denied or rejected change proposals to determine potential document clarification needed

Documentation in the form of photos or video recordings of both successful and less-than-desirable execution of the project helps to transition the review from the field to in-house personnel. Refer to Figure 6.10 for an example of a feedback form.

Knowledge for Creating and Sustaining the Built Environment

FEEDBACK

Project: _____ ☐ Specification Item: _____

_____ ☐ Drawing Item: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Use this form to suggest improvements based on actual experience. The improvements may involve changes in the master specification or the standard drawing detail library.

Detailed Explanation:

Suggested Improvement:

Supporting Data Attached: ☐ Specification ☐ Drawing ☐ Photograph ☐ Video ☐ _____

Signed by: Date:

Copies: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 16.0A

Figure 6.10 CSI Form 16.0A Feedback

Chapter 7
Quality Assurance and Quality Control

The construction stage of a project is the process of executing the requirements of contract documents and thus providing the required quality. Contractor project management and construction contract administration (CCA) involve quality assurance (QA) and quality control (QC) processes.

- Quality refers to the project requirements established by the contract documents.
- QA refers to the procedures for discovering defects and deficiencies or deviations to the contract documents before and during the execution of the work. It includes submittals, certifications, and other actions to ensure that the proposed products and services meet the contract requirements.
- QC refers to the procedures for evaluating completed activities and elements of the work for conformance with contract requirements. Procedures include testing and inspection. Contractual agreements may include the responsibility and authority to find and correct causes of unsatisfactory performance.

QA and QC are not exclusive of each other. QC for one process may serve as QA for a subsequent process. For example, a slump test of concrete is QC for the concrete in the mixer verifying the concrete specified requirements, but the same test is also QA for the concrete to be placed in final position. All participants perform various forms of QA and QC, whether or not specifically stated in the contract documents.

7.1 Participants Affect Quality

Each of the participants in the construction process has a role in achieving quality in a project. The rights and responsibilities of the owner, contractor, and architect/engineer (A/E) are addressed in the conditions of the contract. Procedures are addressed in Division 01—General Requirements within 01 40 00, Quality Requirements of the specifications.

In the course of administering a construction contract, the A/E endeavors to verify that the required quality of work is being provided and to inform the owner of known deviations from the contract documents and defects and deficiencies observed in the work. Acting as interpreter of the contract documents, the A/E provides the continuity in the understanding of the intent of the contract documents. Nevertheless, infrequent and ineffective observation of the work because of limited A/E services during the construction stage may jeopardize project quality. Also, inadequate contract documents can cause additional construction administration effort to ensure the quality of work. Because of

the size or extent of a project, the owner may wish to enhance QA/QC by including additional A/E services for more extensive observation in the owner-A/E agreement. These additional services may include a full-time project representative.

The contractor's QA process begins when the contractor visits the site to become familiar with conditions under which work will be performed. The process continues with field measurements, coordination, scheduling, and the preparation and review of submittals.

Manufacturers, fabricators, and suppliers are the initial sources of materials. Preparing submittals describing these materials is an important part of the project's QA. Submittal review provides a QC opportunity to make and verify final color, texture, or finish selection for some materials, and to verify that submitted materials meet requirements. Independent testing and inspection services are often employed for QC to objectively test and verify performance. The test results serve as evidence of conformance or nonconformance with the requirements of the contract.

The contractor's QC process originates when the contractor assumes responsibility to supervise and direct the work using the contractor's expertise, skill, and attention. The contractor also assumes control over the means, methods, techniques, sequences, and procedures for construction. Subcontractors with particular qualifications and expertise in a particular trade or special product type perform fabrication and installation complying with or exceeding project requirements.

7.2 Examples of Quality Assurance

Before actual execution of the work, QA activities help to ensure a common understanding of the contract documents and prevent future problems. These QA activities are in the best interest of all participants. Examples of early QA activities are:

- Verifying site conditions, taking field measurements, correlating the information with the contract documents, and reporting any errors, inconsistencies, or omissions
- Reviewing drawings and specifications to uncover any coordination items, errors, omissions, or inconsistencies prior to construction
- Correlating proposed solutions with the contract requirements
- Scheduling and sequencing of the work
- Meeting with others to resolve unclear or conflicting matters
- Submitting satisfactory evidence of the kind and quality of products
- Obtaining manufacturers' certifications

The A/E performs QA in the design of the project, preparation of documents, and administration of the construction contract. Advance planning and scheduling are aspects of QA. The contractor's construction progress schedule and submittal schedule demonstrate a planned approach to accomplishing the contract requirements. These schedules should allow time to properly resolve unclear or conflicting matters and to make considered decisions and evaluations.

The contractor is required to furnish, in advance, satisfactory evidence of the kind and quality of materials and equipment to be furnished under the contract. The process of submitting shop drawings, product data, and samples is the essence of QA. Complex items may require a presubmittal meeting to ensure a common understanding of the design intent. The A/E's review of submittals before work begins is an opportunity to verify that proposed materials and equipment conform to the intent of the contract documents.

Field samples and mock-ups provide QA in the form of actual examples and can be used to set standards for QC of workmanship. If permitted by the A/E, accepted field samples and mock-ups may be incorporated into the work. Field samples and mock-ups may also be used in destructive testing.

7.3 Examples of Quality Control

QC consists of procedures used to determine whether completed items meet the required quality. Features, characteristics, and functional performance are measured and compared with contract requirements. These procedures may be based on objective, scientific evidence or on a more subjective, aesthetic judgment. Testing may be destructive or nondestructive and may be performed in place or on representative samples. Some of the more common forms of QC include:

- Comparing items to an acceptable standard
- Determining whether items are within an acceptable range of deviation or tolerance
- Checking against a list of contract requirements
- Monitoring, verifying, and substantiating requirements
- Testing and inspection

Testing laboratories and inspection services may be employed by the owner to verify certain contract requirements. Standards exist that identify testing methods to be used by organizations performing tests and inspections. Selection of testing and inspection companies is normally based on qualifications in a particular area of expertise. The types of equipment available, the frequency of calibration, the facilities, and the familiarity of personnel with test methods are typical considerations.

Testing and inspection companies usually report their findings directly to the A/E, often with copies to the contractor, owner, and authorities having jurisdiction (AHJs). These companies are not authorized to release, revoke, alter, interpret, or enlarge on the requirements of the contract documents; approve or accept any portion of the work; or perform any duties of the contractor. They also do not have the authority to stop work.

Employment of testing laboratories and inspection services or acceptance of their findings does not relieve the contractor of the obligation to perform work according to the contract documents. The contractor bears the cost of correcting work found to be defective, including costs for additional testing, inspection, and A/E services related to the defective work. The contractor may also obtain testing and inspection services as a part of the contractor's own QC program, such as additional concrete testing and masonry mortar cube compression tests. Test results can be a valuable tool in adjusting ongoing operations to optimum levels.

QC may also be required by AHJs and may involve tests, inspections, and approvals of portions of the work as required by laws, ordinances, rules, regulations, or orders of public authorities.

QC is inherent in the A/E's authority to reject work that is not in accordance with the contract documents. The A/E may also require additional independent testing and inspection to verify compliance with the contract requirements. Inspections, however, are not performed by the A/E except to determine the date of substantial completion and the date of final completion.

7.4 Concurrent Quality Assurance/Quality Control Processes

QC for one action may become QA for the next step in a process. Raw material suppliers implement QC procedures before shipping to manufacturers. Manufacturers incorporate QC procedures in their manufacturing processes. Following these procedures, manufactured components may be fabricated into more complex units. In each step of the process, the previous QC becomes part of the QA for the next step. This process is referred to as a *quality loop* or *quality spiral* by the American Society for Quality Control.

Quality Assurance Activities	Quality Control Activities
Industry Associations	
Establish quality standards for reinforcement and concrete materials.	
Material Manufacturer	
Review material requirements in contract documents.	Test reinforcement and concrete materials by testing laboratory.
Concrete Supplier	
Review performance requirements for cast-in-place concrete in contract documents.	Analyze of previous mix designs for optimum performance match.
Select concrete mix design and submit to A/E via contractor.	Test mix design by testing laboratory.
Review mix design by A/E and consultants.	
Concrete Subcontractor	
Prepare and submit product data and shop drawings (e.g., reinforcement and form materials), for A/E review.	
Preconstruction conference with suppliers. subcontractors, contractor, testing laboratory, and A/E.	
Construct a cast-in-place concrete panel mock-up by subcontractor for review by contractor, A/E, and owner.	
Formwork and Reinforcement Installer	
Tag reinforcement and coordinate with drawings and required locations.	Inspect and observe form work and reinforcement by contractor and A/E, respectively.
Concrete Placement Crew	
Observe concrete placement by contractor and A/E.	
Take test cylinders and slump measurement by testing laboratory.	Do compressive strength testing of test cylinders by testing laboratory.
	Take tolerance measurements of placed concrete by contractor and A/E.

Figure 7.1
Phases of Quality Assurance and Quality Control

QA requirements in the contract documents generally establish the prerequisites and procedures required to avoid defects. This QA may be the result of previous forms of QC. For example, in the construction of a cast-in-place concrete wall, there are several aspects of QA and QC, as shown in Figure 7.1.

An assembly might consist of components from several specification sections that together meet specific criteria relating to fire resistance.

In many instances, assemblies such as floor or ceiling assemblies made up of standard manufactured products will have undergone fire testing. Each year, the testing agencies generally publish directories in which the tested assemblies and the products that meet the criteria are listed. Project specifications frequently contain QA provisions, in PART 1—GENERAL, requiring products to have been previously tested according to these criteria, thus providing an assurance.

Prerequisite performance requirements and source QC are usually specified in PART 2—PRODUCTS and provide QA before the products are installed. This concurrent process of QA and QC involves the raw material supplier, product manufacturer, product supplier, installing subcontractor, contractor, and A/E. The distinctions between QA and QC and the responsibility for performing and enforcing these functions are necessary to the success of the completed project.

7.5 Quality Established by the Contract

The contract documents establish requirements for the work and procedures for administering the contract. Specifications generally stipulate qualitative requirements, and the drawings generally indicate quantitative requirements. Therefore, the major criteria for quality are described in the specifications. Every specification requirement influences the quality of work, which is not always limited to articles that use the word *quality.* Requirements range from procedural issues to performance criteria and workmanship.

7.5.1 Quality Assurance

The basis for QA is included in the conditions of the contract. Relationships with subcontractors and suppliers should be formalized to the extent they are bound to the contractor by the same kinds of obligations and responsibilities that the contractor is bound to the owner and indirectly bound to the A/E.

Some assurances are based in the legalities of the contract. These may not be as obvious as other procedures; nevertheless, they are just as important. For example, preconstruction submittals, such as bonds and certificates of insurance, are assurances of performance, payment, and financial responsibility.

The contractor is also required to prepare a construction progress schedule and submittal schedule for expeditious execution of the work.

The contractor demonstrates concern for quality by reviewing and approving submittals before submitting them to the A/E. Most standard general conditions include warranty provisions requiring the contractor's affirmation that materials and equipment will be new and of good quality unless otherwise required or allowed, will be free from defects not inherent in the quality required or allowed, and will conform to the requirements of the contract documents. The warranty provisions summarize the contractor's

main responsibility for quality and for conforming to the requirements of the contract documents. The warranty should not be confused with, and is not limited to, the one-year period for correcting defective work.

7.5.2 Quality Control

The QC provisions in the conditions of the contract are to verify conformance with the contract requirements. Many standard general conditions require the contractor to supervise the work using expertise, skill, and attention. The contractor is solely responsible for controlling the means, methods, techniques, sequences, and procedures for construction, and is therefore responsible for controlling the quality of the work.

The contractor is typically required to provide for, or coordinate, tests and inspections required by the contract documents and laws, ordinances, rules, regulations, or orders of public AHJs. The contractor schedules the tests and inspections and provides timely notice to the A/E when these inspections and tests are scheduled. Testing and inspection costs and fees may be paid by the contractor, the owner, or both, depending on the contract requirements. Certificates of testing, inspection, and approvals are secured by the contractor and delivered to the A/E as QC submittals.

The A/E usually visits the site to become familiar with the progress and quality of the completed work. On the basis of field observations, the A/E reviews the contractor's applications for payment and certifies or recommends payment of amounts due. This process is verification by the A/E that the quality of work is generally according to the contract documents.

Standard general conditions typically give the A/E authority to reject work that is defective or does not conform to the contract documents. This authority does not constitute control of the work, nor does this authority establish a responsibility for means, methods, techniques, sequences, or procedures for construction. The A/E may require additional independent inspection and testing. The general conditions typically stipulate that the contractor shall bear the expense of any additional testing and inspection only if the work is found to be defective.

Work not conforming to the contract documents may be considered *defective* or *nonconforming*. The owner, however, has certain rights and remedies with respect to defective or nonconforming work and may elect to accept such work along with an adjustment in the contract sum.

7.6 Team Approach

The responsibilities and performance of each participant affect overall project quality. The success of a project depends on all participants being committed to a team approach for meeting the requirements. A *team approach* is a cooperative effort in which each participant is involved in accomplishing the overall goals. The team approach involves procedures that make the achievement of quality a manageable task:

- The owner must have realistic goals and a reasonable program, budget, and construction schedule. The owner's selection of an A/E and the extent of basic services are necessary to the realization of these goals.

- The A/E's ability to develop the owner's requirements into a documented design is critical to defining the quality and the basis for evaluation (such as tolerances and standards).
- The contractor's performance and the completed project will be evaluated based on conformance to the contract documents.

Quality is established in the contract documents, along with procedures for QA and QC. The contractor project management and CCA processes enforce these procedures to ensure the required quality by avoiding defects from the beginning. The contractor project management and CCA processes also provide controls to verify the resultant quality.

Chapter 8
Interpretations and Modifications

There is no substitute for clear, concise, correct, and complete contract documents. However, the extent of the design and construction process is such that contract document modifications and changes to a project are sometimes made. The contract documents are not perfect, and the architect/engineer (A/E) is normally called upon for interpretations, clarifications, and modifications. Some changes, such as those resulting from concealed and unknown conditions, cannot be avoided. Part of the A/E's construction contract administration responsibility is having orderly procedures for managing these situations, whenever they occur.

There are two types of modifications: those that require a change to the contract sum or time, and those that do not. Changes to the contract sum or time require a change order. Changes that do not affect cost or time are minor changes in the work and may take the form of substitutions, supplemental instructions, or field orders.

Project participants need to have a clear understanding of contract provisions related to:

- Contract document relationships
- Requests for interpretations
- Interpretation of contract documents
- Concealed and unknown conditions
- Contract document modifications and changes to the project
- Substitutions
- Evaluation of substitution requests
- Project time provisions
- Project review, analysis, and evaluation

Project participants also need to understand that interpretations and modifications are often necessary and understand the methods used to modify contract documents.

8.1 Interpreting Contract Documents

Well-coordinated contract documents minimize the potential for conflicts and the need for contract interpretations and modifications. Information should be stated clearly, but only once. Information in the drawings and specifications should complement each other, but should not be repetitive. If similar information appears in both the drawings

and specifications but is in conflict, document interpretation or modification will be needed. Standard contract documents prepared by the American Institute of Architects (AIA) and the Engineers Joint Contract Documents Committee (EJCDC) prescribe the role of the A/E to act as the impartial interpreter of the documents and render decisions regarding the documents' intent. A change directive, a minor change in the form of an architect's supplemental instruction or an engineer's field order, change order, notice of claim, or claim may result from a contract interpretation, depending on whether the contractor and owner agree with the interpretation.

8.1.1 Contract Document Relationships

AIA Document A201, General Conditions of the Contract for Construction, and EJCDC C-700, Standard General Conditions of the Construction Contract, describe the contract documents as complementary, and state that what is required by one is as binding as if required by all. Contract documents are defined as the legally enforceable requirements that become part of the contract when the agreement is executed. They usually include the contracting forms, conditions of the contract, specifications, drawings, addenda, and modifications.

When the contract documents are being interpreted, the contents of the drawings and the specifications must be considered together. If an item is not addressed in both the drawings and the specifications, it does not mean that it is not required for the project. The drawings and specifications must be seen as a whole. If an item is adequately indicated in either the drawings or the specifications, the item is required by the contract. AIA Document A201 states that the contract documents are intended to include all items necessary for the contractor to complete the work, that what is required by one is as binding as if it were required by all, and that the contractor is required to do only what is reasonably consistent with the contract documents and what is reasonably inferable as being required to produce the intended results. The phrase "reasonably inferable" is subject to interpretation and should be used carefully. It is not a license for the A/E or the owner to require items that are not adequately described.

Typically, the conditions of the contract require the contractor to report errors, inconsistencies, or omissions to the A/E. The A/E then makes an interpretation consistent with the intent of the contract documents and issues an interpretation, minor change, or a proposal request. Provisions in the contract also provide the contractor with specific actions that can be taken if the contractor is not in agreement with the findings of the A/E.

8.1.2 Requests for Interpretations

The acronym *RFI* is sometimes used to mean request for information. AIA Document A201 states that the architect will review and respond to requests for information about the contract documents. As stated and with respect to the A/E as the interpreter of the documents, RFIs should be limited to requesting an interpretation of the documents or may be a request for information that may be missing. The A/E requirement to respond to RFIs should not give rise to a practice of a contractor or subcontractor not reviewing the documents and simply asking where to find a particular piece of information. CSI uses the acronym *RFI* to mean a request for interpretation, since that is a specific contractual obligation. RFIs asking for interpretation of an item in the contract documents, may be initiated by the owner or by the contractor. AIA and EJCDC standard

general conditions make the contractor responsible for carefully studying and comparing the contract documents before proceeding with fabrication and installation of the work. The contractor should promptly advise the A/E of any error, inconsistency, omission, or apparent discrepancy discovered. AIA Document A201 states that it is the architect's responsibility to interpret and make decisions regarding the requirements of the contract documents in response to written requests from the owner or contractor. It further states that the architect's decisions regarding aesthetic effect are final, unless they are inconsistent with the intent expressed in the contract documents. EJCDC C-700 states that the engineer will issue written clarifications and interpretations of the contract documents, which shall be consistent with the intent of and reasonably inferable from the contract documents. Reasonable time should be allotted in the construction progress schedule to allow the A/E to respond to inquiries without delaying the project. Procedures should be established among the parties to the contract for the management of RFIs.

RFIs allow:

- The contractor or the owner to inquire about an item of work insufficiently described or detailed in the contract documents and to seek an interpretation.
- The A/E to respond with an interpretation or minor change that does not require a change to the contract sum or time. A clarification notice, similar to Figure 8.1, may be used for projects involving EJCDC documents.

A standardized RFI form with a space for requesting interpretations and a space for a response aids both the contractor and the A/E. If the A/E has a standardized RFI form, the form may have been included in the project manual and be distributed to the contractor for use. Refer to Figure 8.2 for a sample RFI form. In order to maintain proper lines of communication, RFIs should be accepted only from the owner or the contractor.

If an item is not clearly indicated or reasonably inferable, the A/E may respond to the RFI with a proposal request for a designated solution that anticipates an adjustment of the contract sum or time. An error may or may not have cost or time impacts. The A/E may answer an RFI directly on the RFI form if the form is designed for such a response and if the response does not have an impact on the contract sum or time. Modifications to the contract documents affecting the contract sum or time should not be prepared as a minor change in the work.

Some projects involve hundreds of RFIs. However, excessive numbers of RFIs may be an indication of inadequate contract documents by the A/E, incomplete study and comparison of the contract documents by the contractor, or evidence of ineffective use of project meetings. Many RFIs are avoided when issues not involving time or cost are addressed in project meetings with responses documented in the minutes. Issues addressed in meetings are usually resolved quickly, whereas writing and responding to RFIs is time consuming.

RFIs may occasionally be an attempt to make a product, material, or system substitution after expiration of the time limit for submitting requests for substitutions. The contractor should not attempt to transfer the contractor's responsibility for a timely and thorough review of the contract documents to the A/E through the issuance of RFIs. The contractor should be limited to the submission of valid RFIs, and the A/E should render interpretations in a timely manner. RFIs and the responses to them should be referenced to the contract documents if possible.

Depending on the nature of the RFI, there are several possible responses, as indicated in Figure 8.3. The reply to the contractor could be written directly on the RFI form as a clarification, or as a minor change in the work. The reply to the contractor may include revised drawings, revised specifications, or a proposal request.

CLARIFICATION NOTICE

Project: _____ Clarification Notice Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

This Clarification Notice is issued for the purpose of clarifying the Contract Documents based on an interpretation reasonably inferable from the Contract Documents, and therefore has no effect on the Contract Sum or Contract Time. Proceeding with Work in accordance with this Clarification Notice indicates acceptance with no change in the Contract Sum or Contract Time.

Specification Section: Paragraph: Drawing Reference: Detail:

Description:

☐ Attachments

Signed by: Date:

Copies: ☐ ☐ ☐ ☐ ☐ ☐ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 13.3A

Figure 8.1 CSI Form 13.3A, Clarification Notice

Knowledge for Creating and Sustaining the Built Environment

REQUEST FOR INTERPRETATION

Project: _____ R.F.I. Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 13.2A

Figure 8.2 CSI Form 13.2A, Request for Interpretation

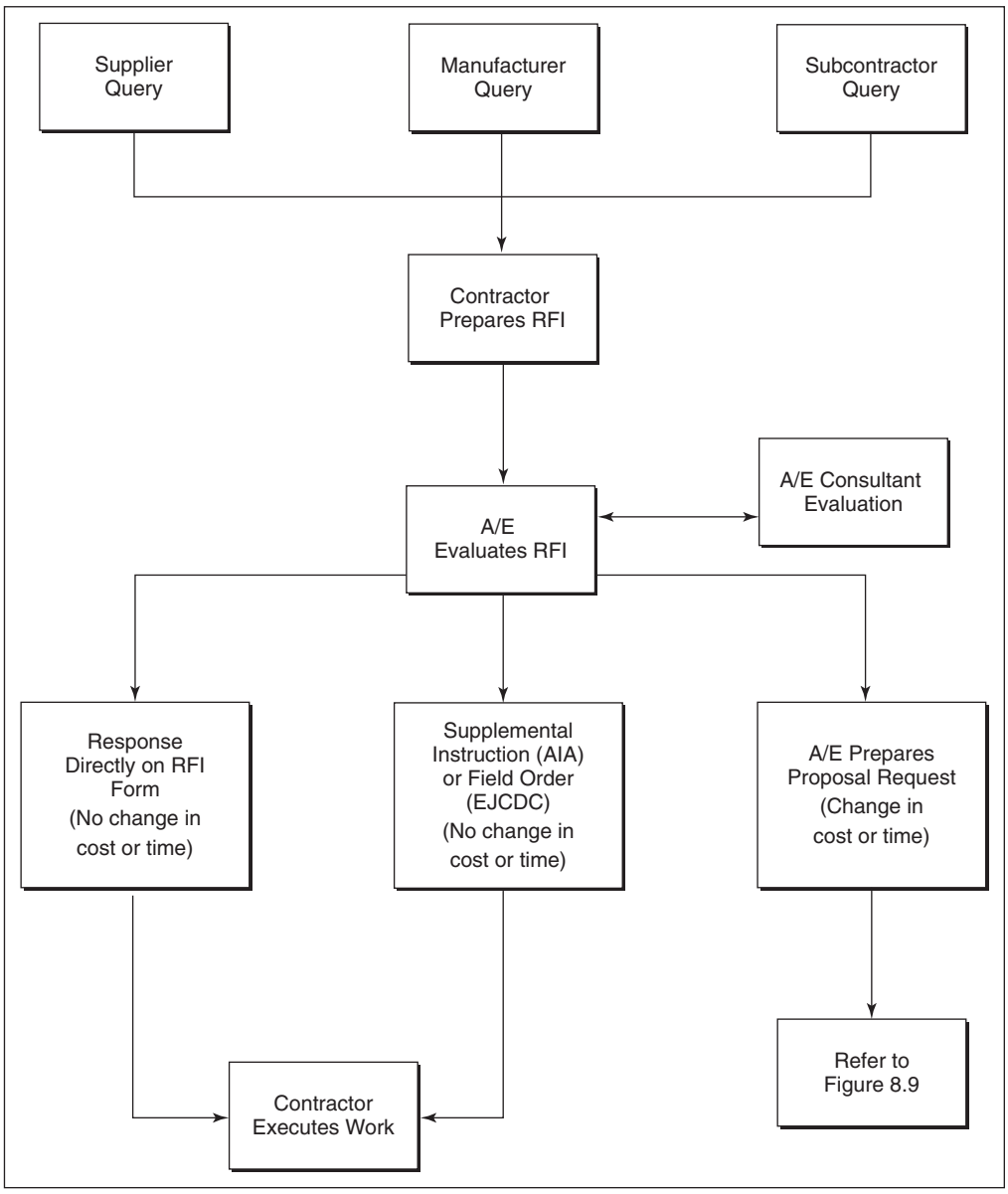

Figure 8.3 RFI Routing Process

8.1.3 Interpretation of Contract Documents

Both AIA Document A201 and EJCDC C-700 stipulate that the A/E is the interpreter of the contract documents and that the A/E's decisions will be consistent with the intent of what may be reasonably inferable from the contract documents. The contract documents communicate the design intent; however, they cannot foresee every variable that may occur during construction, nor are they perfect. Interpretations are usually required, and modifications may be necessary to satisfy actual construction conditions.

Because the A/E prepared the contract documents, it is appropriate for the A/E to interpret their meaning. Interpretations should be issued with reasonable promptness, in writing, and supplemented with drawings and specifications. The A/E should render interpretations based on the contract documents without partiality to either the owner or the contractor.

Owners should understand that the A/E must be impartial when interpreting the contract documents because the quality of the constructed project may depend on these interpretations. Most contractors also understand that many questions will arise during construction that are best answered by the A/E. The A/E must understand some of the contractor's constructability concerns and allow flexibility; however, compliance with the intent of the contract documents is required. Minor variations that meet the intent of the contract documents and that are not contrary to the specified requirements should be considered. Cooperation and communication among the owner, the contractor, and the A/E benefit the project in terms of achieving the contract requirements.

8.1.3.1 Timeliness of Interpretations

The conditions of the contract usually have provisions for the timeliness of interpreting the contract documents and making responses to the contractor's written RFIs. AIA Document A201 states that the architect will respond to RFIs in writing within time limits that are specified or agreed upon, otherwise with reasonable promptness while allowing professional judgment. EJCDC C-700 simply states that the engineer will issue written clarifications or interpretations with reasonable promptness. It is important that the A/E be responsive to the contractor. Failure to respond in a timely manner may delay the contractor and result in a claim for delay.

8.1.3.2 Claim Situations

Claims may be caused by the owner's or the contractor's disagreement with the A/E's interpretation, clarification, or request for a minor change that the A/E does not believe will have an impact on the construction cost or time. Claims may be minimized by the use of effective communications, negotiations, and instructions to the appropriate party. Claims should be resolved in a timely manner to avoid disputes.

8.1.3.3 Dispute Resolutions

Unresolved claims become disputes. Some methods that promote dispute resolution are:

- Documenting interpretations, conversations, and decisions
- Having a complete understanding of the rights and obligations of each party to the contract for construction
- Acknowledging a dispute if one arises and dealing with the dispute promptly and fairly
- Listening carefully and communicating effectively
- Finding mutually beneficial solutions
- Considering outside or expert help, if necessary

Refer to Chapter 10, "Claims and Disputes" for additional information.

8.2 Contract Modifications

Contract modifications are required whenever a change will modify the contract documents, whether or not the change will affect the time or cost. Change orders are used to modify the contract documents when cost, time, or both are affected. Minor changes

in the work are issued when neither time nor cost are affected. Prior to preparation of a change order, the contractor is usually asked to respond to a proposal request or submit a request for proposal, in which the cost of the change and schedule impact is identified. If the A/E is in agreement with the proposed change, cost, and time revisions submitted by the contractor, a change order will be issued. If the A/E is not in agreement with the contractor's proposal, a change directive may be issued. A change directive directs the contractor to proceed with the work. A change directive may result in a claim later when the contractor is not in agreement with all of the change directive terms. Contract modifications are not required when an RFI does not affect cost or time.

8.2.1 Modifications and Changes to the Project

Properly prepared contract documents include provisions for modifications along with commensurate adjustments in the contract sum and time without invalidating the contract; however, the modification must be within the general scope of the contract. The A/E should avoid relying on modifications to correct inadequately prepared drawings or specifications.

Well-prepared and coordinated conditions of the contract and Division 01 describe the conditions under which modifications to the contract documents will be allowed.

Contract document modifications may be necessary when:

- The intent of the documents is not "reasonably inferable" and corrections are required to eliminate errors, omissions, discrepancies, or design deficiencies.
- Unknown conditions necessitate changes to the project.
- The owner's requirements change and involve additions or deletions to the project.
- There are changes in the regulations after issuance of a permit.
- Time period between bid proposal acceptance and contract execution is long.
- There are interpretations of the regulations by AHJs.
- A specified product is no longer available.
- A new product is considered because it offers cost savings or other benefits.
- New information about a specified product becomes available.
- Adjustment in the contract sum occurs because of the difference in the actual cost of a product or item of work and the specified allowance for that product or work.
- The estimated quantity of work for unit price is changed.
- Unattainable requirements exist and need to be revised.

8.2.1.1 Construction Change Process and Documentation

A request for a contract modification can be initiated by the owner, the contractor, or the A/E. It is important that the parties identify those individuals who are authorized to act on proposed changes. Proposed modifications are most often initiated by one of the parties during a meeting or conversation with one or more of the other parties. This creates an informal awareness of a pending modification. At other times, subcontractors and material suppliers may convey to the contractor, orally or in writing, a request for a modification that is passed to the A/E in writing, with a copy of any written correspondence by the subcontractor or supplier attached. The owner can also direct the A/E to initiate a modification.

Several methods are available to request and to make contract document modifications to the project:

- Written requests for change (not a directive to make a change)
  - Proposal request
  - Change order request
  - Request for substitutions
- Minor changes (that do not affect contract sum or time)
  - Architect's supplemental instructions (AIA)
  - Field order (EJCDC)
  - Written interpretation or clarification (EJCDC)
- Change directives (directs change to be made; contract sum or time adjusted at a later date in the form of a change order)
  - Construction change directive (AIA)
  - Work change directive (EJCDC)
- Change orders (directs change to be made with contract sum or time adjustments stipulated)

The contractor is not to perform extra work for which payment is expected without following the change procedures in the contract documents. An exception to this guidance is emergency work, which must be performed immediately to prevent harm to personnel or damage to the project. The basis for all such work must be documented and submitted to the A/E and the owner, including applicable labor rates, material and equipment costs, definition of that portion of the contractor's general conditions costs that will be included, and the percentage of overhead and profit that will be added to all costs.

8.2.1.2 Proposal Requests

A proposal request is a written document, usually prepared by the A/E, that describes a proposed change to the project. The proposal request is sent to the contractor for evaluation of how the proposed change will affect the contract sum and time. The proposal request must include enough detail for the contractor to accurately estimate the cost and time impact of the proposed change on the project. The proposal request should state the reasons for the proposed change. A proposal request is not a change order or a directive to make changes to the project. It is only a request for the contractor to prepare and submit a written, itemized quotation of changes in the contract sum or time that would result from the proposed change if accepted.

The A/E can initiate a proposal request by issuing a form similar to AIA Document G709, Work Changes Proposal Request. The request may be supplemented by additional or revised drawings and specifications. A proposal request is for information only and is not an instruction to execute the proposed changes or to stop work in progress. As indicated in Figure 8.4, AIA Document G709 states that a proposal request is not a change order, a construction change directive, or a direction to proceed with the work described by the proposal request. The contractor then responds to the owner with a change order request itemizing changes to the contract sum, the contract time, or both. The change order request should not be confused with a proposal request. They serve different functions and are prepared by different parties. The A/E should review the schedule of values to become aware of the contractor's cost for units of work. Such awareness assists the A/E in evaluating the contractor's proposals.

AIA® Document G709™ – 2001

Work Changes Proposal Request

PROJECT: *(Name and address)*

OWNER: *(Name and address)*

FROM ARCHITECT: *(Name and address)*

PROPOSAL REQUEST NUMBER:

DATE OF ISSUANCE:

CONTRACT FOR:

CONTRACT DATE:

ARCHITECT'S PROJECT NUMBER:

OWNER ☐
ARCHITECT ☐
CONSULTANT ☐
CONTRACTOR ☐
FIELD ☐
OTHER ☐

TO CONTRACTOR: *(Name and address)*

Please submit an itemized proposal for changes in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Within ( ) days, the Contractor must submit this proposal or notify the Architect, in writing, of the date on which proposal submission is anticipated.

THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.

DESCRIPTION: *(Insert a written description of the Work)*

ATTACHMENTS: *(List attached documents that support description)*

REQUESTED BY THE ARCHITECT:

(Signature) *(Printed name and title)*

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

Figure 8.4 AIA Document G709, Work Changes Proposal Request

8.2.1.3 Change Order Request

A change order request may be used by the contractor to initiate proposed changes that the contractor deems necessary. A contractor-initiated change order request should state the reasons for the proposed change along with an itemization of costs for labor, material, taxes, subcontracts, bonds, insurance, and overhead and profit. The contractor should reference the portion of the drawings or specifications generating the need for change. The A/E, the contractor, and the owner should be aware of contract document stipulations for additional service reimbursements for A/E reviews of contractor- or owner-initiated changes. Refer to Figures 8.5, 8.6, and 8.7, for sample change order request forms that are used together.

The change order request should not be confused with substitution requests. A substitution request proposes a change of manufacturer, product, material, or system from the requirements of the contract documents, along with any cost implications. Approval of a substitution request should be documented in a change order. Refer to the Article on Substitutions later in this chapter for additional information.

8.2.1.4 Minor Changes

Minor changes to the project or clarifications of the contract documents are defined as instructions or clarifications not involving adjustment of the contract sum or time. AIA Document A201 does not identify a specific document for minor changes, but AIA Document G710, Architect's Supplemental Instruction, is commonly used. EJCDC C-700 allows the engineer to authorize or order minor variations to the project by use of a field order. Minor changes may be initiated by the architect's supplemental instructions or the engineer's field orders, or another document identified in the contract documents that direct the contractor to make stated modifications. The architect's supplemental instruction does not require the owner's or the contractor's signature. The field order also does not require the owner's signature. Figure 8.8 is an example of a field order form.

A minor change is initiated by the A/E as a written instruction or order directed to the contractor and is binding on the owner and contractor. These instructions or orders do not require an executed change order because neither the contract sum or time is affected and, therefore, they do not require the signature of the owner or the contractor. The owner should be informed of and receive copies of such instructions or orders. The contractor is required to carry out the written instructions or orders for minor changes to the project.

8.2.1.5 Change Directives

AIA Document G714, Construction Change Directive, and EJCDC C-940, Work Change Directive, direct the contractor to make a change to the project before the owner and contractor have agreed upon the proposed changes in contract sum or time. Change directives are used in the absence of an agreement between the owner and the contractor on the terms of a change order or when the value of a change cannot be determined until after the work is performed. The change directive may or may not affect the contract sum or time; however, the change directive serves as notice that the change will be incorporated in a change order once the value of the work is established. This is in contrast to a change order in which the parties have agreed on the adjustment in contract sum or time before the work is accomplished. The change directive is prepared by the A/E and signed by both the A/E and the owner. The contractor is directed to proceed with the change even if the proposed adjustment in the contract sum or time is subject to later acceptance

Knowledge for Creating and Sustaining the Built Environment

CHANGE ORDER REQUEST (PROPOSAL)

Project: _____ Change Order Request Number: _____

_____ From (Contractor): _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

This Change Order Request (C.O.R.) contains an itemized quotation for changes in the Contract Sum or Contract Time in response to proposed modifications to the Contract Documents based on Proposal Request No. _____ .

Description of Proposed Change:

Attached supporting information from: ☐ Subcontractor ☐ Supplier ☐ _____ ☐ _____

Reason For Change:

Does Proposed Change involve a change in Contract Sum? ☐ No ☐ Yes [Increase] [Decrease] $_____

Does Proposed Change involve a change in Contract Time? ☐ No ☐ Yes [Increase] [Decrease] _____ days.

Attached pages: ☐ Proposal Worksheet Summary: _____

☐ Proposal Worksheet Detail(s): _____

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 13.6A

Figure 8.5 CSI Form 13.6A, Change Order Request (Proposal)

Knowledge for Creating and Sustaining the Built Environment

PROPOSAL WORKSHEET SUMMARY

Project: _____ Change Order Request Number: _____

To: _____ From: _____

Re: _____ Date: _____

Proposal Request Number: _____ A/E Project Number: _____

Complete and attach Proposal Worksheet Detail for each element of Work. Enter Worksheet Information below.

ADDITIONS:

	Sheet	Description	Material	Labor	Subtotal
1					
2					
3					
4					
5					
6					
7					
		Subtotal			

DEDUCTIONS:

	Sheet	Description	Material	Labor	Subtotal
1					
2					
3					
4					
5					
6					
7					
		Subtotal			

Subcontractor's Net:	
Subcontractor's OH&P:	
Subcontractor's Bond:	
Subcontractor's Total:	$ -
Contractor's OH&P:	
Contractor's Bond:	
Insurance:	
Tax:	
WORKSHEET TOTAL:	$ -

Form Version: July 1994

Figure 8.6 CSI Form 13.6D, Proposal Worksheet Summary

Knowledge for Creating and Sustaining the Built Environment

PROPOSAL WORKSHEET DETAIL

Project: _____ Change Order Request Number:

To: _____ From: _____ Contact: _____

Re: _____ Date: _____

Proposal Request Number: _____ A/E Project Number: _____

SHADED AREAS FOR A/E USE

ADDITIONS

	Ref. No.	Item Description	Quantity		UNIT PRICES Materials		UNIT PRICES Labor		SUBTOTALS Materials		SUBTOTALS Labor		TOTAL	
1														
2														
3														
4														
Subtotal (Enter this number on Worksheet Summary.)														

DEDUCTIONS

	Ref. No.	Item Description	Quantity		UNIT PRICES Materials		UNIT PRICES Labor		SUBTOTALS Materials		SUBTOTALS Labor		TOTAL	
1														
2														
3														
4														
Subtotal (Enter this number on Worksheet Summary.)														

Form Version: July 1994

Figure 8.7 CSI Form 13.6C, Proposal Worksheet Detail

Knowledge for Creating and Sustaining the Built Environment

FIELD ORDER

Project: _____ Field Order Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

You are hereby directed to execute promptly this Field Order which interprets the Contract Documents or orders minor changes in the Work without change in Contract Sum or Contract Time.

If you consider that a change in Contract Sum or Contract Time is required, submit a Change Order Request to the A/E immediately and prior to proceeding with this Work.

Specification Section: Paragraph: Drawing Reference: Detail:

Description of Interpretation or Change:

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 13.4A

Figure 8.8 CSI Form 13.4A, Field Order

or rejection. Once the cost or time is agreed upon, the change directive is incorporated into a change order.

The method by which a change directive is prepared, and costs to be incorporated in the change, is described in AIA Document A201 and EJCDC C-700.

Absence of agreement on cost or time may become a problem. Many owners fear that contractors take advantage of a change situation by charging inflated costs. However, many contractors feel that owners do not understand the true costs associated with changes and that owners' concerns regarding being overcharged are not justified. True costs should be documented and available as evidence of faithful performance.

8.2.1.6 Change Orders

A change order is a written instruction to the contractor issued after execution of the agreement. It authorizes an addition, deletion, or revision to the project in consideration of an adjustment in the contract sum, contract time, or both. A change order is used for changes to the contract documents that affect contract sum or time. A principle of most standard general conditions is that only the owner has authority to execute a change order. The term *execute, as* used here, means an owner authorization for the change order. The A/E usually prepares and signs the change order, and then the contractor signs the change order indicating acceptance of the change. The owner then signs the change order to formally authorize the change. Change orders may originate by issuance of a change directive, change order request, or proposal request. Figure 8.9 illustrates the change order process. On construction management, fast-track, or design-build project delivery, parties other than the A/E may be responsible for initiating, preparing, evaluating, and approving change orders.

Documentation prepared for a proposal request may have been sufficient for pricing, but may need to be supplemented for construction purposes. Additional drawings or specifications may have to be prepared for issuance with the change order. These additional documents become part of the contract documents once the change order is executed.

8.2.1.7 Change Order Procedures

Change orders should be processed promptly to avoid delays. The formalities of negotiating costs, preparing the change order, securing signatures, and circulating information is time consuming.

It is usually beneficial for the A/E to prepare the A/E's own estimate of cost for a proposed change, compare the estimate with the contractor's proposal, negotiate an acceptable price, and then issue a formal change order before any work involved in the change is performed. The A/E should be aware of the progress of the construction and avoid changes, where possible, that cause delay or that require costly removal or alteration of completed elements. As discussed earlier, the A/E and the owner may, by issuing a change directive, authorize the contractor to proceed, subject to later negotiation of the cost of the change.

Another potential difficulty involved in change orders is agreement on price adjustments. Most additions to a contract cost more than if the same work had originally been included in the procurement documents. Conversely, the full value of items deducted by change order is usually not recovered by the owner. The manufacturer or supplier may be entitled to shipping and restocking costs, and the contractor may be entitled to the overhead and profit for coordinating the changes. The cost increase or

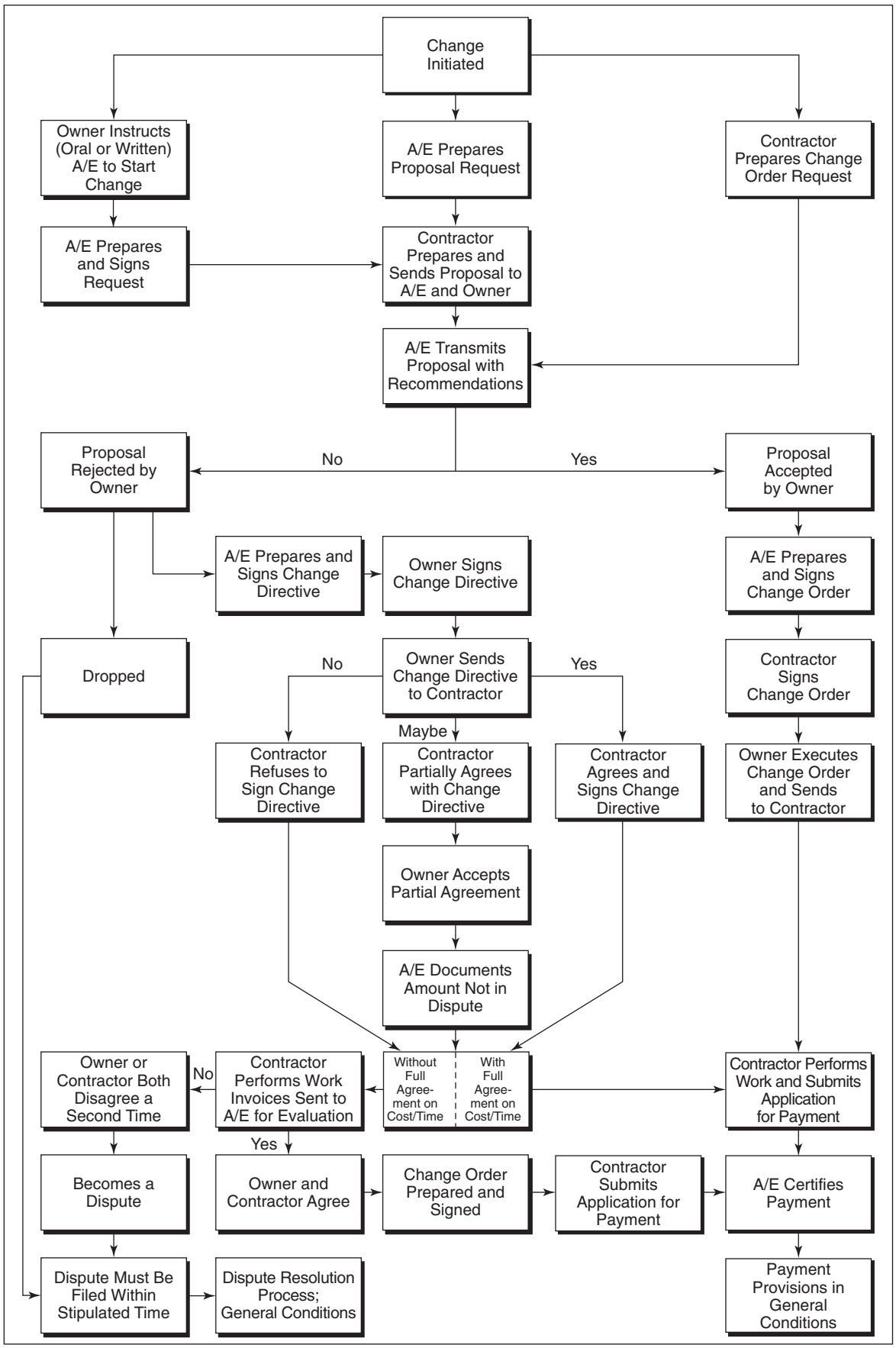

Figure 8.9 Change Order Process

decrease for a change order may be determined on the basis of one or more of the following methods:

- Mutual acceptance of a stipulated sum
- Unit prices as stated in contract documents or subsequently agreed upon
- Contractor's costs plus a fixed or percentage fee for overhead and profit

Prices submitted by the contractor for changes to the project should be offered in the same spirit as the original bid; that is, the contractor has evaluated the effects of the change and the costs submitted are complete. Claims for additional costs after the proposed change is accepted by the A/E and owner should be waived. If forced to waive future claims, the contractor should be allowed to carry a contingency amount covering unknown costs that may become apparent only after work has begun.

Unit prices are common in stipulated sum contracts for items such as drilled concrete piers and shafts, piles, excavation, unsuitable soil removal and replacement, rock removal and replacement, or engineered fill installation. Unit prices are used in an attempt to be fair to both the owner and the contractor; however, difficulties may still exist. For example, the cost for additional depth for some drilled concrete piers and shafts may not be the same as decreased depth for others because piers are usually required to have reinforcing steel and concrete placed shortly after drilling has been completed. The reinforcing cages must be fabricated and ready, and the concrete order is usually placed before completion of the drilling. Therefore, an equitable procedure for calculating cost changes is needed.

The following are some of the things to be considered when determining the cost of a change:

- Amount of contractor's overhead and profit
- Method of crediting owner for deductions
- Unit prices to be used in determining the cost
- Confirmation of costs incurred by contractor
- Use (or not) of subcontractors to perform the work
- Equipment rental costs for both active and idle equipment
- Amount of time extension, and related costs, if applicable

Overhead and profit for both the contractor and subcontractors might have been made part of the original procurement by requiring that the contractor indicate on the bid or proposal form the amount of overhead and profit that will be added and deducted for any changes. An alternate method states the allowable overhead and profit in the supplementary conditions. The AIA and EJCDC documents address this issue in different ways:

- AIA Document A201, General Conditions of the Contract for Construction, does not address this issue. However, AIA Document A503, Guide for Supplementary Conditions, provides an additional subparagraph for inclusion in supplementary conditions. It provides for amounts (percentages) to be stated for the basis used for allowances for overhead and profit. This information is then available for later use in computing the cost of change orders.
- EJCDC C-700 outlines a tier structure for the contractor's and subcontractors' fees for overhead and profit. If the owner wishes to modify these values, the values are changed in the supplementary conditions and coordinated with EJCDC C-700.

There may be several different rates for overhead and profit, depending on the cost of the work. For example, the supplementary conditions may stipulate that changes up to $5,000 may include 20 percent for overhead and profit; changes up to $30,000 may allow 15 percent for overhead and profit; and changes over $30,000 may allow the contractor 10 percent for overhead and profit. The rates for subcontractors and sub-subcontractors may also be stipulated. These rates require careful attention when changes to the contract are made. The method of computing change orders with deductions raises the question of whether the contractor is entitled to overhead and profit on deleted work. For example, changes made in reinforcing steel design delete $10,000 worth of steel and replace it with $30,000 worth of new steel. The change order format used could result in two change order prices:

Example A—Incorrect Method
Added steel $30,000
Plus overhead and profit 15 percent
Total addition $34,500
Deducted steel $10,000
Change order price $24,500

Example B—Correct Method
Added steel $30,000
Deducted steel $10,000
Net additional $20,000
Plus overhead and profit 15 percent
Change order price $23,000

Both AIA Document A201 and EJCDC C-700 state that whenever both additions and credits are involved in a change that has a net additional cost, the adjustment in the contractor's fee shall be based on the net change. Depending on which standard general conditions are used, the contractor may be entitled to keep some or all of the contractor's overhead and profit for changes that result in a change order credit to the contract sum. The appropriate general conditions should be referred to for the proper methods of determining the contractor's overhead and profit for net decreases in the contract sum.

The AIA and EJCDC standard general conditions cover methods of determining the cost of changes in considerable detail. However, if the general conditions do not stipulate the method of handling computations, then the subject should be covered in the supplementary conditions to minimize disputes.

Some government agencies set allowable fixed percentages for overhead and profit as a basis for contract sum adjustments. These percentages are usually outlined in the supplementary conditions.

Unit prices are often used as the method of computing change order costs. When unit prices are the principal basis for award, as in highway work, problems are minimal except in those instances where actual quantities vary significantly from the estimated quantities included in the procurement documents. On these projects, sufficient unit prices are established in the contract to take care of most changes. Problems arise when unit prices are a minor part of a stipulated sum or other basis. Unit price work may be excessive, and change orders based on these unit prices may be unrealistic.

It may be difficult to confirm costs claimed by the contractor for changes. Some A/E firms require the contractor to provide a complete cost breakdown of the project with the bid or proposal. The cost breakdowns are made a part of the record and can be referenced for change orders. In such instances, provisions of procurement and contract documents are carefully prepared in coordination with the owner and the owner's legal counsel.

Still another area subject to disagreement in change order work involves charges for equipment rental. It should be clearly established what is to be included in equipment rental rates, such as fuel, labor, and the allowance for overhead and profit. If the contractor actually rents equipment only for making the change, there is no problem. If equipment used for making the change has already been rented and is on the project site, then there may be disagreement as to how much time will be allowed against the change. If the contractor uses contractor-owned equipment in making the change, the rate will need to be set or negotiated. Equipment, whether rented or contractor owned, invariably experiences periods during the normal working day or even entire days, when the equipment is not being used. Perhaps an excavator is used for four hours in the morning and then sits idle for four hours while underground pipe is being installed. The contractor may not be entitled to bill the owner for the full rental rate because the equipment is idle, but should be able to bill for a lower, standby rate to cover this idle time.

Many difficulties with change orders result from lack of communication. It is helpful for the A/E to stipulate the modification procedures to be followed and the data required to substantiate claims for extra costs in a Division 01 section of the specifications.

After a change order has been issued, the contractor should adjust the schedule of values and the construction progress schedule to reflect the appropriate changes.

8.2.1.8 Pricing Changes

The contract usually has very specific guidelines to follow when pricing changes. This may include the amount of overhead and profit that the contractor is allowed to add to the cost of labor, equipment, material, and supplies. The contractor needs to be fair in accumulating the costs of changes, including all legitimate costs associated with the change, but not inflating the costs needlessly. Often, the change involves getting prices from subcontractors and suppliers for portions of the work. When the contractor presents the cost of a change to the A/E, it is important that it be complete and as accurate as possible. If there is not enough information given by the A/E to provide an accurate price, the contractor has a responsibility to ask for additional information that will allow accurate pricing. The contractor should look at additional project site overhead costs and include them in the change, if the change is significant enough to prolong completion of the project.

8.2.1.9 Time Changes

The AIA standard general conditions state that time limits in the contract documents are of the essence. The time limit usually is the period of time allotted in the contract documents to achieve substantial completion of the project. By signing the agreement, the contractor agrees that the time limit stated is a reasonable period of time to construct the project. The contractor's construction progress schedule should accurately reflect anticipated construction activities and time periods. On some occasions the A/E requires the contractor to include anticipated weather delays in the construction progress schedule based on the normal weather conditions as determined by the local weather bureau. When anticipated weather delays are included in the construction progress schedule, only delays beyond the anticipated conditions will be allowed in extending the

construction progress schedule. However, it is unusual to grant a change to the contract sum for additional contractor overhead when extensions are granted for weather delays. Careful monitoring of the contract time provisions is necessary during construction.

Often, a change to the contract also affects the completion time. When change orders are being priced and prepared by the contractor, the impact of time must also be considered and included, if appropriate. Some changes do not have significant monetary impact but do require more time for completion. Time changes need to be documented as prescribed in the contract, which may include documentation on how the change affects the schedule's critical path. Often, a formal record of the day count on the project is kept. If this is the case, all parties to the contract need to review these regularly and immediately notify the others if there is disagreement with the stated day count.

There are occasions when delays are justified and time extensions to the contract may be granted. If the owner or the A/E delays the contractor through failure to act in a timely manner, or if there are other unavoidable causes, such as weather or strikes, beyond the contractor's control that prevent the contractor from expediting the project, the contract time may be extended by change order for a reasonable period of time. Some changes in time might result from reconciliation of claims.

8.2.1.10 Posting Modifications to the Contract Documents

Once a modification has been issued, it should be posted on the A/E's and the contractor's sets of the contract documents. Having current information on the documents used by project participants can facilitate accurate preparation and review of submittals, help the contractor in coordinating and executing the work, and provide information needed for record document preparation.

These modifications, whether they are a complete drawing revision, small sketches, changes to schedules, or a specification section, must be posted to the appropriate document. All such changes must also be transmitted promptly to all related subcontractors and vendors. Changes concerning code-related issues should be communicated to the AHJ for approval. The AHJ could issue a stop work order upon discovering a failure to report code-related changes to the approved "Permit Set."

8.2.2 Unknown Conditions

Unknown conditions may arise that were not anticipated during the preparation of documents or pricing. Alteration work often uncovers previously undetected conditions or hazardous materials. A soils report may not indicate certain items that interfere with the excavation or grading, or soil conditions may be encountered that are different, resulting in increased or decreased cost. Changed conditions may also include:

- Work of the owner or separate contractor interfering with work progress
- Changed existing conditions beyond the contractor's control

If the contractor encounters conditions materially different than indicated on the contract documents, the procedures contained in the conditions of the contract are to be implemented. These procedures allow the work to proceed while the contractor and the owner agree on a fair and equitable adjustment to the contract time, cost, or both for credits or expenses incurred by the concealed or unknown conditions.

8.2.2.1 Hazardous Materials

Both AIA and EJCDC standard general conditions have disclaimer provisions for hazardous materials that may exist on a project site. Other situations may include sites containing hazardous waste and lead-based paint in existing structures. Special requirements and specialty contractors are usually involved when performing environmental restoration of contaminated sites. AIA Document A201 and EJCDC C-700 state that the contractor shall stop work in the area affected by suspected hazardous materials and notify the owner and the A/E of the condition. The owner is responsible for hazardous materials unless the materials were brought to the site by the contractor. The A/E will not recommend corrective or remedial measures; however, the A/E may recommend that a qualified expert be employed by the owner to investigate and evaluate the materials and recommend corrective action.

Unless the project includes removal of hazardous materials, the contractor is not usually requested to remove hazardous materials. A separate specialty contractor is usually employed to remove or encapsulate the hazardous materials. Occasionally, the owner's staff may be qualified to perform this work. In any case, the contractor cannot be forced to perform work in areas where hazardous materials are located until the materials are removed or made safe by encapsulation. AIA Document A503, Guide for Supplementary Conditions, and AIA Document A533, Guide for Supplementary Conditions, Construction Manager as Advisor Edition, have suggested wording for the supplementary conditions about the procedures to be followed when hazardous materials are encountered or suspected to be present on a project site.

Depending on the situation, the contractor may be entitled to a change order for additional cost, time, or both, and the A/E may be entitled to an additional fee for services rendered in connection with the discovery of hazardous materials. The A/E usually advises the owner of the owner's responsibility for the suspected hazardous material and may help the owner evaluate the qualifications of experts under consideration to examine the situation and recommend corrective action.

8.2.2.2 Concealed Conditions

Concealed conditions are conditions that are not documented or that could not have been observed at the site at the time of the pricing. These conditions may include:

- Subsurface soil conditions materially different from those represented in a geotechnical report
- Concealed conditions uncovered during construction

The AIA and EJCDC standard general conditions have provisions for concealed or unknown conditions. The observing party of the concealed or changed condition is required to promptly give formal notice of the situation before the condition is disturbed. The A/E will promptly investigate the situation and determine whether a contract document modification is required. If the condition is a true change from known or documented conditions, the A/E can recommend an adjustment to the contract sum or time to the extent attributable to the existence of the unknown condition that was not shown. If the A/E determines that no change in the terms of the contract is needed, then the A/E will inform the owner and the contractor, in writing, of the requirements governing the conditions.

8.2.2.3 Alteration Work

Alteration work, by its nature, usually has unknown and concealed conditions. These conditions are often the result of alterations made after the original construction, but not documented in the record drawings or inaccurate record drawings upon which the new work was based. Unknown soil conditions may result from differing conditions between soil borings or at greater depths than soil borings explored.

Site visits by the contractor during the procurement stage are important because the procurement instructions typically require the contractor to certify that the contractor has visited the site and has correlated existing conditions and personal observations with the contract documents. The contractor, upon uncovering previously unknown items, may request an interpretation. The contractor should inform the A/E upon discovery of unknown or concealed conditions to allow the A/E to observe the condition before it is disturbed and to verify the contractor's change request. All such notifications should be in writing.

8.3 Substitutions

AIA Document A701, Instructions to Bidders, states that substitutions will not be considered after the contract award unless specifically provided for in the contract documents. EJCDC documents allow for material substitutions after bidding and negotiating.

Product, material, or system substitutions may be handled in many ways. Procedures applicable to substitutions proposed after execution of the agreement are described in Division 01. If Division 01 allows for substitutions after the procurement, acceptance of the substitution may be accomplished by use of a substitution request form. EJCDC C-700 has a provision that requires the contractor to reimburse the owner for the engineer's time in reviewing and evaluating a substitution, whether or not the proposed substitution is approved. Charges for A/E services to evaluate substitutions initiated by the contractor, to make subsequent revisions to drawings and specifications, and to prepare other documentation resulting from a proposed substitution should be addressed in the owner-A/E agreement and added to supplementary conditions or Division 01—General Requirements.

Figure 8.10 is a sample substitution request form. Division 01 identifies if the A/E may consider substitution requests during the construction stage and lists criteria for requests for substitutions. However, substitutions during the construction period are normally discouraged. The substitution procedures in the contract documents should be enforced. Improper substitutions may also be viewed as unfair to the unsuccessful bidders or proposers.

Substitutions should not be considered when:

- The substitution request is made as an RFI.
- The substitution is indicated or implied on shop drawings, in product data submittals, or as samples without a prior formal request being submitted and approved according to Division 01.
- The submitted substitution request has not been reviewed and approved by the contractor.

Knowledge for Creating and Sustaining the Built Environment

SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Phone: _____

Address: _____

Trade Name: _____ Model No.: _____

Installer: _____ Phone: _____

Address: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

Page ___ of ___

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Figure 8.10 CSI Form 13.1A, Substitution Request—After the Bidding/ Negotiating Stage

SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase — Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: ☐

A/E's REVIEW AND RECOMMENDATION

☐ Approve Substitution - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Approve Substitution as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Reject Substitution - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

OWNER'S REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
☐ Substitution rejected - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E
☐ Other:

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Figure 8.10 (*Continued*)

- Acceptance will require substantial revision of contract documents or other items of the project, unless the participants involved agree to reimburse costs for changes to the contract documents.
- The substitution request does not include an itemized comparison of the proposed substitution with the specified product.

Occasionally, a subcontractor or supplier attempts to gain approval of nonspecified products by including them on shop drawings or in other submittals without official written notice. AIA Document A201 states that substitutions may be made only with the consent of the owner, after evaluation by the architect, and in accordance with a change order or change directive. EJCDC C-700 states that no substitute will be ordered, installed, or utilized until the engineer's review is complete, which will be evidenced by a change order. Standard general conditions consider a substitution as a change to the contract documents and formal change procedures need to be followed. Work not complying with the contract documents, which include unapproved substitutions, may be considered defective and be rejected. Both the contractor and the A/E should be aware of this requirement and take the time to adequately review submittals to confirm that only specified items and properly approved substitutions are being provided.

8.3.1 Substitutions after Award of Contract

There are occasions when substitutions after award of the contract may be allowed. Under certain project delivery methods the owner may encourage the contractor to propose alternatives during the course of construction. This is often allowed to reduce costs and evaluate alternative products and systems.

The owner may wish to use the contractor's value analysis and constructability experience. The owner also may provide an incentive for cost control by including a shared savings clause in the owner-contractor agreement. The clause may state that cost savings will be shared with the contractor.

Value analysis is a specific effort to examine and weigh the initial cost; evaluate maintenance expense and life cycle cost of certain materials, components, and systems; and assess performance at the lowest cost consistent with the project criteria. The project's quality requirements may be sacrificed if value analysis proposals or product substitutions are not carefully reviewed. It is prudent for both contractor and A/E to review each value analysis proposal in detail to ensure that it adds or maintains value to a project by meeting the requirements at the lowest possible life cycle cost. Sometimes, however, value analysis may be used to disguise reductions in project quality by undermining the minimum project requirements. True value analysis allows the use of substitute products or processes to reduce construction cost or time without reducing quality or increasing maintenance or replacement costs.

8.3.2 Substitutions during Construction

Most contracts have very specific procedures for requesting a substitution. Substitutions during construction can be disruptive and should be avoided as much as possible. There are, however, several legitimate scenarios when substitutions during construction may be required or allowable.

8.3.2.1 Owner-Initiated Substitutions

After contract award, the owner may decide to change a certain product, system, or other element of the project. The A/E would then issue a proposal request to the contractor, asking the contractor to provide cost and schedule impacts. If the owner accepts the cost and schedule changes, then a change order would follow.

8.3.2.2 Contractor-Initiated Substitutions

After contract award, many developer-type owners may encourage the contractor to propose changes of products, systems, or other elements of the project in order to save money. The contractor initiates the substitution request, complete with cost and schedule impacts. If the owner accepts the proposed changes, then a change order would follow. Under this scenario, the A/E may be entitled to additional service fees from the owner since it is the owner who has directed the contractor to investigate "cost savings" changes and unlimited substitution reviews during construction are beyond normal A/E submittal review services.

8.3.2.3 Contractor-Initiated: Low Bid Substitutions

After contract award, many design-bid-build type projects allow changes of products, systems or other elements of the project in order to save money. The contractor initiates the substitution based on the subcontractor's submission of information to the prime contractor. Often this occurs because the subcontractor has underbid the competition and has based their bid on a nonspecified product at a more competitive cost. This can be equal to the quality of the specified product, but often the product is of a lesser quality. Under this scenario, the A/E may be entitled to additional service fees as outlined in the owner-A/E agreement.

8.3.2.4 Integrated Project Delivery (IPD) Substitutions

By the nature of the IPD process, there may be multiple modifications to products, systems, or elements of the facility. These modifications typically occur during the design process and involve the entire team.

8.3.2.5 Unavailability of Product

On occasion, a product or system that has been specified cannot be obtained. There can be several reasons: it is no longer manufactured or there has been a labor strike, for example. When the specified product is not available because of a legitimate delivery problem rather than the contractor's failure to obtain the product in a timely manner, a product substitution may be necessary. The contractor needs to do the research before submitting the substitution request, ensuring that the product meets the contract requirements.

8.3.3 Evaluation of Substitution Requests

A number of items are considered when evaluating substitutions. The first and foremost of these is whether or not the proposed substitution meets the requirements of the contract documents. These include the product, the manufacturer, the product representative,

the installation, operating costs, maintenance costs, and warranty concerns. Equipment operating costs such as energy demands, replacement part life cycles, and routine maintenance costs are all factored into the evaluation process.

8.3.3.1 Product

When the product is evaluated, consideration should be given to the general characteristics of the product, including performance, reference standards, sustainability, fire ratings, fabrication, warranty, operation, and finishes.

8.3.3.2 Manufacturer

When substitutions are evaluated, the manufacturer is often as important as the product itself, because much of the information and advice regarding the product and its application comes from the manufacturer. Issues for consideration include:

- Length of time the manufacturer has been in business
- Manufacturer's ability to meet specification requirements
- Technical services provided by the manufacturer and whether or not the services are available locally
- Accurate preparation of submittals
- On-time delivery and supervision during installation
- Manufacturer's track record in resolving problems involving the manufacturer's products

8.3.3.3 Product Representative

The product representative may be a valuable source of information regarding substituted products. Competent product representatives can give advice on the limitations as well as on the benefits of the products they represent. Knowing what a product cannot do is as important as knowing what the product can do.

8.3.3.4 Installation and Installer

The contractor should carefully study the manufacturer's directions for installation. Issues for consideration include:

- Coverage of the particular conditions of the project
- Installation methods that are designated in the specifications
- Availability of skilled workers and complexity of installation
- Preparation and finishing requirements
- Installer compliance with qualifications required in the specifications

8.3.3.5 Operation and Maintenance Costs

In addition to procurement cost, equipment and system operation and maintenance costs should be presented to the owner for consideration. Product selection may be based on many factors including proposed duration of occupancy, facility operations, maintenance capabilities, and other factors.

8.3.3.6 Warranty

Warranty terms including duration, cost, and owner's and manufacturer's responsibilities should be carefully compared to the specified product(s).

8.3.3.7 Response to Substitution Request

The entity submitting the proposed substitution should be required to prove that the substitution is appropriate for the intended use. The specified product may have been selected because the product not only performed the required function, but because it also had specific attributes necessary for the project. The proposer of a substitution should recognize that the intended use of the product or system in the specific project is consistent with the manufacturer's intended use.

8.3.3.8 Summary

There is no substitute for a complete review of the proposed deviation from original contract requirements. The amount of time devoted to a request should be in proportion to the item's importance to the project. A request for approval of a curtain wall system requires considerably more attention and time than a request for approval of a towel dispenser. If a request is submitted with inadequate documentation, the request should be rejected and returned for resubmittal. It is the responsibility of the entity requesting the substitution to research and document the substitution to prove equivalency.

The A/E determines the acceptability of proposed substitutions and should review valid requests with reasonable promptness. The decision to approve or reject a requested substitution should be indicated on a substitution request form. Rejection of the proposed substitution usually requires use of the specified product. Most owners and most courts will hold the A/E, not the proposer of the substituted product, to be responsible as the ultimate judge. A simple principle applies: the same liability exists whether a product is specified or is accepted as a substitution.

It is important to establish standard procedures for the processing of substitution requests. Although the reasons for substitution requests may vary, the procurement and contract documents should contain an explanation of the procedure to be followed by material suppliers, product representatives, manufacturers, contractors, and the A/E. It is equally important to enforce the specification requirements to ensure that only specified products or approved substitutes are used, and that the integrity and fairness of the bidding or negotiating process are maintained.

8.4 Feedback

Once interpretations or modifications have been accepted, a determination should be made on whether the interpretation or modification was specific to a project or more general in nature, requiring a revision to the A/E's standards or system. If a standard detail or specification item requires an interpretation or clarification, the A/E should review the appropriate drawing or specification system to prevent future need for interpretations and clarifications. Failure to improve the system will only perpetuate the problem and generate more requests for information or requests for clarification on future projects.

The time required to make interpretations becomes costly if the same item needs repeated clarification.

To be effective, feedback should occur on a continual basis. The purpose of evaluation and feedback is to provide information to the project team so that they may learn from actual experience. The benefits of feedback include:

- Enhanced experience in various project types, materials, systems, and processes
- Input of valuable information for use on future projects
- Better quality assurance and control methods
- The refinement of innovative designs, materials, and construction techniques
- Identification of correctable situations for the benefit of future projects

Chapter 9
Executing the Work

9.1 Field Engineering

Field engineering consists of taking the measurements, facility placement, and layout from the contract drawings and laying them out on the project site. Field engineering includes site surveying and layout. It is important that this work be performed by properly trained and experienced personnel, which may include a licensed land surveyor, the contractor's superintendent, or project engineer. Mistakes made in field engineering can result in significant construction and legal problems. Errors made in field engineering become compounded as the project is constructed.

9.1.1 Surveying

Preliminary surveying is usually done before the project design is completed. During this process, datum points or benchmarks are established and protected for future use. The points usually include both horizontal and vertical references. The horizontal points are used to establish site corners, facility corners, and limits and to place the facility relative to its surroundings. The vertical reference is usually stated as an elevation relative to sea level. In this context, elevation refers to height rather than a drawing view. This is usually correlated to a critical element of the facility, such as finished floor elevation. Infrastructure projects are surveyed in a similar way, but the elevation is usually related to the top of a finished roadway or bridge deck.

9.1.2 Layout

Layout differs from surveying in that layout is usually done by someone other than a licensed surveyor. In addition, layout usually deals with much smaller increments. Examples of layout might include the spacing, pattern, and distance between the anchor bolts for subsequent structural steel that embed in the concrete foundation, or studs for the walls, with door and window openings accounted for. There are many different types of layout performed throughout the course of a project, so it is important to have properly trained people doing the layout work. Often, the contractor's superintendent, project engineer, foreman, or lead person does the layout work.

9.2 Supervision of Construction

Qualified and competent supervision of construction is often the difference between a successful project and one that is not. The contractor's project manager and superintendent(s) are responsible not only for getting the project constructed correctly, but also for safety, coordination, scheduling, dealing with media inquiries, dealing with project visitors, and a large variety of other tasks.

9.2.1 Contractor Responsibilities for Supervision of the Work

Different types of agreements and conditions of the contract describe certain roles and responsibilities differently, but one that is common to all types of agreements and conditions of the contract is that the contractor is responsible for supervision of the project work. Several forms of agreements have language that is specific as to the experience requirements for the contractor's project manager and superintendent, how much time the individuals must physically be on the project site, and define their responsibilities.

Generally, the superintendent is the contractor's spokesperson for the project. The responsibility vested in the superintendent usually includes coordinating and sequencing the subcontractors, procuring and tracking the materials, coordinating the contract documents for the proper construction of the project, preparing and updating the project schedule, coordinating inspections and testing, choosing the means and methods to accomplish the work, renting equipment, and many other activities. Superintendents should be competent, have good communication skills, be diplomatic, have strong leadership skills, and have diverse experience. Depending on the contractor's organization, some of the previously mentioned tasks may be performed by a project manager, project engineer, or foreman.

9.2.2 Complying with Contract Documents

The contract documents represent what is to be constructed. The contract obligates the contractor to comply with the contract documents. Standards and other reference documents are included by reference in the contract documents. The participants need to be familiar with the referenced documents and comply with requirements. This includes obtaining the proper inspections, tests, transmittal of requested and required information, and routing of correspondence, and not deviating from the contract documents. The contractor is not required to confirm completeness and accuracy of the contract documents, nor is the contractor required to ascertain that the contract documents are in accordance with applicable codes and regulations. However, if the contractor discovers errors, omissions, or inconsistencies in the contract documents, or discovers nonconformity with applicable codes and regulations, the contractor is obligated to notify the A/E as soon as the issue is discovered as a request for interpretation.

9.2.3 Quality Assurance and Quality Control Procedures

The contractor must verify that the work being performed complies with the contract documents. This verification is a primary aspect of quality control (QC). This QC provides quality assurance (QA) for subsequent operations. Each participant should verify that existing or preceding work is proper and does not contain obvious defects that will affect subsequent work. Verification of work varies, depending on who is verifying, on which portion, and at what time during the process. This verification may include inspecting, testing, and reporting the results. Other verification may be a simple review of work for accuracy and workmanship. The contractor needs to continuously verify that the work performed is according to the planned schedule and sequence. The contractor also prepares progress billings on the basis of verification of the quantity of work performed. Similarly, the A/E verifies the quality and quantity of work that has been completed, so the A/E can recommend to the owner whether the requested payment should be made.

Refer to Chapter 7, "Quality Assurance and Quality Control," for information about other aspects of QA and QC.

9.3 Coordinating Construction Activities

Coordinating construction effectively is the most important activity contributing to a smoothly running project. The contractor must coordinate all of the subcontractors, suppliers, inspections, testing agencies, consultants, and other project participants at the correct times in order to ensure success. Preparation of an accurate, concise, properly sequenced, and thorough construction progress schedule is paramount to being able to coordinate all the various elements of a project.

9.3.1 Issues Related to Coordinating the Work

It is important that the contractor's project manager or superintendent put in charge of coordinating the work must have pertinent experience for the type of work being performed. The contractor should have good spatial understanding and drawing reading skills. Just as the A/E used spatial skills to document the different drawing views, the contractor now converts these drawing views into three-dimensional elements and systems. The individual in charge needs to understand the type of work being performed so that sequencing and scheduling can be done correctly. Other issues that affect coordinating the work include labor disputes, material manufacturing schedules and delivery dates, weather conditions, completion time, available resources of the contractor, subcontractors and suppliers, status of submittals, inspections, and tests.

Coordination with contract requirements means more than just furnishing the specified material or installing it as directed in the project drawings and specifications. Depending on the product, it may include providing submittals that must be approved prior to installation. It may also include field samples, mock-ups, test panels, or other means of providing the A/E and owner with the assurance that the product and

workmanship will be acceptable. Coordination also requires ensuring that the required inspections happen when they are supposed to, required testing is performed, and the results are properly submitted to the A/E prior to the work being covered or concealed. Sometimes it is discovered that a product is not available after award of contract. The documents should indicate how this situation is to be handled. The owner and A/E have the right to expect that the contractor will follow proper procedures in providing another product.

9.3.2 Coordination Drawings

Preparation of coordination drawings is an activity that contributes to getting the project constructed correctly the first time. Coordination drawings are prepared by the contractor primarily to coordinate related work, which is shown on several contract drawings or schematically by the drawings. Coordination drawings may or may not be required by the contract documents but are a valuable aid in coordinating the work. Failure to coordinate work can lead to reworking and even removal and correction of work.

In the coordinating drawings, the contractor also coordinates the shop drawings prepared by subcontractors and suppliers.

9.4 Sequencing the Work

Effective sequencing of the work requires an understanding of the construction processes required for the project. The list of tasks that are dependent on each other in a project is extensive. For example, concrete forms are built first, then reinforcing steel is placed, and then the concrete can be placed. Walls are framed, then electrical, plumbing, and mechanical rough-in are completed before the wall framing is covered. Although common sense will dictate a lot of the sequencing, there is no substitute for adequate experience. Someone who does not have the appropriate experience may make some sequencing decisions that are not correct and that may cost the contractor money and time if work has to be rescheduled or corrected later. Contract documents may specify certain sequences required for the project. As an example, a specification may require resilient flooring to be installed prior to cabinet work being installed.

Project phasing can be a contractual sequencing of work based on a construction progress schedule, typically established by the owner. Phasing can be the division of major portions of a project separated by sequence and time intervals to allow continued or early use. When phasing is required on a project, the requirements will often be set forth in Division 01 of the project manual. When the construction progress schedule is prepared, the phasing requirements need to be accounted for. It is common to show the completion of a phase as a milestone on the construction progress schedule. Project phasing may have an impact on the permitting process. An example might be where site work is allowed to proceed as Phase 1, to be followed by the structural work as Phase 2. Phase 2 documents are submitted and reviewed by the code officials while the Phase 1 work is constructed. By the time the Phase 1 work is completed, the Phase 2 documents are ready, and construction can proceed uninterrupted.

9.5 Scheduling the Work

Regardless of the project delivery method, the contractor is responsible for scheduling and timing the work. Given this authority, the contractor has an obligation to keep all members of the project team informed of progress, expected delivery dates, start dates for tasks, and other issues that may affect milestone dates or the completion date. This is easily performed when a good updated construction progress schedule is shared with the participants on a regular basis. Weekly scheduling meetings are an excellent way to accomplish this. The owner, A/E, contractor, subcontractors, sub-subcontractors, suppliers, consultants, and any appropriate agencies, such as testing laboratories or inspection agencies, are invited to attend these meetings as deemed appropriate. By maintaining the schedule and communicating with all members of the construction team, there are fewer surprises and the participants know what is expected of them and when it is expected to occur.

The contractor needs accurate schedules and delivery dates from all the subcontractors and suppliers on the project, so that an accurate construction progress schedule can be prepared. A well-prepared construction progress schedule is a helpful tool in keeping the project on track. Unanticipated events can affect the schedule; labor strikes, inclement weather, plant shutdowns, availability of materials, and discontinued product lines can all affect when products get to the project site. When something does not arrive and get incorporated into the project as scheduled, there can be a ripple effect, and several tasks that follow the affected task will also be impacted. The contractor should have contingency plans to implement when any of these occurrences happens, so that the project continues to progress.

9.5.1 Construction Progress Schedules

Construction progress schedules are addressed in detail in Chapter 3, "Preconstruction." In the context of sequencing and coordination, it becomes obvious very quickly why an accurate, thorough, and realistic construction progress schedule is so important. When used correctly, the construction progress schedule shows critical dates and what the impact to completion is when a date is not met. It is a planning tool that all members of the construction team contribute to and use regularly. The person charged with preparation and maintenance of the construction progress schedule must be sufficiently knowledgeable about the type of construction, and specifically the project being constructed, to be able to create and maintain a useful construction progress schedule. If the construction progress schedules are not updated and reviewed regularly, they become meaningless. A project is dynamic, changing constantly. A construction progress schedule must be dynamic and continually reflect where the project is and where it is going.

Occasionally, a project falters and recovery schedules, rather than revised schedules, are required. Increases in manpower, lengthening of the workday, and other methods can be input into the schedule to indicate how recovery can be achieved and the project be put back on the original schedule.

9.6 Construction Means and Methods

Construction means and methods are the techniques and procedures that will be used to construct the project, the "how to" aspects of performing the work. Means and methods involve the planning and sequencing of activities, assignment of labor, use of the site,

logistics of materials, coordinating with other activities, and executing the work. Means and methods involve how the work is carried out. A product or system may be assembled on- or off-site, in a single process or a series of processes, or it may be delivered to the site in components to be assembled in its final location. Means and methods involve the specific selection of equipment and personnel to perform the work expeditiously and cost effectively. Power equipment, such as nail guns, backhoes, cranes, and lifts, may be used in lieu of hand tools to expedite the work and improve efficiency.

Construction means and methods are the sole responsibility of the contractor, unless specified otherwise in the contract. Whereas the contract documents specify what is being constructed and where it will be located, means and methods deal with *how* it will be constructed. Both the owner and the A/E must be very careful not to direct the means and methods. The A/E's responsibility is to ensure that the project is constructed as indicated in the contract documents.

Means and methods are one of the most important elements of a contractor's duties on a project. When careful and thoughtful planning has been coordinated with expedient and extensive communication with all of the construction team, a successful project is the result. Several of the critical components of successful means and methods are as follows:

- Have regular progress meetings that include all essential subcontractors and suppliers. This includes those who are actively performing the work and any others who will be performing work at the site in the near future.
- Communicate with the members of the construction team. This is accomplished through weekly meetings, preinstallation meetings, weekly schedule updates, phone calls, e-mails, and faxes. It is important for the contractor to be organized and communicate with everyone ahead of time, so that they can properly plan their schedules in harmony with the construction progress schedule.
- Have contingency plans for unexpected events. Construction is a dynamic process; events happen every day that have an impact on the project. By developing contingency plans for as many events as possible, the contractor is better prepared to react quickly and decisively when unexpected events occur.
- Follow the construction progress schedule and keep it updated. A well-prepared construction progress schedule shows the sequence of activities. When any of these activities change, the schedule needs to reflect the change, and provisions need to be made to compensate for the lost time.

If the owner or A/E attempts to influence means and methods, the contractor needs to respond professionally. It is prudent for the contractor to listen to suggestions from anyone on the construction team—owner, A/E, subcontractors, and the contractor's own employees. However, the contractor is ultimately responsible for all construction activities. The owner and A/E need to be careful to not attempt to change the contractual relationships by telling the contractor how to construct the project. By not interfering with the contractor's means and methods, the owner and A/E minimize the risk of transferring unwanted liability to themselves.

9.7 Product Delivery, Storage, and Handling

Product storage and handling is an important aspect of any project that cannot be overlooked in preliminary construction planning. Before the contractor mobilizes on the project site, the locations where material will be stored and how they will be unloaded,

inventoried, and protected should be addressed. Some materials are weather or temperature sensitive. When this is applicable, the material or product needs to be stored in a proper climatically controlled area or enclosure. If the product is not stored correctly, the product may be damaged and the warranty may be voided before it is installed in the project. If there are special handling requirements for products, they need to be understood and planned for before the product arrives on the project site. Unloading may require a crane, boom truck, forklift, or other means. Arrangements for the correct equipment should be made in advance of the material delivery.

When products arrive at the project site, the individual who will unload the products should first examine the bill of lading and other shipping documents to make sure that the material is for the correct project. Next, the individual should check to make sure it is the material that has been specified and verify the quantity. Finally, a thorough inspection should be performed, and any damage that may have resulted from shipping should be noted on the bill of lading or other shipping documents before signing for receipt of the materials and unloading them. This gives the receiving party a remedy to pursue with the shipper if there is damage to the materials.

9.7.1 Complying with Contract Requirements

It is important to understand the contract requirements as they relate to handling and storage of products. Often, the contract documents are very specific about how a product is to be unloaded and stored. This may include the climate that it is to be stored in, how it is to be packaged, or other criteria that may affect not just the warranty but how the product will perform in the long term. The manufacturer's requirements are usually related to specific installation details and warranty coverage. Specifications and manufacturer's requirements should complement each other and not be in conflict. The specifications may reference the manufacturer's instructions, which might be submitted as evidence of requirements.

9.7.2 Manufacturer's Recommendations

Even though the contract documents may indicate how the product is to be handled and stored, the manufacturer often has additional information. This information typically accompanies the material when it is delivered to the project site. It is good practice for the individual charged with unloading materials to look for the packing slip and any other information that the manufacturer has attached to the product. This slip often states any special handling and storage requirements. The manufacturer's recommendations are normally followed. Not doing so may void the warranty and shift the liability for any future product failures to the contractor or party choosing to ignore the recommendations. In the event that the contract requirements and the manufacturer's recommendations differ, the contractor should comply with the more stringent requirements. The contractor is required to comply with requirements of the contract documents, but should also comply with manufacturer's instructions or recommendations if they are more stringent than the contract document requirements.

9.7.3 Product Delivery

The contractor and the product representative should be aware of the conditions affecting product delivery and their possible effects on the construction progress schedule. Once a purchase order for the product has been received, product representatives assist the contractor by facilitating timely delivery. If suppliers learn that the product cannot be delivered by the desired date after placement of an order, the contractor should be informed immediately.

Once a product is ready for shipment, the selected carrier usually has the responsibility to deliver it to the project site or final location for further distribution. Suppliers should be aware of the construction progress schedule and the projected product delivery date. Refer to *The CSI Project Delivery Practice Guide* for conditions affecting delivery and distribution of products.

Suppliers should understand phasing of construction and scheduling of product installation when estimating a requested delivery date. A product delivered early may need storage and if delivered late may cause a construction delay. Suppliers should review the purchase order prior to ordering the product to verify where it will be delivered.

9.7.3.1 Lead Time

Lead times vary based on the product and manufacturing requirements. For example, it may take up to 12 months to manufacture a custom product. To complete the project on schedule without being affected by the lead time, the owner might purchase the product directly from the manufacturer in advance of awarding the construction contract and have the contractor include a price for installation only in the bid. The owner may also execute an agreement with the manufacturer and assign the entire subcontract for manufacture and installation to the contractor.

Commodity products are usually manufactured and stocked for immediate shipment. This is commonly referred to as *stock on hand.* Although most products have a lead time, commodity products normally do not require additional manufacturing time prior to shipping. Nonstandard and custom products often require an extended lead time.

Unanticipated weather conditions may also affect lead time. Product representatives should be aware of conditions affecting lead time and know the anticipated delivery schedule to obtain approval of submittals, order the product, and have it shipped in a timely manner. Product representatives need to be aware of schedule changes and change orders that may affect the product ordered. Schedule information communicated to the contractor should be accurate.

9.7.3.2 Special Shipping and Handling Considerations

Many manufacturers have plants strategically located throughout the country to facilitate efficiency in product distribution. Some industries tend to be local, such as the manufacturers of concrete and unit masonry. However, many national manufacturers have only one plant. Products are distributed throughout the country by various transportation methods. Delivery by ground transportation, by either train or truck, is popular, cost effective, and reliable. However, depending on the time of year, the shipping of materials may be delayed. When shipping by rail, more time may be needed because trucking will still be required to deliver the product from the transfer point to the project site.

Major temperature and other climatic variations, as well as altitude changes, may need to be taken into account when a product travels outside the immediate area in which it

is manufactured. Special manufacturing techniques may even be required for a product, depending on the product's route of travel to its final destination. For example, many products need to be protected from freezing, such as water-based paints, coatings, and adhesives. Shipping these types of products during winter months in many parts of the country requires heated delivery vehicles. This affects the shipping method as well as cost. Other concealed and unknown factors affecting transportation include abnormal weather, accidents, and fog.

Some cities and states require carriers of hazardous materials or oversized loads to use alternate travel routes. Restricted travel can adversely affect the delivery.

A possibility of delay always exists in receiving clearances through customs, and overseas shipping can present several challenges if product representatives are unaware of requirements for international shipping and payment policies.

Overseas shipping is a major factor to consider when establishing delivery schedules. Prior to the product's being shipped, the manufacturer is responsible for packaging it properly but has little control over delivery once it leaves the dock. Prior to departure, full payment is often required on the order. The signer of the receipt now owns the shipment regardless of the product's condition on arrival. If the product is defective once it is applied or installed, the responsibility lies with the manufacturer's last distribution point prior to loading. One method of accepting payment for shipping involves an irrevocable letter of credit. This guarantees payment is made on the shipment.

9.7.3.3 Import/Export

Trade agreements and laws governing import and export of construction products are considerations the contractor should understand, because they may affect the construction progress schedule. Refer to *The CSI Project Delivery Practice Guide* for general discussion of these issues.

9.8 Examination and Verification

Each installer should inspect previously completed work prior to starting the installer's own work. This is especially true for specialized subcontractors, such as cabinet installers, floor covering installers, glazers, and finish carpenters. This may include verifying actual field dimensions with dimensions on shop drawings; ensuring that openings, built-in anchorage, and reinforcing are in place and correctly sized; and ensuring that all work required prior to the start of the installer's work has been completed. This examination is intended to identify defects in previously completed construction. It is advisable to not begin work until defects and deficiencies have been noted and brought to the attention of the contractor. This procedure is a QA action that will help prevent compounding defects.

9.9 Preparation

After examination and verification of previously completed work, each installer needs to make necessary preparations for installation of the installer's work. These preparations may include verifying that the materials to be installed are at the project site, obtaining the tools and equipment required for the work, confirming that environmental

requirements in the contract documents or of the manufacturer have been met, and coordinating the construction progress schedule with the contractor and other installers performing related work or work in the affected area of the project. Once the installation work begins, it is presumed the substrate upon which that work is installed is acceptable and meets applicable standards for the new material being installed.

9.10 Erection, Installation, and Application

The contractor determines the means and methods of how to construct a project. The contractor's means and methods include erection, installation, and application of products and materials. This includes verifying that required materials are available, access to perform the task is adequate, and sufficient labor and equipment are on-site. A preinstallation meeting at the site often precedes these activities. The attendees at preinstallation meetings may include the contractor or a subcontractor, the manufacturer's representative when applicable, and the A/E.

9.10.1 Erection

Erection of items on a construction site requires careful planning by the contractor. Often, the staging requirements of a site dictate where equipment used for erection is positioned. In buildings, structural steel; exterior facade panels; heating, ventilating, and air conditioning (HVAC) units; and large glazing are examples of items that need to be erected. In heavy construction, bridge girders (both steel and concrete), precast retaining wall sections, work bridges, false work, and heavy concrete gang forms are examples of items requiring erection.

To successfully complete this work, the contractor and the contractor's subcontractors and installers need to know the size, shape, and weight of the items to be erected. They also need to know what equipment will be used to do the work. This may include forklifts, boom trucks, or cranes. The weight of the objects to be erected is evaluated in conjunction with a load chart that shows what weights can be lifted safely at a given boom angle, radius to the picking point, and wind. Failure to correctly perform this preplanning function can result in the failure to complete the erection as intended and may result in damage to project components, damage to surrounding facilities, or injury to construction personnel or the public.

If a subcontractor is performing the erection work, the subcontractor will typically do the preplanning, but it is important that everyone communicates how the work will be sequenced. The areas of the site that will be impacted, the location of incoming material that will be staged relative to the erection equipment, and other special requirements are important. Regardless of who does the erection, the contractor is responsible for both the process and the results.

When the contractor or subcontractor rents a piece of equipment without an operator, it is important to provide properly trained and qualified operators who have specific training in operating the equipment. Usually, the lessee is also required to furnish appropriate certificates of insurance coverage prior to taking possession of the rented equipment.

A contractor or subcontractor must also be cognizant of allowing others on the project site to use the equipment. Without providing proper training and provisions,

the owner of the equipment may assume unwanted liability by allowing an improperly trained individual to operate the equipment.

9.10.2 Installation

Installation procedures are specified in PART 3—EXECUTION of individual specification sections. They address requirements for installation procedures, sequencing, and coordination of the participants and processes involved in the installation of a specific product or system. Industry and trade association standards for installation of products may be specified by reference. If standards are specified by reference, the installer must understand the installation requirements included in referenced standards and should have a copy of each referenced standard. The contractor is responsible for compliance with specified installation requirements and the requirements of referenced installation standards. Installation procedures are usually specified to focus on special concerns related to the products included in a specific section and do not relieve the contractor of the responsibility to coordinate the work. The contractor should review installation procedures with the installer and the A/E, if appropriate. By reviewing procedures in advance of the installation, potential problems can often be mitigated. The specifications may include a requirement that the installer comply with manufacturer's installation instructions. Whether or not this requirement is included in the specifications, the installer should obtain a copy of the manufacturer's installation instructions and review, understand, and comply with the instructions.

9.10.2.1 Manufacturer's Installation Instructions

These include manufacturer-prepared instructions concerning the proper application or installation of a product or system. The contractor and the A/E use this information to verify that the project is ready for installation and that the installation follows the recommendations of the manufacturer.

The contractor should ensure that the manufacturer's specific installation instructions are followed. Often, following the manufacturer's instructions is an explicit prerequisite for the product warranty to be honored. In addition, improper installation may result in unsatisfactory product performance and a shorter-than-planned life cycle of the product.

Whenever possible, it is good practice to have the manufacturer's representative on-site to observe the installation of the product. Some contracts specifically require this as a prerequisite for the installation of the product. Costs may be associated with having the manufacturer's representative on-site, so the contractor needs to carefully read and understand the contract requirements, so that the proper costs can be included in the construction contract.

9.10.3 Application

A variety of materials get applied during a project. These may include stucco, floor covering, plaster, joint compound, paint and wall coverings, asphalt chip seal coating, and waterproofing. It is often prudent for the installing contractor to hold a preinstallation meeting on-site that includes the manufacturer's representative when applicable, the A/E, and the contractor. Specific details of how the product will be applied, including temperature and climate constraints, lighting, required condition of the substrate, experience of the applicators, special equipment that may be used,

environmental impacts, and other details, should be reviewed. Regardless of who applies the product, ultimately it is the contractor's responsibility to ensure that the work is done correctly.

9.10.4 Tolerances and Clearances

The quality of workmanship required for each project is established by the contract documents. Construction specifications identify the qualitative requirements for products, materials, and workmanship upon which the construction contract is based. Tolerances are QC requirements specified for construction items in the specifications, or by references to various industry or trade association standards related to products or equipment. Tolerances vary, depending on the material and its use. Tolerances may be industry standards or they may be special project requirements. For example, the tolerance for concrete floors will be different for superflat warehouse floors than for concrete floors that will receive carpet in an office building. The specifications normally recognize the difference in requirements between these areas. The concrete floor standards for flatness in carpeted areas may not need to be verified if spot checks prove acceptable. However, because of the precise project requirements for a superflat floor, testing methods are normally required to verify compliance with the contract documents.

Material tolerances are as important as construction tolerances. The finish tolerance for architectural precast concrete used for a building facade may be more precise than precast concrete used for structural purposes. The architectural precast concrete will be exposed to view and therefore requires a uniform surface finish, flatness, and dimensional tolerance. The architectural precast concrete needs to maintain continuity of line between adjoining pieces while allowing for uniformly sized joints.

The specifications also normally consider the tolerances and clearances required for constructability. For example, a building frame and slab edges will not be perfectly plumb, level, and square. A reasonable clearance should be allowed between the structure and the facade to allow the facade to be installed plumb from the ground to the coping without interference from structural elements.

Good communication can prevent problems from occurring. The contractor should inform the A/E of tolerances it believes to be too restrictive before an item is constructed or fabricated. Difficulties can be prevented before they occur when the contractor takes seriously the contractor's obligation under the general conditions to carefully study and compare the contract documents and to promptly give the A/E written notification of conflicts, errors, inconsistencies, omissions, or constructability issues that are discovered. Feedback of this nature can also prevent problems from occurring on future projects by correcting the original information at the source, where it will be available for future use.

Throughout the construction process, the work is monitored to verify compliance with the specified requirements. As stated previously, the contractor should be allowed some latitude regarding how to go about achieving the requirements of the project.

9.10.5 Contractor's Inspections

The contractor should perform regular inspections throughout the project, to ensure that the project is being constructed per the contract documents. This means that in addition to supervising and inspecting the contractor's own work, it is also the contractor's

responsibility to inspect the work of those under the contractor's control. The fact that the contractor did not perform an element of work with the contractor's own forces does not excuse the contractor from compliance with the contract documents.

9.11 Cleaning and Construction Waste Management

Cleaning and removal of construction waste are a necessary aspect of construction. A poorly maintained site can be a safety hazard as well as being unsightly. Even though each individual may be responsible for their own debris, there needs to be central control of construction waste and debris. This overall control of cleaning and construction waste management may vary, depending on the project delivery method. Division 01—General Requirements may specify the procedures and responsibilities for cleaning and construction waste management.

Many projects, whether sustainable or not, have requirements maximizing the amount of construction waste being sent to recycling facilities. Many contractors have discovered that in certain urban project locations, it makes very good business sense to recycle as much construction waste as possible because the costs are far less than the cost of using landfills. Many projects have recycled more than 75 percent of construction waste, including material packaging.

9.11.1 Progress Cleaning

Regular cleaning is important during construction for several reasons. It presents a better project image to the public and to visitors at the work site. Having a clean work site reduces accidents such as tripping and stepping on nails, as well as making access easier for all workers. Often, the requirements of regular project cleaning may be spelled out in the contract. Weekly cleaning is common, as is cleaning after a major phase of work is completed. The requirements of periodic cleaning are usually discussed either at the preconstruction conference or at the site mobilization conference. The contract may allow the owner to withhold monies from the contractor if periodic project cleaning is not done, or the owner may have the cleaning done and request a contract modification for the costs incurred. Periodic cleaning is especially important when part of the project is occupied.

Many projects are starting to use environmentally friendly cleaning methods. On sustainable projects, the cleaning methods are often required to comply with the environmental standard Green Seal 37 for general-purpose cleaning and toilet room cleaning. Many natural cleaning materials are available. These include:

- One-half of a lemon dipped in borax instead of abrasive cleaners
- Vinegar, salt, and water, or baking soda in water instead of ammonia
- Borax in water instead of disinfectants
- Baking soda and vinegar in boiling water instead of caustic drain cleaners
- Dry cornstarch instead of upholstery cleaners

9.11.2 Construction Waste Management

Part of an efficient project-cleaning program includes construction waste management. Having adequate construction waste receptacles to isolate recyclable materials from trash going to a landfill is important.

In order to comply with sustainable requirements, the contractor may be required or simply desire to provide for salvage and reuse of existing materials and minimization of construction waste through recycling. As sustainability and reuse of construction materials become a higher priority, recycling and reuse opportunities are increasing. Often, a recycling company provides receptacles on-site for collecting construction materials, which are then picked up and hauled away at no cost to contractor or owner. In several instances, the contractor or owner can make nominal revenue from the recycling efforts. Scrap steel and reuse of existing wood beams are good examples of constructive reuse of materials.

When developing a construction waste management plan, the contractor should determine how the recycler will receive recyclable materials. Some recyclers will sort materials at their facility. Others will require sorting at the source. If sorting at the source, it is important to have separate containers or dumpsters for each type of recyclable material clearly identified to prevent "contamination" by mixing different types of materials. The source sorting requirement will affect the contractor's site staging/layout plan.

Some demolition waste can be reused on the project site. Under certain conditions, for example, asphalt or concrete paving can be crushed to very small size and used as fill.

Sustainable projects will require the contractor to develop and implement a construction waste management plan to comply with an established industry-recognized reference standard. The plan normally consists of:

- Construction waste identification
- Construction waste reduction work plan
- Cost/revenue analysis
- Estimated quantities by weight or volume

Often, a construction waste reduction plan is developed: Such a plan often:

- Lists each type of waste
- Determines whether waste will be salvaged for reuse, salvaged for sale, salvaged for donation, recycled, or disposed of in landfill or incinerator
- Includes points of waste generation, total quantity of each type of waste, and quantity for each means of recovery
- Includes handling and transportation procedures

9.11.3 Final Cleaning

Final project cleaning is performed just before turning the project over to the owner. Timing is important so that the cleaning is done only once. Usually, professional cleaning services are enlisted for this important cleaning. It is common to have a line item in the schedule of values for final cleaning. The requirements of final cleaning may be spelled out in the contract or at the preconstruction or site mobilization meetings. On sustainable projects, compliance with industry-recognized referenced standards for stewardship of cleaning commercial and institutional facilities is often required.

Prior to final cleaning, the contractor and subcontractors need to demobilize, removing all of their equipment and materials from the facility and site so that the entire facility, including systems, can be thoroughly cleaned. The contract may provide the owner with remedies for the contractor's failure to perform the final cleaning, including withholding payment or having the cleaning done by a third party and a contract modification for the costs incurred.

9.12 Protecting Installed Construction

Protection of installed construction, while the contractor's responsibility, becomes everyone's job as the project progresses. Subcontractors are also responsible for protection when they perform their work. Even the owner and the A/E need to exercise care when at the project site to ensure that they do not inadvertently soil or damage completed work. This becomes more critical toward completion of the project, especially when finishes have been completed.

9.12.1 Protection of Installed Work during Construction

As the contractor and subcontractors complete their work, they should protect completed work from potential future damage that may result during construction. This may entail leaving protective wrapping or packaging on certain items. Protection may also be accomplished by limiting access to certain areas of the project. If an area has been completed and all of the finishes have been completed and cleaned, the contractor may more easily protect the area by closing off the area and denying access to the area by the contractor's employees and subcontractors.

9.12.2 Protection of Work until Owner's Acceptance

When the project has been completed, the contractor still has an obligation to protect the work until the owner takes possession. It is prudent for the contractor to protect the work until owner acceptance, as any damage done in the interim is usually the contractor's responsibility. The substantial completion inspection usually reveals any areas that have been damaged during construction that require repairs prior to turning the project over to the owner.

9.12.3 Protection of Workers and the Public

The contractor is also responsible for taking steps to protect the workers on the project and the public. Protection of workers is an integral part of the contractor's safety program. Examples of worker protection include appropriately secured and labeled railings,

barriers, hole covers, rebar caps that reduce the risk of impalement, and access to high-risk areas being limited to only those actually performing work in those areas.

Requirements for protection of the public are typically specified in Division 01—General Requirements, Section 01 50 00, Temporary Facilities and Controls. Temporary protection for the public frequently consists of installation of physical barriers between the public and areas where work is being performed. These barriers may include fences, temporary walls, covered sidewalks, and barricades closing off sidewalks and streets. Concrete jersey barriers, plastic bollards and cones, and flaggers are frequently used to protect the public by limiting access to work areas on highway projects. On projects that include demolition of a large existing facility, temporary protection for the public may include restricting public access to a significant area surrounding the project site for a short period of time. This requires significant coordination with authorities having jurisdiction (AHJs), public safety officials, adjacent property owners, and the public. The installation of temporary environmental barriers is becoming increasingly important and common as our understanding of airborne health hazards increases and technology improves. Contractors may be required to provide air barriers, dust barriers, water runoff barriers, and noise barriers to protect the public from exposure to project site conditions. On projects including hazardous material abatement, complete enclosure of work areas and containment of materials is required. Temporary barriers and enclosures should be supplemented by appropriate signage that clearly identifies the potential hazard and directs the public away from work areas.

9.13 Testing and Inspection

There are numerous requirements for testing and inspection from a variety of AHJs and testing agencies throughout a project. Total facility commissioning may be a significant component of the testing and inspection required for a project. Commissioning is a critical component in the QC processes for a project. Whereas testing and inspection typically focus on specific items of work or systems, total facility commissioning checks the entire project to verify that it will meet the needs identified by the owner in the design stage.

The type of project determines which of the numerous tests will be required throughout a project. These may include pile-driving bearing tests, rebar and concrete QC inspections and tests, rock and asphalt compaction tests, structural steel welding tests, and fireproofing tests. The contract documents specify who is responsible for testing. The party responsible for payment of the testing agency may vary from project to project, but the contractor is always responsible for scheduling the testing. The results of the test or inspection should be clearly documented, including whether the item tested passed or failed to meet the requirements, and issued in a report within a day or two after the test or inspection. Test reports are submitted to the contractor and the A/E to document required testing. The contract documents may also require the testing agency to submit copies of test reports to the owner, the A/E, the applicable subcontractor, and AHJs. Codes and applicable regulations often require the owner to provide special inspections and testing for portions of the project. The owner may rely upon the A/E for assistance in securing names and proposals for these services from independent testing laboratories and inspection agencies. The A/E may also be required to monitor these testing and inspection services to verify that required tests and inspections are taking place in a timely manner.

9.13.1 Coordination with Owner's Selected Testing Agency

If the owner has designated certain testing agencies to be used, the contractor has an obligation to inform the testing agency with enough advance notice to coordinate the testing when required, thereby eliminating delays to the project. On some projects, testing agencies may be employed by both the owner and the contractor. The tests of each respective agency may even overlap, such as if the owner's testing agency performs the structural steel welding tests while the contractor's testing agency performs the steel bolt torque tests.

On projects where the owner selects, employs, and pays for the testing agency, the contractor is normally required to pay for retesting when initial inspections and tests indicate that work does not comply with the contract documents. Also included in the contractor's responsibility would be any costs of patching or replacing removed work and fees for the A/E for re-review of new inspection/test information. The same testing agency is used for retesting and the associated cost is either paid directly by the contractor or deducted from the contract sum by change order.

9.13.2 Notices

The contractor is responsible for providing adequate notice to all parties involved in testing and inspection. This may include notifying the A/E if the A/E's personnel need to be present during testing, notifying the owner if the owner's personnel need to be present during a test, and actually scheduling the test. Part of the notice to the testing agency requires notification of the routing for test results. Tests should not be scheduled until the work to be inspected is complete and ready for inspection. Inspections also require adequate advance notice to participants in the testing process. The contract documents addressing requirements for the work to be tested need to be available at the project site for use by the testing agency and others involved in the testing and inspection. In addition, the appropriate permit and permit documents that cover the work to be inspected need to be on-site and in an easily accessible location for the inspector.

9.14 Project Site Safety

Project site safety is important to all of the construction team participants. Whereas the contractor is responsible for the overall project safety, the owner and A/E are obligated to abide by the contractor's safety rules when at the project site.

9.14.1 Considerations

As construction has become more complicated, so have the health and safety issues facing the contractor. The contractor must be cognizant of a myriad of agencies and regulations. The Occupational Safety and Health Administration (OSHA) dictates many of the safety requirements that must be adhered to in construction. Furthermore, many

states and local jurisdictions have safety requirements in addition to those mandated by OSHA. The owner and A/E should not direct the contractor in matters of safety, or they may be liable for the consequences that arise from their direction. In addition to OSHA, most companies have their own safety rules. These may include issues such as personal protective equipment, safety meetings, safety committees, new employee orientation, and accident/incident reporting. Personal protective equipment includes a variety of devices designed to protect the employee from the hazards found on a construction site. Some common types of personal protective equipment and related hazards are as follows:

- Hard hats—falling objects
- Ear protection—high-decibel noise
- Dust masks and respirators—sweeping, grinding, and spray applications
- Safety glasses, goggles, and face shields—airborne particles that may enter the eyes, such as sawdust, grindings, chemicals, and dust
- Safety vests—increased visibility to the traveling public and construction traffic
- Safety harnesses, lanyards, and lifelines—fall protection for overhead and elevated work
- Gloves—hand protection from abrasive and sharp objects
- Boots—foot protection from dropped material, sharp penetration, or other hazards

Other considerations include:

- Shoring of trenches
- Temporary bracing of work
- Scaffolding and ladders
- Confined spaces
- Air quality

Safety and health are complementary. Safety procedures and requirements usually protect the health of the workers. Safety costs must be included in the project. The cost of safety is not measured just in the cost of the safety equipment. Lost-time accidents can lead to legal claims and work delays. Accident costs do not end just with the cost of an incident, but usually include higher liability and workers' compensation insurance premiums and substantial regulatory penalties.

9.14.2 Procedures

Good safety procedures result from an effective safety program that is endorsed by management and adhered to by everyone in the organization. Procedures include having methods in place for doing repetitive tasks the same way with safeguards in place, such as equipment checks before operating, an assured grounding program for electrical cords and power tools, the engineering of safety into every aspect of the work, and similar practices that contribute to a consistently safe project site.

9.14.3 Meetings

Several different types of safety meetings may occur on a project. Contractors often hold weekly safety meetings, at which the supervisors and workers gather before start of shift and discuss a selected safety topic. These meetings offer the workers a chance for interactive feedback, insight into the upcoming work, and the opportunity to ask questions or express

any safety concerns that they might have. Sometimes a contractor invites OSHA Consultative Services to visit the project and do a safety consultation. This is an excellent opportunity for the contractor to take advantage of OSHA's safety resources while minimizing the risk of fines for unsafe conditions.

9.14.4 Training

Many different types of safety training are available and are often necessary to accomplish the work on a job site. Some examples of this include lead-based paint training; competent person training for excavation support and scaffold erection; first aid and cardiopulmonary resuscitation (CPR) training; specialized operator training for equipment operators; respirator training; and many other elements of training that are project specific. Ongoing safety training should be a critical part of every contractor's daily operations. Proper and thorough safety training has been proven to reduce accidents, incidents, and workers' compensation insurance premiums. Every incident, no matter how minor, should be recorded and followed up.

9.15 Contractor Record Keeping

Accurate and timely record keeping throughout the project is important. The record-keeping needs and recommended procedures for the contractor project management are similar to those identified for construction contract administration (CCA) in the section on Record Keeping and Reporting in Chapter 6, "Site Visits, Observations, and Inspections." The major differences between the two record-keeping processes result mainly from the differences between the A/E's or owner's role as construction contract administrator and the contractor's role as project manager.

Project records provide data for establishing the legitimacy of claims, create a history for the contractor and owner, record information for future projects, and document inspections and test results. The contractor's project documentation should be complete and provide a detailed record of construction stage activities. Contractor project management records should be organized and maintained in a format that allows information to be easily accessed and retrieved.

In addition to typical CCA records, the contractor's project manager should maintain records of items specific to the construction of the project. Some of these include:

- Daily reports
- Project scheduling information
- Communications with subcontractors and suppliers
- Safety procedures, reports, and records
- Reference standards included in the contract documents
- Material certifications
- Construction photographs
- Record documents
- Safety issues
- Staffing reports

9.15.1 Daily Reports

The contractor's project manager or superintendent prepares a daily report in which important events that transpire on the project site are recorded. These reports should be objective, factual, and complete. In addition to information typically included in the A/E's field observation reports and a project representative's daily log or journal, the contractor's daily report should include:

- Project name and location
- Contractor's project number
- Project personnel present
- Date
- Weather and temperature variations during the day
- List of subcontractors working on-site (include crew size and number of hours worked)
- Project schedule review, adjustments, and variations
- Testing (scheduled/performed)
- Project deliveries
- Safety meetings held and safety inspections conducted

Reports should be prepared daily, including weekends and holidays. These reports describe construction activities and progress items that may impact the schedule or the construction cost.

The contract documents may require the contractor to send copies of the contractor's daily reports to the A/E. The A/E should forward the reports to the owner. Figure 9.1 is an example of a daily report form.

9.15.2 Use of Photographs and Video

Photographs and videos provide a visual record of construction. This visual documentation is valuable to the contractor as well as the A/E and owner. Refer to the section on Record Keeping and Reporting in Chapter 6, "Site Visits, Observations, and Inspections" for use of photographs and video as visual project records.

9.15.3 Use of Forms and Log Forms

Use of standardized forms speeds up the documentation and written communication processes. Clear communication keeps parties informed and helps prevent problems. Written communications on standard forms also help to avoid misunderstandings. Standard forms that may be used for contractor project management are produced by the Construction Specifications Institute (CSI), the Associated General Contractors of America (AGC), American Subcontractors Association, Inc. (ASA), American Institute of Architects (AIA), and the Engineers Joint Contract Documents Committee (EJCDC). In addition, it is beneficial for the contractor to develop in-house forms. CSI sample forms have been included in the appendix.

CONTRACTOR'S DAILY REPORT

Contractor: _____
Project Name: _____ Project No.: _____
Address: _____
Day and Date: _____ Report No.: _____

Owner Name: _____ A/E Name: _____
Telephone: _____ Telephone: _____
Contact Name: _____ Contact Name: _____
E-mail Address: _____ E-mail Address: _____

Weather:

Temperature at: 7:00 a.m. _____ 11:00 a.m _____ 3:00 p.m. _____

Weather: _____ Wind Velocity: _____

Precipitation: _____ Total Precipitation to Date: _____

Crew:	Name	Hours	OT Hours	DT Hours	Task or Activity Code
Contractor:					

	Company Name	Number of Workers	Hours Worked
Subcontractors:			

	Company Name	Visitor Name	Reason for Visit
Visitors:			

Figure 9.1 Contractor's Daily Report

CONTRACTOR'S DAILY REPORT

Work Progress (include Areas and Quantities where appropriate):

Contractor: _____

_____

_____

_____

_____

Subcontractors: _____

_____

_____

_____

_____

_____

_____

	Company Name	Equipment Description	Hours Used
Equipment on Site (including rental equipment):	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Material Deliveries: _____

_____

_____

Meetings: Yes _____ No _____ Led by: _____

Minutes: Yes _____ No _____ Recorded by: _____

Safety Meeting: Yes _____ No _____ Led by: _____

Items Discussed: _____

Safety Inspection: Yes _____ No _____ Inspected by: _____

Comments: _____

Injury Today? Yes _____ No _____ Describe: _____

Issues Raised or Resolved: _____

_____

_____

_____

_____

_____

Reported by: _____ Reviewed/Approved by: _____

Figure 9.1 (*Continued*)

9.15.4 Filing and Retrieval of Documentation

Similar to the A/E and owner, the contractor should establish a standard filing system for efficient retrieval of information. Refer to Chapter 13, "Developing a Construction Contract Administration Guide," for additional information on filing methods.

Figure 9.2 is a suggested filing system for contractor project management. The CSI forms follow this file numbering system.

9.15.5 Posting Modifications to the Contract Documents

Contract modifications should be posted to the documents used on the project. The A/E may issue a new drawing or specification page to document a revision or may issue a detail drawing or specification paragraph. The contractor is responsible for ensuring that these revisions are incorporated into the document sets used by the parties working for the contractor. This means that the affected subcontractors and suppliers must receive the necessary documents. Contract modifications should be incorporated in a permanent manner on the working set of documents at the site. Modifications may be posted by lining through or drawing an "X" across the drawing or specification section that is no longer applicable, and making a notation referring the user to the contract modification that has superseded the section. Sometimes the section of the specifications or drawings is cut out and taped over the old document, so that there is no chance of misinterpretation. The modification may also be electronically posted on the contract documents. Contract modification documentation should be kept current on the contractor's working sets of documents and properly distributed to all those who need this information. Failure to do so can result in improper construction that must be corrected at a later date. When this happens, this cost is borne by the contractor, not the owner. The A/E is responsible for getting the information to the contractor. The contractor is responsible for getting the information to the members of the construction team.

9.15.6 Record Documents

The contractor is responsible for maintaining record documents at the project site. Most of the documentation prepared by the contractor is primarily for the contractor's use and records. However, the contract documents often require the contractor to prepare several types of record documents for submission to the owner at project closeout. These record documents typically include:

- Record drawings
- Record project manual
- Record submittals
- Start-up logs

Record documents are the project submittals, start-up logs, and construction documents (drawings and project manual) modified to include revisions made during the construction stage. Record information is recorded by the contractor and subcontractors. Record documents are assembled by the contractor.

Contractor Project Management Filing System and Standard Forms

CATEGORY			TYPES OF FORMS
1.0	Project Contracts		
	1.1	Copy Owner-Contractor Agreement	AIA Document A101, *Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.* EJCDC C-520, *Suggested Form of Agreement Between Owner and Contractor Stipulated Price.*
		Notice of Award	EJCDC C-510, *Notice of Award.*
		Notice to Proceed	EJCDC C-550, *Notice to Proceed.*
	1.2	Copy Subcontractor Agreements	
	1.3	Copy Purchase Orders	
	1.4	Executed Change Orders	AIA Document G70l, *Change Order.* AIA Document G70l/CMa, *Change Order-Construction Management Edition* EJCDC C-41, *Change Order.* CSl Form 13.8B, *Change Order Log.*
		Change Order Log with Listing of Costs	
	1.5	Procurement Information	
		Bid Form	EJCDC C-410, *Suggested Bid Form for Construction Contracts.* CSl Form 1.5B, *Subcontractor/Supplier Bid Form.*
		Bid Tabulation Form	
		Alternates	
		Substitutions	CSl Form 1.5C, *Substitution Request—During the Bidding/ Negotiating Stage.*
		Subcontractor List	AIA Document G705, *List of Subcontractors.* CSl Form 1.5A, *Subcontractors and Major Material Suppliers List.*
	1.6	Bonds	
		Bid Bond	AIA Document A310, *Bid Bond.* EJCDC C-430, *Bid Bond, Penal Sum Form.*
		Performance Bond	AIA Document A312, *Performance Bond and Payment Bond.* EJCDC C-610, *Construction Performance Bond.*
		Payment Bond	EJCDC C-615A, *Construction Payment Bond* (interim performance bond).
	1.7	Certificates of Insurance	AIA Document G715, *Supplemental Attachment for ACORD Certificate of Insurance* 25-S.
2.0	Cost Information		
	2.1	Contractor's Original Bid / Budget	
	2.2	Schedule of Values	
		Payment Requests and Logs	AIA Document G702, *Application and Certificate for Payment.* AIA Document G703, *Continuation Sheet for G702.* AIA Document G736, *Project Application and Project Certificate for Payment, Construction Manager as Advisor Edition.* EJCDC C-620, *Contractor's Application for Payment.* CSl Form 2.2B, *Payment Request Log.*
		Subcontractor Payment Requests and Logs	
	2.3	Purchase Order Payments and Logs	
	2.4	Allowance Disbursements	CSl Form 2.4A, *Allowance Authorization.* CSl Form 2.4B, *Allowance Disbursement Log.*
	2.5	Stored Material	CSl Form 2.5A, *Stored Material Summary.*
	2.6	Consent of Surety	
		Reduction or Release of Retainage	AIA Document G707A, *Consent of Surety to Reduction in or Partial Release of Retainage.*
		Final Payment	AIA Document G707, *Consent of Surety to Final Payment.*
	2.7	Contractor's Affidavits	
		Release of Liens	AIA Form G706A, *Contractor's Affidavit of Release of Liens.*
		Payment of Debts and Claims	AIA Form G706, *Contractor's Affidavit of Payment of Debts and Claims.*
		Subcontractor Lien Releases	

Figure 9.2 Standard Forms Integrated with the Suggested Construction Project Management Filing System

Contractor Project Management Filing System and Standard Forms

CATEGORY			TYPES OF FORMS
3.0	**Personnel Information**		
	3.1	Project Directory	AIA Document G807, *Project Team Directory*.
	3.2	A/E Consultant List	
	3.3	Owner Consultant List	
	3.4	Subcontractor List	AlA Document G 705, *List of Subcontractors.*
	3.5	Product/Manufacturer/Supplier List	CSI Form, 1.5A, *Subcontractors and Major Material Suppliers List.*
4.0	**Chronological Information**		
	4.1	Procurement Dates	
	4.2	Notice of Award Date	EJCDC C-510, *Notice of Award*.
	4.3	Construction Start/Notice to Proceed Date	EJCDC C-550, *Noticte to Proceed*. CS I Form 14A, *Notice to Proceed.*
	4.4	Progress Schedule	
	4.5	Submittal Schedule	
	4.6	Original Substantial Completion Certificate	AlA Document G704, *Certificate of Substantial Completion*.
	4.7	Copy of Final Payment	
	4.8	Project Data	AlA Document G808, *Project Data*.
CORRESPONDENCE AND WRITTEN DOCUMENTATION			
5.0	**Correspondence**		
	5.1	A/E: To and From	AlA Document G810, *Transmittal Letter*.
	5.2	Owner: To and From	
	5.3	Contractor; To and From	
	5.4	Subcontractors: To and From	
	5.5	Suppliers: To and From	
	5.6	Others: To and From	
6.0	**Memoranda**		
	6.1	Contractor Memos	CSI Form 6.0A, *Memorandum*.
	6.2	Construction Team Memos	
	6.3	Other	
7.0	**Communication Reports**		CSI Form 7.0A, *Communication Record.* CSI Form 7.0B, *Communication Log*.
	7.1	Contractor Telephone Reports with Log	
	7.2	Construction Team Telephone Reports with Log	
	7.3	Owner Telephone Reports with Log	
	7.4	A/E Telephone Reports with Log	
	7.5	Other with Log	
8.0	**Meeting Reports**		CSI Form 8.0A, *Meeting Minutes.*
	8.1	Preconstrucrion	
	8.2	Construction	
	8.3	Postconstruction	

Figure 9.2 (*Continued*)

Contractor Project Management Filing System and Standard Forms

CATEGORY		TYPES OF FORMS
9.0	**Daily Reports and Field Observation Reports**	
9.1	Contractor Daily Reports	
9.2	A/E Periodic Field Reports	AlA Document G711, *Architect's Field Report.* CSI Form 9.1 A, *Periodic Field Observation Report.*
9.3	A/E Consultant Field Reports	
9.4	Site Representative Daily Field Reports	CSI Form 9.3A, *Daily Field Observation Report.*
9.5	Site Representative Weekly Reports	CSI Form 9.4A, *Weekly/Monthly Progress Report.*
9.6	Site Representative Monthly Reports	
9.7	Project Photos	CSI Form 9.6B, *Project Photo Log.*
9.8	Project Videos	CSI Form 9.7B, *Project Video Log.*
9.9	Nonconforming Work Reports	CSI Form 9.8A, *Nonconforming Work Notice.*
9.10	Safety Meetings	
9.11	Job Specific Safety Training	
9.12	OSHA Inspections	
9.13	Insurance Inspections	
9.14	Accidents—Injuries	
9.15	Accidents—Equipment	
9.16	Accidents—Public	
10.0	**Test Rod Inspection Reports**	
10.1	Civil	
10.2	Geotechnical	
10.3	General/Finishes	
10.4	Structural	
10.5	Soil Compaction	
10.6	Concrete	
10.7	Paving	
10.8	Steel	
10.9	Mechanical	
10.10	Plumbing	
10.11	Power	
10.12	Communications	
10.13	Fire Protection	
10.14	Other	
11.0	**Project Specific Information**	
SUBMITTALS		
12.0	Shop Drawings, Product Data, Samples, Certificates, Etc. (File by Division or Specification Section Number)	
12.1	Submittal Transmittals	AIA Document 0712, *Shop Drawing and Sample Record.* CSI Form 12.1 A, *Submittal Transmittal.*
	Submittal Log	CSI Form 12.1 B, *Submittal Log (A/E).* CSI Form 12.1C, *Submittal Log (Contractor).*
12.2	Submittal Checklist	CSI Form 12.2A, *Submittal Checklist.*
12.3	Progress Photos	
CONSTRUCTION CONTRACT ISSUES		
13.0	**Contract Document Interpretations and Modifications**	
		CSI Form 13.0B, *Supplemental Drawing Log.*
13.1	Substitution Requests and Log	CSI Form 13.1 A, *Substitution Request–After the Bidding/Negotiating Phase.* CSI Form 13.1B, *Substitution Request Log.*
13.2	Requests for Interpretation and Log	CSI Form 13.2A, *Request for Interpretation.* CSI Form I3.2B, *Request for Interpretation Log.*

Figure 9.2 (*Continued*)

Contractor Project Management Filing System and Standard Forms

CATEGORY		TYPES OF FORMS
13.3	Clarification Notice and Log	CSI Form 13.3A, *Clarification Notice*. CSI Form 13.4A, *Field Order*.
13.4	Supplemental Instructions/Field Orders and Log	AIA Document G710, *Architect's Supplemental Instructions*. CSI Form 13.4A, *Field Order*. CSI Form 13.4B, *Minor Change/Field Order Log*.
13.5	Proposal Requests and Log	AIA Document G709, *Work Changes Proposal Request*. CSI Form 13.5B, *Request for Proposal Log*.
13.6	Change Order Requests and Log	CSI Form 13.6A, *Change Order Request* (*Proposal*). CSI Form 13.6B, *Change Order Request Log*. CSI Form 13.6C, *Proposal Worksheet Detail*. CSI Form 13.6D, *Proposal Worksheet Summary*.
13.7	Change Directives	AIA Document G714, *Construction Change Directive*. AIA Document G714/CMa, *Construction Change Directive—Construction Manager—Adviser Edition*. EJCDC C-940, *Work Change Directive*.
14.0	**Construction Closeout**	
14.1	Contract Completion (Punch) Lists	CSI Form 14.1A, *Punch List*.
14.2	Substantial Completion Certificate	AIA Document G704, *Certificate of Substantial Completion*. AIA Document G704/CMa, *Certificate of Substantial Completion—Construction Manager—Adviser Edition*. EJCDC C-625, *Certificate of Substantial Completion*.
14.3	Release of Liens	
14.4	Project Closeout Information Operations Data Maintenance Data Record Documents Warranties	
14.5	Copy of Final Payment Certificate	
15.0	**Project Specific Information**	
FEEDBACK		
16.0	**Feedback Forms**	CSI Form 1.6.0A, *Feedback*
16.1	Civil	
16.2	Site Improvements	
16.3	General and Finishes	
16.4	Structural	
16.5	Mechanical	
16.6	Plumbing	
16.7	Power	
16.8	Communications	
16.9	Fire Protection	
16.10	Other	
POSTCONSTRUCTION SERVICES		
20.0	Postconstruction Correspondence	
21.0	Postconstruction Site Visits	
22.0	Warranty Action Reports and Logs	

Figure 9.2 (*Continued*)

Record drawings should include contract modifications such as addenda, change directives, minor changes in the work, and change orders. They also include locations of concealed elements of the work. The depth of buried utility lines should be identified and dimensions provided showing distances from permanent facility components that are parallel to utilities. Ends, corners, and junctions of buried utilities should be dimensioned to permanent facility components using triangulation. The record drawings also identify and locate any existing buried or concealed items that were encountered during the project.

The project manual should also be revised to include modifications. In addition, the contract documents may require the specifications to be revised to identify the selected manufacturer, model name or number, and finishes of materials incorporated in the work.

The record documents include a complete set of submittals. The contract documents may require the contractor to assemble this set of submittals. Record submittals should be indexed and ordered according to *MasterFormat®*. Record shop drawings should be clearly labeled with *MasterFormat®* section number and the manufacturer's or fabricator's name, address, telephone number, fax number, web site address, and e-mail address.

Chapter 10
Claims and Disputes

10.1 Introduction

The successful project is one completed on time, within budget, and with all claims resolved. Contract document modifications are a natural part of the construction process. When either an interpretation or a modification affects contract sum or time for completion of construction, a claim may be submitted. An unresolved claim may lead to a dispute. Other factors relative to the performance of obligations by each of the parties may also give rise to unanticipated claims. Whatever the sources of construction claims may be, the success of the project depends, to a large extent, on how well the owner, architect/engineer (A/E), and contractor manage these claims.

Project participants need to understand the contract provisions governing claims and disputes and the way claims may be managed in order to avoid disputes. American Institute of Architects (AIA) Document A201, General Conditions of the Contract for Construction, states that a *claim* is a "demand or assertion by one of the parties seeking, as a matter of right, payment of money or other relief with respect to the terms of the contract."

Generally, a claim is a request for compensation for dealing with a situation that differs materially from what was anticipated by the parties at the time of entering into the contract. Engineers Joint Contract Documents Committee (EJCDC) C-700, Standard General Conditions of the Construction Contract, defines the term *claim* as "a demand or assertion by owner or contractor seeking an adjustment of contract price or contract times, or both, or other relief with respect to the terms of the contract."

Claims are initial requests for adjustment in contract sum or time. For example, change order requests and proposal requests are claims. They are open to challenge but are not necessarily a matter in dispute. *Disputes* are claims that cannot be resolved by the parties to the construction contract without the intervention of an independent third party.

Many claims can be avoided through the careful preparation of clear, concise, correct, and complete contract documents. However, contract documents are seldom perfect. During construction, the participants relate to the contract documents as they are, not as they would like them to be. If a claim situation exists, it should be formally addressed and documented.

Orderly administration of claims and the associated documentation help the processes of construction contract administration (CCA) and contractor project management by preserving each party's rights under the contract documents. Deciding claims quickly aids the progress of the work by providing the contractor with certain and specific direction.

Completion of the project with all claims resolved requires cooperation among the owner, contractor, and other participants in the project. Both AIA Document A201 and EJCDC C-700 establish procedures and requirements for filing, settling, and disputing claims. It is important that all participants recognize the benefits of adhering to the requirements and procedures for the administration of claims.

10.2 Claims

10.2.1 Sources of Claims

Generally, three sources of claims may occur on a project. Two sources fit the definition established in this chapter. They include claims by the contractor (often on behalf of their subcontractors and suppliers) against the owner, and claims by the owner against the contractor or the A/E. The third source is a claim initiated by someone other than a party to the construction contract.

10.2.2 Contractor Claims

A contractor prepares pricing based on the procurement documents and other factors that are reasonably foreseeable at the time. If, during the course of the project, the contractor encounters conditions contrary to those stipulated or inferred in the contract documents, a claim may be initiated. Changed conditions include:

- Active interference by the owner or A/E
- Conditions beyond the control of either the contractor or the owner
- Unknown or concealed conditions that affect the extent of the work
- Modifications made to the contract documents
- Errors and omissions in the contract documents

The contractor is required to provide clear documentation that a changed condition actually was not foreseeable at the time of pricing and resulted in demonstrable damages. Claims resulting from changed conditions may also be submitted by the contractor on behalf of the contractor's subcontractors and suppliers.

In claims involving breach of contract, the contractor must document nonperformance by the other party. Two types of claims relating to breach of contract are claims for untimely payment or nonpayment and claims for improper or ineffective construction contract administration.

10.2.3 Owner Claims

In most cases, except in the case of cost-plus fee contracts, the owner has received a firm price from the contractor to perform the work of the project. When the owner believes the value of the work received is not commensurate with the contract price, or the owner's costs are increased because of actions or inactions by the contractor, the owner may initiate a claim. Claims initiated by the owner may include:

- Correction of nonconforming or defective work
- Repair of damages to existing property
- Liquidated or compensatory damages for late performance

- Ineffective management and/or control of the work by the contractor resulting in added costs for:
  - Inordinate re-reviews of shop drawings
  - Reviews of substitution requests
  - Interferences with the owner's operations
  - Additional site visits, inspections, and related administrative time

These types of claims are also grounds for withholding payment. It is important that the owner understand that the general conditions require the party initiating the claim to provide documentation establishing the claim. Therefore, the owner should carefully document such claims, attempt to settle the claim, and unilaterally withhold payment only as a last resort to satisfying the claim.

10.2.4 Third-Party Claims

The various types of third-party claims are too numerous to name. Injury or death to persons and property damage claims are high on the list in terms of frequency and severity. The methods of claim prevention and resolution for these types of claims are very different and are not addressed in this chapter.

Generally, third-party claims arise from construction activities that affect the interests of others in areas adjacent to or in the vicinity of the project. An example could be the excessive settlement or cracking of an existing building foundation where an adjacent excavation caused unstable soil conditions to occur.

Under the provisions of AIA Document A201 and EJCDC C-700, the contractor agrees to indemnify the owner and A/E against all third-party claims resulting from the contractor's performance of work on the project.

10.2.5 Contractual Provisions Governing Claims

Both AIA and EJCDC standard general conditions contain provisions defining mechanisms for seeking relief when claims arise. These provisions reserve the rights and identify the responsibilities of the owner, contractor, and A/E. Under the legal concept of privity of contract, only the contractor and the owner may make a claim against the other. Therefore, subcontractors, suppliers, and other participants rely on the contractor to pursue claims on their behalf.

Owner, contractor, and A/E all have a responsibility to administer claims in a timely and effective manner. Early notification by the party making the claim and prompt handling of the claim help to minimize the effect of the claim. AIA and EJCDC general conditions identify a structured methodology for initiating and resolving claims expeditiously.

10.2.6 Submitting Claims

Both AIA and EJCDC standard general conditions establish the A/E as the impartial interpreter of the contract documents. EJCDC general conditions require that all claims be submitted through the engineer. The AIA general conditions require that a claim be submitted to the "initial decision maker." The initial decision maker may be an entity identified in the contract documents who is not the architect. If an initial decision maker

is not identified, the architect retains this traditional role. The standard general conditions also require notification of the claim to the other party. All claims are initially decided by the initial decision maker or the A/E depending on the prior agreements, and if either party takes exception to the decision of the decision maker, the claim may be negotiated, mediated, arbitrated, or litigated between the parties as provided for in the contract documents.

Time limits for initiating claims are established in the general conditions to promote timely resolution so the project may proceed in an orderly manner. Timely notification is also a right reserved for the party to whom the claim is directed so that the party has an opportunity to mitigate the consequences of the claim situation. Parties are discouraged from accumulating claims or delaying responses to claims by stipulations that result in the forfeiture of rights if the time limits are exceeded. AIA Document A201 and EJCDC C-700 stipulate a time limit for submitting claims involving adjustment of contract sum or contact time, and require the A/E to make an initial response within a specified period of time. Under both documents, claims are submitted in writing. The A/E may request additional information, submit a schedule for resolution to which the parties may agree, or propose other actions that would initiate new time frames. It is important to note that not all claims can be or should be settled in a single, specified time frame. The process relies on commitment by the parties to resolve claims as expeditiously as is practical.

10.2.7 Processing and Settling Claims

The procedures for processing and settling claims are contractually based and focused on timely and equitable resolution.

A claim should be initially addressed by reviewing the contract documents to determine entitlement. Once entitlement is established, cost or time adjustments should be determined and documented as required by the contract documents. Contractual requirements may be waived if mutually agreed to. When all parties involved in addressing claims have reasonable expectations and exercise professional and ethical behavior, the procedures followed usually produce desirable results, and disputes can be avoided. Figure 10.1 illustrates the sequences for handling claims.

10.3 Entitlement

Entitlement is defined as the right to benefits specified by law or contract.

10.3.1 Contractor Entitlement

The contractor's entitlement to a claim involves two separate determinations. First, the claim is evaluated to determine whether the contract documents adequately identify the claim as being within the contractor's contractual obligations. If the work in question is found not to be reasonably inferred, the contractor is entitled to a contract modification. If the work in question is found to be reasonably inferred, the entitlement to the claim is denied.

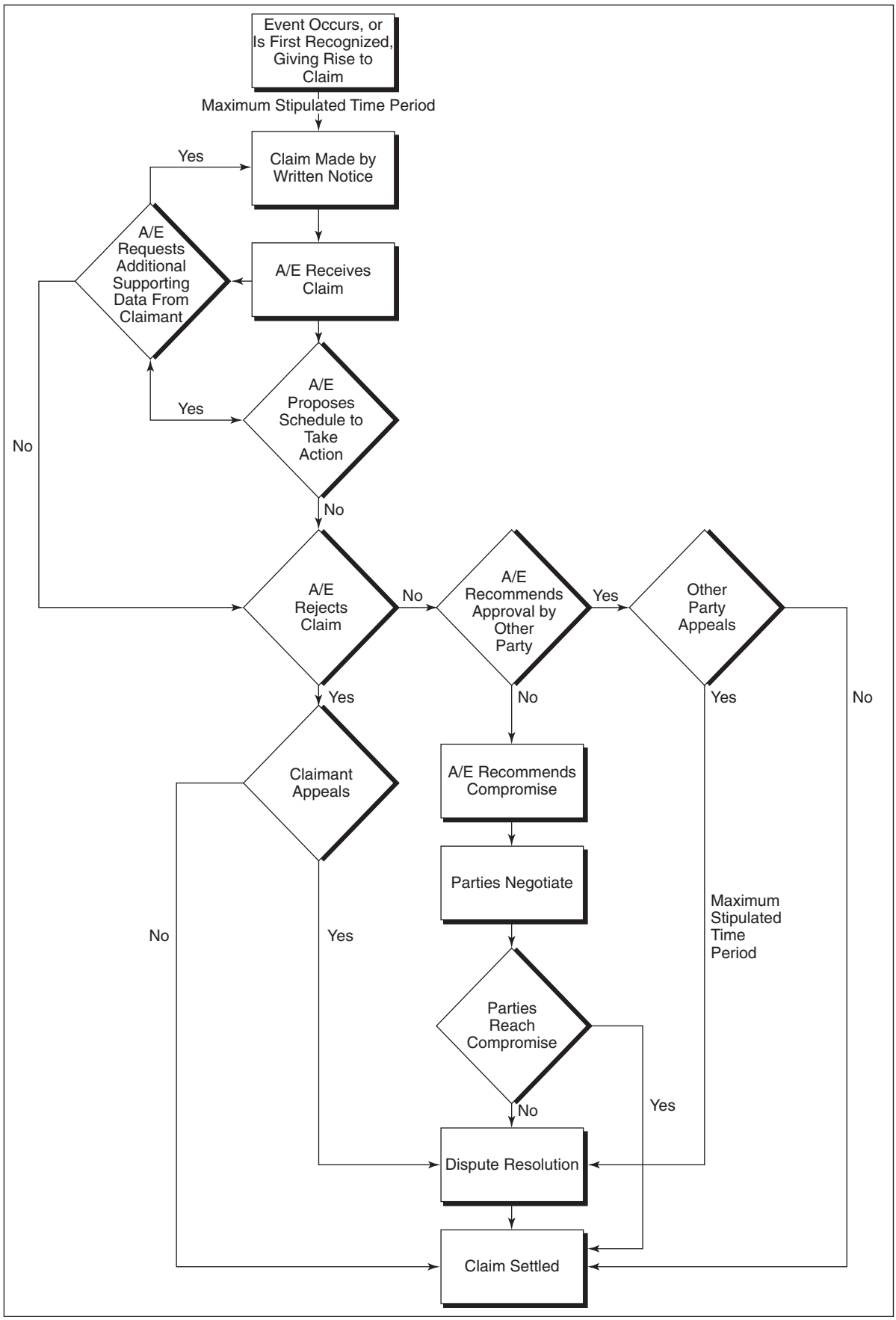

Figure 10.1 Claims Management Process

The second determination of contractor entitlement is the timing of the claim. The general conditions require the contractor to notify either the A/E or the owner before performing extra work. In special instances, the contractor must notify the A/E and the owner within a specified period of time after performing the extra work. Receipt of proper notification by the contractor is a right reserved by the owner. This allows the owner to evaluate extra work situations with the A/E and attempt to identify the most cost-effective action. It also is intended to avoid situations where the passage of time has prejudiced the owner's ability to challenge the claim. Failure to properly notify the A/E and the owner can result in a forfeiture of entitlement to the claim.

10.3.2 Owner Entitlement

The determination of owner entitlement similarly involves determining whether the work in question required of the contractor by the owner may be reasonably inferred from the contract documents. If the work in question may be reasonably inferred, the owner's claim may be upheld without a modification of the contract. If the work in question cannot be reasonably inferred, the owner's claim is denied and the work in question is either dismissed or provided for as a contract modification.

10.4 Resolving Claims

Upon receipt of a claim, the A/E or initial decision maker may request additional information to support the claim. Once the claim is clearly documented and understood, it may be appropriate to generate a written preliminary response summarizing the essence of the claim, identifying any concerns requiring reconciliation, and establishing a proposed schedule for resolving the claim.

The justification for many claims is often apparent at the outset, and such claims can be handled with much less effort by promptly addressing the issues and negotiating a settlement, if at all possible.

Claims involving adjustments in contract sum or time require supporting documentation. It is the responsibility of the party making the claim to prove the claim and it is the responsibility of the A/E or initial decision maker to evaluate the supporting documentation. On stipulated sum contracts, claims for additional cost are reviewed against the A/E's independent estimate of cost, based upon the contractor's schedule of values and published estimating guides. On unit price contracts, estimating guides are used if none of the unit price items apply to the extra work. The A/E should also attempt to verify with the contractor that the costs claimed are representative of the total impact of the conditions giving rise to the claim. If certain costs and conditions are not determinable, they should be clearly identified and mutually acknowledged for future determination. A claim for extra time is more easily addressed when the contractor provides documentation in the form of planned schedules, historical or baseline schedules, and contemporaneous project site records of events that support the extent and duration of activities on the planned schedule. Detrimental impact to the original project "critical path" must be established if additional time is requested. The A/E evaluates this documentation to determine the validity of the claim and presents the findings to both parties.

In the case of a claim arising from defective or nonconforming work, the A/E may require testing and sampling of the work. Testing and sampling procedures should conform to recognized industry standards. Test reports should be certified by an independent testing laboratory, and samples should be labeled and accompanied by a report indicating the appropriate reference standard method of sampling. The A/E should establish these procedures, arrange for a meeting with the testing laboratory and contractor, and schedule the sampling or testing so that interested parties have the opportunity to witness the event. Generally, the costs of special testing are the responsibility of the party against whom the claim is decided.

Information gathering to address claims may involve field observations. Again, the A/E should take the lead in coordinating these activities. In some cases, it may be beneficial to use independent consultants with expertise in the particular area of concern. Coordinating such observations and inspections so that interested parties have the opportunity to participate often leads to discovery of mutually acceptable solutions that are not initially apparent at the negotiation table.

When all the documentation has been presented, contract documents reviewed, necessary testing performed, and special observations conducted and analyzed, the A/E can evaluate the claim and render a decision in writing to both parties. If either party takes exception to the A/E's decision, the documentation and findings of the A/E can be considered in negotiating a compromise solution or settlement. When resolution is reached, a change order may be issued to reflect the terms of the settlement.

10.4.1 Dispute Avoidance

Because unresolved claims, or disputes, have become so commonplace in the construction industry, *claims avoidance* has become a common term applied to the management of claims and disputes. Because a *claim* is defined as a request for adjustment to the contract, it is more appropriate to think in terms of dispute avoidance.

Each party understanding the interests and limitations of the other is a first step to avoiding disputes. The owner holds the contractor accountable for only those cost elements of the project that are reasonably documented or foreseeable at the time of pricing. The contractor should understand the owner's need for thorough documentation justifying a claim. The contractor should reference the specific parts of the contract documents that support the contractor's claim and also provide sufficient cost breakdowns to permit a complete analysis of the costs. The contractor must accept that the owner also has the right to claim compensation for nonperformance, poor performance, or negligence resulting in damages to the owner.

The A/E's role is to interpret the contract documents impartially and recommend a settlement to the parties. This is a particularly burdensome responsibility when the decision favors the contractor rather than the owner who has retained the A/E to protect the owner's interests. In those situations where contractor claims stem from errors and omissions in the A/E's design, the burden is magnified. The A/E's integrity and sense of accountability can make the difference between a claim being settled or becoming a dispute.

When any of the participants refuses to accept its contractual responsibilities, disputes occur. Therefore, the process of submitting, processing, and successfully settling claims relies on individual integrity and cooperation among the participants.

Dispute avoidance requires a proactive approach that recognizes that claims are an expected part of the construction process and that claims administration focused on

dispute avoidance must be planned. Three keys to dispute avoidance are communication, documentation, and claim resolution action plans.

The project team should work to identify communication methods and protocols that offer the best opportunity for early identification and discussion of issues, events, or circumstances producing a claim. Many claims are brought to resolution for less expense when the participants recognize some portion of responsibility and dedicate themselves to a quick and equitable resolution. Initial notification of a claim event should be oral and followed by a written notice as specified by the general conditions. The preconstruction conference is the ideal forum for establishing these communication methods and protocols.

Each participant should choose as the primary contact the individual most capable of recognizing and understanding the problem in relation to the overall project. Preliminary discussions with or among the design team and construction team members should occur only with the primary contact persons present. Direct communication between subcontractors and suppliers and the A/E or the design team should not occur without the participation of the contractor, unless the contractor has suggested or approved it.

Concise, pertinent, and accurate documentation contributes to the participants' understanding of the claim and increases their comfort level regarding the legitimacy of the claim. Each party should be aware of its responsibilities to document the claim and be committed to making the effort to expedite the claim. Although it is widely held that construction has been overwhelmed by paperwork, there is no substitute for timely and accurate documentation.

Claim resolution action plans establish a system for:

- Prioritizing claims and promptly submitting detailed documentation for evaluation
- Identifying parties with responsibility and authority for settling claims
- Advancing the claim to a higher authority when the initial parties are in dispute

Action plans encourage claim resolution at the lowest possible and appropriate level. Action plans can also help to reduce the time needed to reach resolution and lower the tensions that can lead to unresolved claims that become disputes.

10.5 Disputes

Disputes often occur when the A/E's or the initial decision maker's decision on a claim is not accepted by one or both parties and the claim cannot be resolved through negotiation. A claim may become a dispute no matter how responsibly the parties attempt to resolve it. Each party may be convinced its position is correct and that there is no further room for compromise. In most cases, the failure to negotiate effectively is due to one or more of the participants failing to understand and accept the rights, responsibilities, and requirements established by the contract documents.

10.5.1 Contractual Provisions Governing Disputes

When attempts at reaching a mutually acceptable settlement have been unsuccessful, the parties are obligated under the conditions of the contract to use the specified method of dispute resolution indicated in the contract documents. AIA Document A201 states that

if no resolution is reached after the initial decision maker's decision, then either party can demand the other party file for mediation. If the other party does not file for mediation, then both parties waive mediation and any other dispute resolution method with respect to the initial decision. EJCDC C-700 also identifies mediation as the first attempt to resolve a claim. If mediation is unsuccessful, the parties may choose to invoke any dispute resolution process provided for in the supplementary conditions, submit the claim to another dispute resolution process acceptable to both parties, or submit the claim to a court of competent jurisdiction.

Arbitration and mediation are alternative dispute resolution (ADR) methods used to avoid litigation. AIA Document A201 stipulates binding arbitration, with the expectation that in most states binding arbitration will be exercised to the exclusion of litigation. In those states where binding and mandatory arbitration provisions are enforceable, neither party will be allowed to litigate the dispute. EJCDC C-700 excludes litigation only when the parties mutually and voluntarily agree to binding arbitration after the dispute arises.

10.5.2 Notification of Demand for Dispute Resolution

EJCDC standard general conditions require that the engineer first make a final determination on a claim and then notify the owner and contractor. AIA standard general conditions require that the initial decision maker, who may or may not be the architect, make a final determination on a claim and then notify the owner and contractor. If, after receiving a final determination on a claim, there is disagreement with the determination, the appealing party may within a stipulated time period provide the other party with written notification of its demand for dispute resolution. If, however, the initial decision maker or A/E has failed to render a decision in the required time period, a demand for dispute resolution may be made by either party. AIA Document A201 stipulates that if the claim relates to a mechanic's lien, the party asserting such claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

EJCDC C-700, General Conditions of the Construction Contract, provides that no demand for arbitration will be made later than 30 days after the engineer's final decision. Failure to make written demand within 30 days will make the A/E's final decision binding on both the owner and the contractor.

10.5.3 Alternative Dispute Resolution

Litigation can, in many instances, be the least desirable method of dispute resolution because the parties to the contract lose control of the outcome. In addition, the cost and time of litigation detract from the success of the project. Therefore, many projects use contract documents providing for ADR. ADR provisions can prevent a single party from initiating litigation and provide a suitable method for economically and expeditiously addressing disputes.

Whichever method of ADR is indicated, it is important that the parties advance the claim to ADR as soon as they agree they have reached an impasse in negotiations. The project team's objective should be to avoid having the uncertainties of unresolved

questions, issues, or claims or disputes adversely affect the contractor's planning, scheduling, and performance of the work on the project.

10.5.4 Methods of Alternative Dispute Resolution

Binding dispute resolution may be stipulated in the contract documents, whereby both parties agree to resolve disputes by the specified method and to honor the findings and award, usually without appeal. When a binding method of ADR is indicated, most judicial jurisdictions do not allow the parties to litigate a dispute. This is an important legal factor of which the parties to the construction contract must be made aware. Being mindful of this factor, the parties should recognize the significance of the time limits established for appealing decisions through ADR. Failure to observe the time limits can result in a surrender of rights to pursue the claim through any avenue of appeal. Binding dispute resolution methods include:

Binding Arbitration Binding arbitration is stipulated by AIA Document A201. In general, when a claim has been decided by the initial decision maker, either party dissatisfied with the decision may make a demand for arbitration after an attempt at mediation. Upon demand for arbitration, the parties to the contract select a neutral arbitrator or panel of arbitrators, and the matter is submitted for a decision. The method is very similar to litigation but offers more expeditious resolution. Another advantage of arbitration over litigation is that the arbitrator's panel is composed of individuals with experience in the construction industry and its idiosyncrasies, and therefore is better able to understand and evaluate the claim, as opposed to a judge and jury with layperson's knowledge of the industry.

Judicial Reference This process is provided for by statute in a number of states. The statutes establish the authority for an independent private party, usually a lawyer or retired judge, to be retained to decide the matter. Avenues of appeal are the same as if the case was heard and decided in the judicial system. The advantages of this process are that cases can be resolved in less time, and persons better versed in construction and construction law can be selected to hear the case.

Nonbinding Dispute Resolution Nonbinding dispute resolution may use methods similar to binding dispute resolution or other less formal methods. Several forms of nonbinding dispute resolution have emerged in response to the high cost of legal fees and lengthy periods of resolution associated with litigation. The contract documents do not prevent either party from appealing through a court having jurisdiction. However, although the findings are nonbinding, the participants are more likely to make a business-decision settlement on the basis of the findings rather than incur the expense of a litigated settlement, which may come to the same finding. Nonbinding dispute resolution methods include:

Mediation Mediation is an extension of negotiation whereby a neutral party acts as a facilitator to aid the parties in finding a mutually acceptable settlement of the claim.

Nonbinding Arbitration As the term implies, this is a form of arbitration that can be appealed in other venues.

Mini-trial The mini-trial method is not an actual trial. It is a structured process that allows the parties to present the necessary facts and elements of the claim and the concepts of law applicable to the claim in a compressed period of time. A neutral party hearing the case is normally a skilled legal practitioner who can render an opinion based on established case law and the limits of the contract documents.

Disputes Review Board This process involves establishment of a three-member board of construction experts who periodically convene to review the status of the project in order to detect areas of potential conflict and make recommendations for resolution of issues before they become conflicts.

Chapter 11
Measurement and Payment

Measurement means quantifying the amount of work eligible for payment, and *payment* is the disbursement of money proportionate to that quantity of work. Under some contracts, measurement may involve only identifying the attainment of specified milestones for which predetermined amounts of payment are to be paid. Under other contracts, particularly unit price contracts, *measurement* means verifying the quantities of work submitted for payment based on unit prices.

Most projects involve significant costs and extended construction periods. The contractor depends on cash flowing through the contractor's operation to minimize the need to borrow funds. Progress payments are standard, and the owner's promise to make payment is a primary obligation under the construction contract. Therefore, the determination of quantities eligible for payment and the payment itself are important to both parties to the construction contract. The orderly and timely administration of payment for the value of the work performed relies on project team members understanding their respective roles and responsibilities and developing good working relationships with the others.

Most contract agreements between contractor and subcontractor include a "pay when paid" clause that, in effect, states that the subcontractor will receive payment when the contractor receives payment from the owner. However, a growing number of subcontractors are taking exception to this clause and insisting on payment not contingent on payment by the owner.

The administration of measurement and payment is also important to other participants such as the surety or lenders on the project. Estimates of progress and the amounts paid are valuable indicators other people can use to determine whether their interests in the project are being met.

The following documents establish the rights, responsibilities, and duties of the various participants in the project as they pertain to measurement and payment:

- American Institute of Architects (AIA) Document A201, General Conditions of the Contract for Construction
- Engineers Joint Contract Documents Committee (EJCDC) C-700, Standard General Conditions of the Construction Contract
- AIA Document B101, Standard Form of Agreement Between Owner and Architect
- EJCDC E-500, Standard Form of Agreement Between Owner and Engineer for Professional Services

In the interest of simplicity, AIA terms are used in this chapter, though they may differ from terms in EJCDC documents, such as *contract price* rather than *contract sum* and *recommend* rather than *certify.*

11.1 Applications for Payment

Most contracts specifically stipulate the requirements for preparation and delivery of the application for payment. The contractor needs to clearly understand the requirements for submitting an application for payment and follow procedures correctly, so that payment is not delayed. Most contracts require that a schedule of values be submitted to the architect/engineer (A/E) for approval prior to the first application for payment. It is not uncommon for the contractor to be required to submit an updated construction progress schedule, test reports, material certifications, and other accompanying information as a prerequisite for payment. On more complex projects, schedules may be both manpower and cost loaded, which would allow its use with the application for payment. The contractor may also be required to submit a list of proposed or pending change orders and change order requests for review by the owner's lender. Just as the contractor submits an application for payment, subcontractors also submit an application for payment. The contractor must have all pertinent subcontractor applications for payment in hand prior to preparing the contractor's application for payment. Construction manager as adviser (CMa) may be required to consolidate applications for payment from multiple-prime contractors.

11.2 Payment Intervals

The interval between payments is normally identified in the contract documents. The payment interval specified should reflect the nature of the work of the project. Common payment intervals are as follows:

Periodic Progress Payments AIA and EJCDC documents refer to progress payments. The calendar month is the most common payment interval. Monthly progress payments are appropriate for most projects, including those of long duration and high cost, where the rate of progress will vary from month to month. Twice-monthly or even weekly progress payments may be appropriate for small projects performed by small contractors or large fast-track projects where large amounts of money are expended over brief periods on a regular basis.

Provisional Payments Provisional payments are predetermined partial amounts of the total contract sum tied to the attainment of identifiable milestones. The milestones may be percentages of the total quantities in the project, or they may be certain portions of the entire project that have been assigned a predetermined value. Provisional payments are a form of progress payment, but are distinguished from periodic progress payments by being independent of a time interval. Provisional payments are often used for design-build projects.

Single Payment When projects are of a size that enables the work to be completed in a short period, the contract sum is small, or the vast majority of the contract sum is earned in the latter stages of the project, a single payment of the entire contract amount may be appropriate. For projects with critical deadlines, the "single payment on completion" provision provides a strong incentive for timely completion.

The A/E's role in certifying payment varies according to the payment interval and requires skill, judgment, knowledge, and acceptance of the value of each component of construction as represented on the schedule of values. For single-payment and provisional-payment contracts (except for design-build), the A/E makes a determination of substantial completion of the entire work or specified portions of the work. Under periodic progress payment contracts, the A/E often is required to determine the quantities or percentage completed of partially completed work that the A/E believes will conform in general to the requirements of the contract documents when the project is finally completed.

11.3 Basis of Payment

The contract sum may be established by a combination of base bid items, including unit prices, allowances, and alternates.

The payment administration process depends on the basis of payment identified in the contract documents for the various contract items. There are generally three bases of payment, and each places different demands on the project team. The three bases of payment are as follows:

Stipulated Sum Common for building projects and for some heavy civil projects. On stipulated-sum or lump-sum contracts, a single price becomes the amount agreed upon for completion of the entire contract.

The contract requires that values of the various portions of the work be established before the first application for payment. This is accomplished by the contractor preparing and submitting a schedule of values breaking down the contract amount into definable line items with corresponding dollar amounts assigned. The quantities or percentages of completed or partially completed portions of work are estimated by the contractor at each payment interval, and payments are requested on a proportionate basis.

Unit Price Common to civil engineering projects where final quantities can be measured only upon completion but cannot be determined at time of pricing. Under unit price contracts, the actual quantity of work is measured and verified as it is completed and payments are made at the agreed-upon unit price rates. Unit price payment is often used for linear work such as gas, water, sewer, and electrical utility line work and for roadway paving, where the estimated quantities and the final constructed quantities are not expected to vary significantly, but simple measurement and progress payment on the basis of unit pricing are desired.

Cost-Plus Fee Utilized where both the quantity and the cost per unit of work are uncertain or when the contract sum is a cost of the work plus fee not to exceed a guaranteed maximum price contract. Cost-plus fee payment, also referred to as the *time and material* basis of compensation, may also be applied to work required by change when the parties to the contract cannot agree on a price before performing the work. This may result from the issuance of a construction change directive. As the term *cost-plus* implies, the contractor is reimbursed the contractor's actual cost of labor, equipment, and material, plus a predetermined fixed fee, or percentage of costs, for overhead and profit. Cost-plus fee payment does not involve the measurement of quantities. However, accurate records must be kept to document

material purchases, equipment rental or amortization, and labor hours and wages. Payments are made on cost-plus fee contracts according to the documented costs. This basis of payment generally requires more extensive record keeping and time spent in the preparation of the application for payment by the contractor.

Some construction contracts use a mix of payment bases in order to accommodate the various types of work in the project. Under a stipulated sum contract, it is not uncommon to have unit price work.

11.4 Contractual Responsibilities

The owner-A/E agreement establishes that the A/E will certify the amounts due the contractor based on the A/E's observations of the work in progress and evaluation of the contractor's application and certification for payment. The A/E's certification is a representation that the contractor is entitled to payment of the amount certified. The A/E's certification is based only on the A/E's knowledge, information, and belief that the work has progressed to the point indicated and the quality of work conforms to the requirements of the contract documents. It does not mean that the A/E:

- Made exhaustive on-site inspections
- Reviewed construction means, methods, sequences, or procedures
- Reviewed requisitions of subcontractors or suppliers
- Determined the disposition of previously certified payments

The contract documents contain terms, conditions, and procedures for payment application and certification by the contractor; review and certification by the A/E; and payment by the owner. Contract documents addressing payment usually include the following:

- Agreement
- General Conditions
- Supplementary Conditions
- Division 01—General Requirements, Section 01 20 00—Price and Payment Procedures

The project participants should be thoroughly familiar with the contract documents to ensure that payments are administered correctly. Payment provisions commonly included in the contract documents include:

- Submittal, review, and approval of a schedule of values before the first payment application is made
- Submittal of cash flow projection for the owner's financing, coordinated with the construction progress schedule, might be stipulated
- Identification of measurement criteria for unit price items
- Identification of payment interval schedule of payments
- Provisions for Retainage and the reduction or release of Retainage

- Application to be made a stipulated number of days prior to the established date of payment
- Provisions for payment for stored material
- Provisions for unit prices and allowances
- Requirement that the owner pay the amount certified by the A/E
- Conditions for withholding payment
- Contractor's rights if the owner fails to make payment
- Procedure for final payment.

11.5 Measurement

There are three methods of measuring or quantifying the amount of work eligible for payment:

Stipulated-Sum Contracts For stipulated-sum or lump-sum contracts, progress payments are related to a schedule of values. The schedule of values serves as a basis for estimating percentage payments for partially completed work.

Unit Price Contracts or Items Unit price contracts generally consist of items that are measurable units suited to progress payments, such as lineal feet of storm sewer pipe or cubic yards of topsoil. Unit price items may also be used in other types of contracts. At the contractually stipulated interval, the actual in-place units are measured or counted. The contractor prepares the application for payment, and the A/E certifies payment for the measured quantities at the established unit prices.

Cost-Plus Fee Contracts Cost-plus fee contracts are administered on the basis of receipts for materials and equipment and on payroll records to establish values for progress payments.

11.6 Schedule of Values

The schedule of values is prepared by the contractor according to the contract documents. It is an itemization of the costs of various portions of the work, which together comprise the total contract sum. Depending on the complexity of the project, the schedule of values could be divided into line items using either *UniFormat*™ or *MasterFormat*® classification system. Each line has a value that is a proportionate fraction of the total value of the whole project. Taking those line items and then dividing the costs between material and labor provides further clarity. Having the ability to compare invoice data to quantities of stored material, for example, makes processing of the application for payment more timely and accurate. On projects involving a single structure, lower construction costs, or of a shorter duration, a *UniFormat*™ classification of the construction elements may provide sufficient detail for estimating and evaluating progress payments. Major projects involving multiple structures, higher construction costs, and longer duration require the greater detail provided by classifying components using *MasterFormat*®.

The first step to orderly payment administration on stipulated sum contracts is to secure a properly proportioned schedule of values. This is normally done after award of the contract and before processing of the first progress payment. The contractor submits the schedule of values to the A/E for review. The level of detail required by the contract documents should be sufficient to establish the proportionate cost of each of the various items of work in the project.

Values of each item should be realistic and not reproportioned for early obtainment of funds. Inflated amounts at the early stages of construction, sometimes called *front-end loading,* can result in overpayment and insufficient funds for uncompleted work. This can affect surety coverage and liability for uncompleted work. An accurate schedule of values results in a basis for progress payments that is fair to the contractor and the owner. Receiving the relative value for completed work provides the contractor with a reasonable cash flow and protects the owner from the consequences of overpayment if the contractor defaults.

Other benefits are derived from the process of developing, reviewing, and revising the schedule of values:

- The schedule of values complements the construction progress schedule and shows that the contractor understands the contract requirements. The schedule of values identifies how all the costs in the project are apportioned and can lead to revision or refinement of the construction progress schedule to account for activities previously overlooked.
- Developing a proportionate schedule of values can result in the contractor giving more attention to the allocation of resources and the early planning of the later activities of the project, such as commissioning and demonstration and training.
- A properly proportioned schedule of values eases the payment process and allows time for the contractor and the A/E to focus on construction activities.

In reviewing the schedule of values with the contractor, the owner and the A/E should not attempt to dictate the contractor's costs for individual items or portions of the work. If disagreement occurs, quite often a more detailed presentation of the line item in question can resolve or justify the issue. The schedule of values is examined for obvious omissions or flagrant excesses in individual line items. If an item of significant value is omitted or a line item appears to be excessive and cannot be justified, then the schedule of values is not properly proportioned and should be revised.

When there is disagreement on the proportionate value of items of work, the A/E is authorized by the general conditions to request supporting documentation from the contractor. Copies of calculations and quotations or signed contracts or purchase orders with subcontractors and suppliers may be furnished by the contractor to substantiate the schedule of values submitted.

The schedule of values should also be required to identify separate line items for administrative and procedural requirements, temporary facilities and controls, mobilization, bonds, insurance, punch list development and updating, final cleaning, operation data, and other services, such as facility commissioning. The administrative costs related to conformance with the general conditions and overhead may be shown as a separate line item or they may be allocated to and included within each line item. The schedule of values should also identify, by separate line item, all allowances that may require reconciliation and accepted alternates. As construction progresses, change orders are usually added to the schedule of values as additional line items. Should change orders contain more than one item of modification, each item should be listed as a subheading under the

total for the change order, with a value indicated. This allows for more accurate review for payment as the individual changes are implemented into the project. On rare occasions, when a change order significantly alters the values of numerous line items, it may be appropriate to revise the existing line items, rather than list the change order separately.

11.7 Application for Payment

Both AIA and EJCDC application for payment forms require significant representations of both the contractor and the A/E to the owner. Therefore, it is important to recognize that the application forms, schedule of values, contractor's preparation, and A/E's review and certification/recommendation are significant parts of the payment process.

11.7.1 Application Forms

AIA Document G702, Application and Certificate for Payment, and EJCDC C-620, Contractor's Application for Payment, are two commonly used application forms for payment prepared by the contractor and reviewed by the A/E. Some public owners may have their own forms. The forms contain representations made by both the contractor and the A/E to the owner. The contractor prepares the application and certifies that the work covered by the application conforms with the requirements of the contract documents and that all the previous amounts paid to the contractor have been properly applied to discharge the contractor's obligations to others furnishing materials and labor on the project. Figure 11.1 illustrates the contractor's certification statement. This certification by the contractor is an important representation upon which the owner will rely. The A/E should not accept unsigned applications or recommend payments for which the contractor has not made application on properly completed forms.

The A/E's representation is that to the best of the A/E's knowledge the work covered by the application is in general conformance with the requirements of the contract documents. Figure 11.2 illustrates the A/E's certification statement. Whereas AIA Document G702 contains language supported by AIA Document A201, stating that the architect "certifies" the amounts due the contractor, EJCDC C-620 states that the engineer "recommends" payment of a certain amount. Refer to Chapter 2, "Roles and Responsibilities," for a description of the significant difference between certifying and recommending.

The A/E's certification is not intended to be based on exhaustive or continuous on-site inspections of the quality or quantity of the work. The AIA and EJCDC owner-contractor agreements also state that the authority to certify payments and the act of reviewing the work to determine in general the quality and quantity of the work does not impose on the A/E a responsibility to supervise, direct, or control construction means, methods, sequences, procedures, or safety precautions and programs.

11.7.2 Contractor's Preparation of Application

The contract documents stipulate the form of the application for payment. Both AIA and EJCDC have standard forms for the contractor's application for payment, and many owners have their own unique forms.

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER: **PROJECT:** **APPLICATION NO:** **Distribution to:**

PERIOD TO: OWNER ☐

CONTRACT FOR: ARCHITECT ☐

FROM CONTRACTOR: **VIA ARCHITECT:** **CONTRACT DATE:** CONTRACTOR ☐

PROJECT NOS: / / FIELD ☐

OTHER ☐

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. **ORIGINAL CONTRACT SUM** ..... $ _____
2. **Net change by Change Orders** ..... $ _____
3. **CONTRACT SUM TO DATE** (Line 1 ± 2) ..... $ _____
4. **TOTAL COMPLETED & STORED TO DATE** (Column G on G703) ..... $ _____
5. **RETAINAGE:**
   a. _____% of Completed Work (Column D + E on G703) $ _____
   b. _____% of Stored Material (Column F on G703) $ _____

   Total Retainage (Lines 5a + 5b or Total in Column I of G703)..... $ _____
6. **TOTAL EARNED LESS RETAINAGE** ..... $ _____
   (Line 4 Less Line 5 Total)
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT** ..... $ _____
   (Line 6 from prior Certificate)
8. **CURRENT PAYMENT DUE** ..... $
9. **BALANCE TO FINISH, INCLUDING RETAINAGE**
   (Line 3 less Line 6) $ _____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$	$
Total approved this Month	$	$
TOTALS	$	$
NET CHANGES by Change Order	$	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract

Figure 11.1 AIA Document G702, Application and Certificate for Payment—Contractor's Certification Statement

The undersigned Contractor certifies that to be the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the date comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

Figure 11.2
A/E's Certification Statement (from AIA Document G702; see boxed portions in Figure 11.1.)

The contractor's application for payment is usually made on a form similar to AIA Document G702. The application is usually supported by a listing of payment items on a form similar to AIA Document G703, Continuation Sheet. For a unit price contract, the itemization is a listing of the unit price items. For stipulated sum contracts, the itemization is prepared by listing the approved schedule of values. The contractor then indicates the number of units of work completed or the percentage of work completed for each line item. Stored materials may also be identified in a separate column on Form G703, if the contract provides for payment for materials properly stored and invoiced. In this case, a second supporting document showing the flow of materials into and out of storage is useful. Figure 11.3 shows a sample format for stored material summary.

The application for payment accompanied by a stored material summary and the continuation sheet, includes the following information:

- The original contract sum and the contract sum revised by change orders
- The agreed-upon schedule of values for stipulated-sum contracts, or the bid items for unit price contracts
- Estimated work completed and covered by previous applications, including adjustments for previously identified errors
- New work covered by the current application
- Amount of stored materials
- The total value of previous and current completed work and stored materials for each item in the schedule of values
- Percent complete estimate
- Value of remaining work
- Amount of Retainage, if any
- Certification statements
- Signature lines for the contractor and A/E

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STORED MATERIAL SUMMARY

Project: _____ Application Period: _____

Owner: _____ Application Number: _____

A/E Project Number: _____ Application Date: _____

INVOICE NO.	SUBMITTAL TRANSMITTAL NO.	MATERIAL DESCRIPTION	STORED PREVIOUS		STORED THIS MONTH		INCORPORATED IN WORK		
			DATE (MO/YR)	AMOUNT ($)	AMOUNT ($)	SUBTOTAL ($)	DATE (MO/YR)	AMOUNT ($)	MATERIALS REMAINING IN STORAGE ($)

Form Version: July 1994

Figure 11.3 CSI Form 2.5A, Stored Material Summary

The payment process is enhanced when the contractor and the A/E establish a routine for jointly determining quantities or project progress eligible for payment before completing the application forms. For some projects, a walkthrough of the project can be sufficient. For larger, more complex projects, a review of all line items in the schedule of values may be needed in addition to the walk-through. This is normally accomplished through a preliminary draft submittal process prepared by marking up the previous month's progress statement and stored materials summary.

When the preliminary draft approach is used, the contractor completes the preliminary draft of the continuation sheet, sometimes referred to as the *pencil copy.* It is submitted to the A/E by an agreed-upon number of days before the date for payment to allow time for review, comment, and resolution of discrepancies. The A/E conducts the A/E's review, either noting agreement or identifying questionable items on the draft. The annotated draft can then be reviewed with the contractor for reconciliation of any discrepancies. The A/E retains the draft for use in reviewing the subsequent formal application and for reference on future applications. When the contractor and the A/E complete their review, the contractor then revises the continuation sheet and completes the contractor's application and certificate for payment form and gives them to the A/E for processing and delivery to the owner.

The several steps described in this process often occur in a single meeting. Some progress payment meetings are an adjunct to a regular progress meeting. On more complex projects, progress payment meetings may occur on a schedule separate from progress meetings and may even involve multiple meetings over a period of several days.

11.7.3 A/E's Review of Application

The A/E is responsible for certifying/recommending the amounts requested by the contractor. The A/E reviews the following:

- On unit price contracts, the A/E must be satisfied that the requested quantities are substantiated by actual quantities measured in place by the A/E or documented by weight tickets, truck count, or other specified measurement criteria.
- If portions of work have been identified as not conforming to contract requirements, the A/E should make certain those portions are not included in the application.
- Unit price items of work for which payment is requested should be at a stage of completion eligible for payment as identified by the measurement and payment provisions of the construction contract.
- On stipulated-sum contracts, the A/E must be satisfied that the percent complete estimates are reasonable and in proportion with the remaining effort needed to complete the work.
- On cost-plus fee contracts, the A/E verifies that equipment and material invoices, payroll, and equipment rental or amortization documentation are in order and represent actual progress on the project.
- When payment for stored materials is allowed, the A/E ascertains that materials are properly invoiced, shop drawings are approved, and materials are properly stored in contractually designated areas. If materials are stored off-site, the appropriate insurance and bonds are verified.

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ALLOWANCE AUTHORIZATION

Project: _____ Authorization Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

You are authorized to perform the following item(s) of work and to adjust the Allowance Sum accordingly:

THIS IS NOT A CHANGE ORDER AND DOES NOT INCREASE OR DECREASE THE CONTRACT AMOUNT

Original Allowance ..... $
Allowance Expenditures prior to this Authorization..... $
Allowance Balance prior to this Authorization..... $
Allowance will be [increased] [decreased] by this Authorization..... $
New Allowance Balance ..... $

APPROVAL RECOMMENDED

_____
A/E

_____
By Date

OWNER APPROVAL

_____
Owner

_____
By Date

CONTRACTOR ACCEPTANCE

_____
Contractor

_____
By Date

☐ Attachments

Copies: ☐ Owner ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 2.4A

Figure 11.4 CSI Form 2.4A, Allowance Authorization

- When portions of the project are identified as bid-item cash allowances, the A/E ascertains that such items claimed for payment are documented. The A/E may use an "Allowance Authorization Form." If submittals have not been approved for these materials, the contractor may not be entitled to payment.

An allowance authorization form is shown in Figure 11.4. At the time of final payment, an allowance authorization form may be used to provide the documentation necessary for a final change order to adjust the contract sum.

When the contractor submits the corrected application and certificate for payment, the A/E reviews it against the notes from the draft continuation sheet returned to the contractor, checks the arithmetic, and determines the amount of payment to be certified. If the A/E and the contractor have agreed on the amount of the payment, the A/E certifies the entire amount. If the A/E and the contractor do not agree, the A/E may certify an amount less than requested. The A/E certifies only the amount having a sound contractual basis for payment, and when there is a disagreement, provides both parties with a written explanation of the reasons for withholding certification of all or part of the payment.

If the application contains errors, it is appropriate for the A/E to return the application to the contractor for correction and resubmission. In some instances, as a courtesy to the contractor, the A/E may make corrections, initial and date the corrections, and forward the application to the owner for processing. A copy of the corrected application is also sent to the contractor, especially if the corrections result in a change in the amount of payment due.

11.8 Progress Payments

Upon receiving the contractor's application and certificate for payment with the A/E's certification, the owner is obligated to make payment on or before the time established in the contract documents. When the progress payment has been made to the contractor, the owner has discharged the owner's payment obligation for work completed to date. The contractor then becomes responsible for making payments to the various subcontractors, suppliers, and others with a vested interest in the work. Participants with a vested interest in work covered by past progress payments may inquire of the owner or A/E regarding the status and amounts of those progress payments. Neither the A/E nor the owner is responsible for verifying that payments are made or for causing payments to be made to other participants. If the owner is informed of a judgment against the contractor or the existence of a lien, appropriate amounts are withheld, as provided for under the general conditions, and the amounts dispersed as required by law and recommended by the owner's legal counsel.

The conditions of the contract usually stipulate that progress payments do not constitute acceptance. Progress payments are made in response to representations and certifications by the contractor that the work conforms to the requirements of the contract documents. The A/E represents that the A/E's certification is not based on exhaustive inspections. Therefore, the conditions of the contract make provision for the owner to reject work and adjust payment accordingly any time up to final acceptance.

11.9 Retainage

Progress payments are usually subject to the Retainage of a prescribed percentage of the amount due for payment. This Retainage is not to force the contractor to perform. It protects the owner against errors in estimating the value of work completed or defective work and is used to settle other participant (third-party) claims against the contractor before the release of final payment. If portions of the work paid for have latent defects, or if simple errors in estimating quantities have been made, the Retainage is available to the owner to correct the situation.

Retainage reduction may be specified to occur at the attainment of some milestone such as 50 percent completion or substantial completion of the project. However, some state statutes and federal regulations may preclude the reduction of Retainage, while others may have mandatory Retainage reduction regulations. The construction contract should reference the local, applicable Retainage laws for the project locale. Retainage and withholding of payment for nonconforming work are sometimes confused. Retainage is not insurance for the correction of known defective work. The A/E may not recommend withholding payment for nonconforming, damaged, or deficient work in the belief that the retainage will pay the cost of correction if the contractor defaults. The A/E should recommend use of both Retainage and the withholding of payment to avoid an overpayment situation.

Although Retainage may be a benefit to a project owner, it can be a liability to the contractor and result in higher pricing to cover the cost of borrowed money associated with Retainage. Some owners and jurisdictions may allow Retainage to be held in escrow in interest-bearing accounts, on behalf of the contractor. In this way, the contractor is recognized as having earned the money and is not being denied the benefit of the money and any interest.

11.10 Withholding Payment

The A/E has the right and the responsibility to withhold certification of the whole or any part of the payment application in order to protect the owner. However, the A/E should recommend withholding payments only in the amount necessary to protect the owner from loss, and not in amounts constituting punitive damages. Excessive withholding of payment can, in some instances, be deemed as nonpayment and result in the contractor's exercising the contractor's right to stop work. If the A/E determines that partial or whole payments should be withheld, AIA general conditions require the architect to so notify the owner and contractor in writing. EJCDC general provisions contain a similar requirement.

AIA and EJCDC standard general conditions contain provisions for the owner to withhold payment to the contractor in whole or in part under certain conditions. Among the more common conditions for the A/E to recommend the withholding of payments to protect the interest of the owner are:

- Damaged or nonconforming work requiring repair or correction
- Damaged property adjacent to the project, caused by the contractor and requiring repair or replacement

- Failure by the contractor to meet specified schedule milestones or the contractor's own approved schedule to the extent that liquidated or compensatory damages may reasonably be anticipated
- Claims made against the owner on account of the contractor's failure to perform or furnish work without interference and damage to others
- Liens filed in connection with nonpayment of subcontractors, suppliers, laborers, and mechanics furnishing material and labor for the work of the project
- Failure to keep record documents up to date if required by the contract documents
- The cost of doing cleanup work, by the owner or others, resulting from the contractor's failure to perform cleanup work as specified in the contract

If the contractor has allowed one or more of the conditions to develop, the A/E should evaluate the severity of the situation and make a general recommendation to the owner.

AIA and EJCDC standard general conditions give authority to the A/E to recommend the withholding of payment. As a party to the construction contract, the owner has the final decision regarding payments. The EJCDC general conditions also contain language describing the owner's right to withhold payment when it has knowledge of conditions noted above that may be unknown to the engineer. If the owner exercises this right, the owner is required to give the contractor a written notice stating the reason(s) for withholding payment and to provide the A/E with a copy of the notice.

11.11 Failure to Make Payments

The A/E will have a prescribed time after receipt of the contractor's application for payment to make certification of payment, and the owner will also have a prescribed time after receipt of the A/E's certification to make payment to the contractor. These requirements are identified in the owner-contractor agreement and the conditions of the contract. If there is a failure to make payment within the prescribed times, without cause under the contract conditions, the owner may be in material breach of contract. In this situation, the contractor is protected under the conditions of the contract and may, upon prior written notice, stop work if payment is not made within the notice period. The owner's exposure to liability in such an occurrence may include the contractor's cost of demobilization and the cost of delay and remobilization after the breach is rectified by the owner. If the breach is not rectified by the owner and the contract is terminated, the owner may also be liable for damages resulting from the contractor's loss of profit.

11.12 Liens

A lien is the legal right of a party or claimant, such as a subcontractor, to control the improved property of another or have it sold for payment of a claim. Virtually every state has established laws that permit contractors performing work on real property to file a mechanic's lien against the property. It is important to recognize that mechanic's liens

are creatures of statute, and each statute has some variations in the manner in which liens must be processed.

11.12.1 Liens on Property

Typically, if a contractor, subcontractor, sub-subcontractor, or material supplier is not paid, they have a right to file a lien against the property where the project was performed. Such liens are similar to placing a mortgage on the property, except that often mechanic's liens will have a higher priority than most mortgages—in other words, if the property is sold, payment of the mechanic's lien is a higher priority than payment of the mortgage. The theory behind the mechanic's lien is that since the unpaid contractor or supplier provided work, labor, or materials, which increased the value of the property, they may be entitled to an interest in the property to the extent of the increase in value that they provided.

Mechanic's lien procedures vary tremendously from jurisdiction to jurisdiction. In some jurisdictions, it is necessary to provide the owner with an advance notice prior to performing any work, and the absence of such advance notice will preclude a mechanic's lien later. Most jurisdictions also provide relatively strict time limits for filing liens, often 90 days from the time when the last work was performed. Other states provide that before a mechanic's lien can be asserted against the property, a court hearing must take place to preliminarily assess the validity of the lien. All statutes require some type of legal proceeding before the claimant can force the property to be sold.

Mechanic's liens generally do not apply to public projects, as contractors and suppliers are not allowed to lien public property. As a result, most public projects require payment and performance bonds to provide unpaid parties with a remedy to replace the mechanic's lien right that does not exist on public projects. It is also important to note that even on private projects, in many (but not all) jurisdictions, the right to a mechanic's lien can be waived in the contract as a matter of negotiation between the owner and the contractor.

From the owner's perspective, it is important to manage mechanic's lien rights. Even if such rights are not waived as part of the contract, the owner should require partial releases of mechanic's lien with each payment made to the contractor. In addition, the contractor should be required to obtain releases of mechanic's liens from its subcontractors and suppliers as a condition to payment of each monthly requisition. At the time of final payment, final mechanic's lien releases should be obtained not only from the contractor, but also from, at a minimum, all subcontractors and material suppliers. The owner can also provide an additional measure of protection by requiring the contractor to indemnify the owner against any mechanic's liens filed by lower-tiered subcontractors, suppliers, sub-subcontractors or others.

Most states have an agency to advise on methods of protection against lien claims, including obtaining lien release documents, performance bonds, joint payee checks, and disclosure of potential lien claimants as a condition of payment.

If informed of a judgment against the contractor or the existence of a lien, the owner may withhold appropriate amounts from the contractor's progress payments as provided under the general conditions and disperse amounts as required by law and recommended by legal counsel. Contract documents should require the contractor to furnish a release of liens with each application for payment. In addition, a requirement for consent of surety for final payment usually exists.

Issuance of final payment indicates final acceptance of the work. On acceptance of final payment, the contractor waives all claims except those previously made in writing

and according to the contract conditions against either the owner or the A/E. The owner, in making final payment, also waives all claims except those arising from unsettled liens and defective work appearing after final inspection. Liens on the project are to be released prior to issuance of final payment. Under provisions of the general conditions, final payment for the project is not made until the contractor can certify to the owner that liens have been released.

11.12.2 Stop Notices—Liens on Construction Funds

Some, but by no means all, jurisdictions have statutes that allow contractors, subcontractors, sub-subcontractors, and suppliers to assert claims on construction funds. These are called *stop notices,* although some jurisdictions have alternative language and procedures. A stop notice may be considered a lien on construction funds rather than on real property. Stop notices are the usual remedies available to subcontractors, laborers, and suppliers for breach of contract against the contractor.

The claimant signs and verifies the stop notice, which contains the following information:

- The claimant's name and address
- The type of labor, services, equipment, or materials furnished or agreed to be furnished
- The name of the person to or for whom the labor, services, equipment, or materials were furnished
- The value of the labor, services, equipment, or materials already furnished
- The total value of the labor, services, equipment, or materials agreed to be furnished
- The claimant's signature and verification as well as a statement of the claimant's demand and the project site location
- A statement demanding that sufficient funds be withheld to satisfy the claim, with interest

Typically, a stop notice is served on the owner or other applicable party. Under such statutes, the owner is typically required to withhold that amount for the unpaid claimant, and the failure to do so may expose the owner to liability to the claimant for amounts not withheld.

In many jurisdictions, stop notices are limited to the amounts still in the hands of the owner, so that a stop notice issued after the owner has fully paid the contractor is essentially meaningless. The claimant generally files suit to enforce it before money can be obtained. The claimant must be aware of the time period within which the notice must be filed. If no suit is filed within the proper time period, the stop notice becomes invalid.

As with mechanic's liens, the importance of good contract administration cannot be overstated. The owner should monitor payments to subcontractors and suppliers by obtaining releases prior to payment. Obtaining payment and performance bonds from the contractor may also reduce exposure, but frequently even the existence of such bonds will not prevent a claimant from utilizing their stop notice rights in addition to or in lieu of bond rights.

11.13 Liquidated Damages and Penalty/ Bonus Clauses

Liquidated damages stated in the agreement are usually invoked when substantial completion is not achieved by the indicated date or within the indicated time. Some jurisdictions may allow liquidated damages to be invoked after substantial completion until the project attains final completion or acceptance; which means all work (including punch list completion) is complete and the contractor is no longer on the project site for any reason. Liquidated damages or penalties are normally deducted from the final payment, and bonuses are added to the final payment. Both actions require a change order to modify the final contract amount. In extreme cases of late completion, it may be appropriate to decline to reduce Retainage and withhold payment in amounts sufficient to cover anticipated liquidated damages or penalties. Withholding payments in addition to holding Retainage requires that the A/E evaluate the balance of work to be finished and make a reasonable estimate of the time needed to complete the work to the point of substantial completion. The indicated time for completion may be affected by modifications, claims, and unresolved disputes.

Just because liquidated damages are not specified in a contract does not mean that the contractor is immune from claim for damages from the owner for late delivery of the project. Absent a specific amount for liquidated damages, the owner can document and make a claim for actual damages, which in some cases will far exceed the amount that could have been applied if a liquidated damages clause had been included in the contract.

11.14 Substantial Completion, Partial Occupancy, Final Acceptance, and Payments

The date of substantial completion is when the project, or a portion of the project identified by the construction contract, is determined by the A/E to be sufficiently complete so that the owner can use it for its intended purpose. If progress payments have been properly administered and if provided for by the contract, the Retainage may be reduced to an amount sufficient to complete the project. If this contract provision exists, the A/E must observe the project closeout procedures related to consent of surety and lien waivers.

The same provisions that apply to substantial completion of the entire work also apply to partial occupancy if the owner elects to accept portions of the work or the contract has identified elements of the work for partial occupancy.

Neither progress payments nor acknowledgment of substantial completion or partial occupancy constitute acceptance of work not completed according to the contract documents. The *punch list,* or list of items to be completed or corrected, must be completed prior to final payment. Some agreements for A/E services end within a certain period of time after substantial completion. Considering the time required for correcting or completing work, the contractor could be responsible for the cost of additional or extended services required by the A/E.

11.15 Final Payment

Final payment often requires the processing of a final change order to balance previous payments against the final payment and final contract amount. Typical final change order items may include:

- Adjustments to unit price item quantities
- Adjustments to stipulated allowances
- Adjustments for liquidated damages or penalty/bonus clauses
- Adjustments for testing reimbursement when the owner employs the testing services and pays for only passing tests
- Adjustments for reimbursement of utilities
- Adjustments for reimbursement of the owner's expense for additional A/E services

Final acceptance of the work is indicated by issuance of final payment. Final payment is recommended by the A/E only after all project closeout procedures have been completed. Upon acceptance of final payment, the contractor waives all claims except those previously made in writing and according to the contract conditions against either the owner or the A/E. The owner, in making final payment, also waives all claims except claims arising from unsettled liens and defective work appearing after final inspection.

Chapter 12
Project Closeout

12.1 Participant Roles

Construction contract administration culminates in project closeout and includes activities involved with the orderly transfer of the completed project from the contractor to the owner. The closeout process begins with starting and adjusting systems, and ends with the contractor's accepting final payment from the owner. Following is a list of the participants and some of their major closeout responsibilities:

Manufacturer Inspects installed work and provides special warranties.

Supplier Assembles operation and maintenance (O&M) data.

Subcontractor Starts systems and equipment, prepares record documents, prepares O&M data, completes the punch list, demonstrates systems, and provides training.

Contractor Makes inspections, coordinates completion of the punch list, assembles record documents, assembles O&M data, prepares and coordinates starting of systems and equipment and operational tests, provides demonstration and training, and performs final cleaning.

Consultant Assists with inspection of the project, reviews record documents, adds items to punch lists, certifies compliance of installed work with the contract documents, and reviews O&M data.

Architect/Engineer (A/E) Inspects the project, compiles supplementary punch lists, reviews record documents, reviews O&M data, prepares final change order, certifies substantial and final completion and the final application for payment.

Commissioning Authority Completes project commissioning.

Sustainability Consultant Receives sustainable submittals, prepares necessary paperwork, and submits evidence of sustainable accomplishments to certifying authority.

Owner Accepts the project, makes final payment and releases any retained funds, attends commissioning, attends demonstration and training programs, and arranges for transfer of facility from the contractor to the owner.

Facility Manager Assists in the successful transfer of the completed facility for the owner's use. Major responsibilities may include:

- Identifying maintenance-staffing requirements; assigning and training staff
- Accepting delivery of extra stock and maintenance equipment and supplies included in the construction contract
- Coordinating installation of owner-furnished furniture, furnishings, and equipment

- Participating in systems start-up and testing
- Participating in systems demonstration
- Participating in systems operations and maintenance (O&M) training
- Accepting and managing the record documents

American Institute of Architects (AIA) Document A201, General Conditions of the Contract for Construction, and Engineers Joint Contract Documents Committee (EJCDC) C-700, Standard General Conditions of the Construction Contract, outline procedures to be followed in closing out the project.

AIA Document A201 contains the following:

- The contractor inspects the project and prepares a comprehensive list of outstanding items to be completed or corrected (initial punch list).
- The contractor submits notice of substantial completion.
- The architect inspects the project to verify substantial completion and prepares a supplement to the contractor's list (final punch list).
- The architect prepares the certificate of substantial completion.
- The contractor completes the items on the punch list.
- The contractor submits notice of final completion and final application for payment.
- The architect inspects the project to verify final completion.
- The architect processes the final application for payment and closeout submittals.
- The owner makes final payment.

EJCDC C-700 contains similar procedures:

- The contractor inspects the project and prepares a list of items not completed (tentative punch list).
- The contractor submits notice of substantial completion.
- The engineer, contractor, and owner inspect to verify substantial completion.
- The engineer prepares the tentative certificate of substantial completion with attached tentative list of items not completed.
- The owner approves the tentative certificate.
- The engineer prepares the definitive certificate of substantial completion with a revised list of items not completed.
- The contractor completes the items on the punch list.
- The contractor submits notice of final completion.
- The engineer inspects the project to verify final completion.
- The engineer processes the final application for payment and closeout submittals.
- The owner makes final payment.

More detailed administrative and procedural requirements related to project closeout are specified in Division 01—General Requirements. Sections in other divisions of the specifications are used to specify starting of systems; testing, adjusting, and balancing of systems; and systems demonstration and training. Division 01 sections on contract closeout are used to specify requirements for record documents, O&M data, product warranties and bonds, spare parts, preventive maintenance instructions, and warranty inspections.

12.2 Closeout Meeting

A closeout meeting may be arranged by the A/E to review closeout procedures, or they can be discussed at a regular project meeting. Closeout procedures and submittal requirements may have been discussed during the preconstruction meeting, but several months or years may have passed since that meeting and the participants may need to review the process. Typical closeout meetings are addressed in Chapter 4, "Meetings."

12.3 Closeout

Adhering to a comprehensive set of closeout procedures allows the project to be completed in an orderly and timely manner. Following are basic steps to project closeout:

- Start-up, testing, adjusting, and balancing of systems and equipment
- Demonstration of systems and equipment and training
- Completion of the commissioning activities
- Substantial completion
- Final completion

12.3.1 Starting of Systems and Equipment

There is a particular time in every project when the facility must become functional. This initial functioning of permanent systems and equipment, such as the mechanical, electrical, and elevator systems, is known as *start-up.* Proper systems operation is a prerequisite for the project to be accepted by the owner. Start-up is performed most efficiently by following a systematic method.

The scheduling and coordination of starting of systems is specified in Division 01. These requirements establish the contractor's responsibility for coordinating start-up procedures as follows:

- The subcontractor completes a system.
- The subcontractor notifies the contractor that the system is ready for start-up.
- The contractor field-verifies compliance with the contract documents.
- The contractor coordinates related work necessary for start-up.
- The contractor arranges a time and date with the A/E and the owner to observe starting procedures.
- The subcontractor starts systems and equipment according to the manufacturer's instructions, often in the presence of the manufacturer's representative.
- Testing is completed according to the contract documents and manufacturer's recommendations.
- Reports are submitted to the A/E for review.

The appropriate subcontractor is responsible for notifying the contractor when a system is ready to be started. It is the contractor's responsibility to verify that the system or

equipment item is ready for starting. The contractor is also responsible for determining that interdependent systems are also ready and that everything will proceed in an orderly manner during start-up.

The contractor arranges dates and times and notifies the A/E, who will advise the owner that the systems are ready for starting. The owner's and facility manager's personnel who will be responsible for the operation should attend the systems start-up; however, this is not a session for training the owner and facility manager in system operation. Demonstration and training should be conducted by a qualified instructor when the systems are fully operational.

Start-up of systems should follow the manufacturer's instructions. These written instructions should be thoroughly reviewed by the subcontractor, commissioning authority, and contractor before beginning start-up and should be available for reference during start-up. When start-up begins, the specifications, approved shop drawings, and applicable manufacturer's data should also be available for reference. This information, including the manufacturer's start-up instructions, should be included in the O&M manuals.

Once start-up is complete, required operational testing and monitoring are performed in accordance with contract document requirements and the manufacturer's written instructions. Systems are adjusted to meet contract document and the manufacturer's requirements. Test reports, if any, are completed according to the contract documents and submitted to the A/E.

The contract documents state whether newly installed permanent systems and equipment may be used by the contractor during the construction stage. Some A/Es and owners do not allow the contractor to use any of the permanent systems prior to substantial completion. Others specify conditions under which they may be used. Examples of these systems include elevators; heating, ventilating, and air conditioning (HVAC) equipment; and process equipment. Considerations about whether to allow use of these systems include wear and tear on the equipment, cleaning and maintenance responsibilities, and the effect on warranties (which can be extended for this purpose).

12.3.2 Project Record Documents

Project record documents include the construction submittals, record drawings, record specifications, addenda, contract modifications, photographs, start-up logs, test reports, certifications, and other documents, which are assembled by the contractor. They are used by the owner and facility manager as a resource in facility operations and maintenance. The number of copies required and the submittal format (electronic, hard copy, or both) are specified in Division 01.

Project record drawings include contract modifications, which, in turn, include addenda, change directives, minor changes in the work, and change orders. They also include locations of concealed elements of the work.

The project manual may also be revised to include modifications. In addition, the contract documents may require the specifications to be revised to identify the selected manufacturer, model name or number, and finishes of materials incorporated in the work.

The project record documents include a complete set of submittals. The contract documents may require the contractor or A/E to assemble this set of submittals, or the owner may assemble it as submittals are received from the contractor during the construction stage. If the record set of submittals is assembled by the contractor, the submittals can include review comments added to the submittals by the A/E and contractor. Record

submittals may be indexed and organized according to *MasterFormat®*. Record shop drawings may be clearly labeled with *MasterFormat®* section number and the manufacturer's or fabricator's name, address, telephone number, fax number, web site address, and e-mail address.

This set of documents becomes part of the record documents and is transmitted to the A/E for review and routing to the owner upon completion of the project. These documents are valuable to the owner when future remodeling or alterations are needed.

An owner may retain the A/E to incorporate the contractor's record information into a final "conformed" set of project record documents. Timely receipt of project record documents prepared by the A/E is just as important as receipt of documents prepared by the contractor. Project record documents should be permanently retained and accessible. The owner or facility manager should make copies of these documents on which to record subsequent modifications.

Project record documents are used in project conception, planning, design, and construction document preparation for additions or alterations to and replacement of existing facilities. In addition to the modified contract documents, project record documents may also include reviewed shop drawings, product data, samples, field test reports, inspection certificates, manufacturers' certificates, inspection reports from AHJs, documentation of special foundation depths, measurements or adjustments, surveys, design mixes, and project photographs and videos. Record drawings alone do not provide adequate record documentation without other record documents. Contract documents are not adequate record documents unless they have been accurately and completely modified to show actual construction. To facilitate accuracy and completeness, information is best noted on the documents during the construction stage as work progresses, rather than being prepared at the end of the project.

12.3.2.1 Record Project Manuals

Record project manuals may include:

- Modifications made by addenda, change orders, and minor changes in the work
- Identification of materials and systems incorporated in actual construction

Record project manuals are used by the owner, facility manager, and maintenance personnel to obtain information about materials, systems, and equipment incorporated into the facility. They are helpful in identifying manufacturers, product names, and model numbers for maintaining, repairing, and replacing materials, system components, and equipment. Information included in the record project manuals can be supplemented by information included in the record submittals.

12.3.2.2 Project Record Drawings

Project record drawings are frequently used by the owner, facility manager, and maintenance personnel to obtain information about concealed items. Record drawings are used by facility managers and A/Es in project conception, planning, design, and construction document preparation for alterations to and replacement of existing facilities and development of new facilities. Record drawings can include:

- Modifications made to the drawings by addenda, change orders, and minor changes in the work

- Revisions to materials, detailing, and dimensions incorporated into the project
- Revised locations of structural elements, mechanical equipment, controls cabling and equipment, piping, valves, filters, cleanouts, access panels, electrical raceway, cabling, and junction boxes
- Locations of underground utilities with horizontal and vertical dimensions

12.3.2.3 Project Record Submittals

Project record submittals may include a complete set of shop drawings, product data, test reports, and other information on materials, equipment, and systems incorporated into the project. Record submittals are typically assembled and submitted by the contractor and organized according to project manual organization. Record submittals provide information on products, finishes, and equipment actually utilized in construction of the facility that is typically not included in other record documents.

12.3.2.4 Start-up Logs

Start-up logs record system information at the time of system and equipment start-up. This information assists the A/E in determining compliance with contract documents. Information included in the start-up logs assists maintenance personnel in servicing and adjusting equipment.

12.3.3 Operations and Maintenance Manuals

The most common and perhaps the most useful method of collecting O&M data is by assembling the information into a manual for delivery to the owner and facility manager. These manuals contain valuable information about the O&M of systems and equipment. Requirements for the content of these manuals are specified in Division 01. Specific requirements for O&M data for products, systems, and equipment are specified in PART 1—GENERAL of individual specification sections in Divisions 02 through 49. The information required is ideally tailored to the needs of the owner, the facility manager, and their operating staffs.

An O&M manual may be organized according to *MasterFormat*® and includes:

- Names, addresses, telephone numbers (including emergency after-hours numbers), fax numbers, e-mail addresses, and web site addresses for the A/E, consultants, contractor, subcontractors, suppliers, manufacturers, and authorized service representatives
- O&M data
- Materials and finishes data:
  - Material and parts list
  - Color selection schedule
- List of spare parts, extra stock materials, and O&M tools furnished to the owner
- List of software furnished to the owner

These manuals are assembled prior to start-up and training and reviewed for completeness by the contractor, then submitted to the A/E for review. Missing information or changes should be corrected and the completed manuals furnished to the owner and

facility manager before the required demonstrations are conducted. Though much of the manual is prepared by the contractor, other information may be prepared by the A/E, such as basic descriptions of systems and proper operating guidelines. If the project team includes a commissioning authority, the O&M manuals may be prepared by the commissioning authority. The O&M manuals may also be prepared by a company that specializes in preparing O&M manuals.

Prior to training sessions, the contractor should submit maintenance materials or specialty tools for operations and maintenance. The owner and facility manager should have the O&M data available for review during the equipment and systems training sessions.

O&M data should be specific to the facility for which it is provided rather than generic product or system information. If generic sheets must be included, specific applicable information should be "clouded" or highlighted to indicate the product information used for the facility. The data can be used by the owner, facility manager, maintenance staff, and outside service organizations in scheduling and performing routine cleaning and maintenance, and is also helpful in making emergency repairs.

O&M data should be accessible and user friendly. O&M manuals can be assembled in three-ring binders, spiral-bound or peg-bound, and are typically in 8-$\frac{1}{2}$-inch by 11-inch or 11-inch by 17-inch format. O&M manuals should follow the project manual organization. O&M data often comprises two separate manuals: one for materials and finishes, and one for systems and equipment. It is becoming common for O&M data to be supplied in electronic format. Materials and finishes manuals (frequently used by custodians) typically include cleaning and limited patch and repair information for products and finishes. Systems and equipment manuals (frequently used by maintenance staff) typically include cleaning, maintenance, and repair information for operating systems and equipment.

12.3.3.1 Operating Software

The contract documents may require the contractor to furnish backup copies of operating software loaded into systems and equipment. This information is typically submitted on CDs and includes a backup copy of installed software, uninstall programs, and reinstall programs. Multiple copies may be required, depending on the size and number of systems or equipment provided. The contractor may also be required to install software at one or more existing central operating stations used by the owner and to provide training for the owner and facility manager in its installation and use. Requirements for submission of software to the owner are specified in Division 01. Specific requirements for software related to systems and equipment are typically specified in PART 1—GENERAL of individual specification sections in Divisions 02 through 49.

12.3.3.2 Spare Parts, Extra Stock Materials, and Tools

Spare parts typically include items required for regular maintenance such as filters, gaskets, and seals. Spare parts often include replacement parts for items that are subject to vandalism or damage during normal usage or experience atypical wear. The contractor may be required to furnish spare parts that are highly specialized or have a long lead time for replacement.

Spare parts and maintenance materials are provided by product, equipment, and system manufacturers and installers. This information can assist the facility manager in maintaining and operating the facility during the first year(s) of operation. These materials are important in assisting the facility manager to:

- Maintain equipment and systems
- Furnish an initial supply of materials needed for routine maintenance

- Meet conditions of warranties
- Maintain the appearance of the facility

Extra stock materials are often required for exposed finish materials incorporated in the project, such as floor coverings, wall coverings, ceiling materials, and coatings. Extra stock is typically required for materials where finish color, texture, or pattern is critical and can vary by dye lot, where a custom mix has been provided, and where material color lines are subject to frequent changes. Extra stock materials are used by the owner to repair damaged or worn-finish materials and finishes.

In addition to spare parts and extra stock materials, the contract documents may require the contractor to furnish O&M tools to the owner. These tools are typically unusual, nonstandard, or proprietary tools required for equipment and systems maintenance or for operating access doors, valves, and security panels. Keys, key blanks, and cylinders are often required to be furnished.

A complete list of spare parts, extra stock materials, and O&M tools should be included in the O&M manuals. The contractor should obtain a signed receipt from the owner for items furnished to the owner. The owner should designate in writing the personnel who are authorized to receive items furnished by the contractor.

Requirements for submission of spare parts, extra stock materials, and O&M tools are specified in Division 01. Specific requirements for spare parts, extra stock materials, and tools related to specific materials, systems, and equipment are specified in PART 1—GENERAL of individual specification sections in Divisions 02 through 49.

Spare parts and maintenance materials should be inventoried upon receipt by the facility manager, and a schedule should be prepared for purchasing replacement materials required for routine maintenance. Spare parts and materials should be stored in a secure location near where they are likely to be used, or in a central location. Spare parts and materials not likely to be used in the immediate future should be clearly identified with product manufacturer name and model number, installed location(s), and the original date of installation.

12.3.4 Demonstration of Systems and Equipment and Training

Because a substantially complete project is one that the owner may occupy and use, it is important that the owner understand its operation. A project may not be certified as substantially complete by the A/E until the contractor has demonstrated the various systems and equipment and trained the owner's and facility manager's personnel, and the O&M data have been submitted by the contractor, approved by the A/E, and sent to the owner.

The contractor is responsible for coordinating the activities involved in training the owner's and facility manager's personnel in the proper operation of the systems and equipment. This is accomplished through a series of demonstrations. The demonstrations are usually attended by the owner's representative, facility manager, commissioning authority, maintenance personnel, the A/E, and appropriate consultants. The demonstration and training should be performed by qualified instructors who are knowledgeable about the design, operation, and maintenance of the system or equipment. The instructors may be the contractor, subcontractors, suppliers, or manufacturer's representatives, depending on the systems and training to be provided. During these demonstrations,

the A/E and consultants review the systems and equipment and verify that they conform to the contract requirements. It also may be appropriate to perform final performance testing at this time. The data are used to familiarize the owner's representative and maintenance personnel with where information may be found.

Owner and facility manager training may be divided into two sessions. In this case, the first session typically occurs prior to substantial completion, and a refresher training session is provided after the facility has been occupied for several months. Video recording of training sessions may be appropriate to provide a record of the session for future use by the facility manager.

Equipment and systems operation and training sessions provide an opportunity for the owner and facility manager to review and ask the trainers questions about the data, equipment, and systems. This review and training occurs prior to substantial completion, or when the construction contract stipulates that the owner accepts responsibility for O&M of the facility. The facility manager should ensure that the personnel responsible for the facility are present at the appropriate demonstrations and training sessions provided by the contractor. Prior to the sessions, the owner should receive, from the contractor, documentation indicating that the trainers are knowledgeable in the O&M of the systems and equipment.

After project closeout, additional training and operating information may be needed from the system or equipment installer or product representative. The facility manager should maintain a current contact list for product representatives and service organizations that may be needed to provide assistance in maintaining and operating facility systems and equipment.

12.3.5 Commissioning

There are two basic types of commissioning: total project commissioning and systems and equipment commissioning. Total project commissioning, also referred to as total facility commissioning, begins during project conception and continues through facility management and use. Total project commissioning documents the owner's facility criteria and verifies that the criteria are achieved and that the facility is placed into proper operation. Total project commissioning is addressed in the *Project Delivery Practice Guide*. Figure 12.1 illustrates the commissioning process. System and equipment commissioning includes detailed operational testing, adjusting, and training of specific systems or equipment to ensure their readiness for use in the facility.

The role of the commissioning authority during project closeout varies, depending on the provisions of the commissioning authority's contract with the owner. At one end of the spectrum, the total facility commissioning authority may be responsible for verifying compliance with owner requirements, reviewing systems, equipment start-up, and operational testing. At the other end of the spectrum, the building system commissioning authority may be responsible only for operational testing of one or more systems.

If the commissioning authority is providing total facility commissioning services, they will have been involved in the project throughout the design and construction stages. As the project approaches the end of the construction stage, the commissioning authority has a greater role in the construction administration process. As work on the project's systems nears completion, the commissioning authority begins a detailed review of the systems to ensure that the products and equipment have been installed in accordance with the requirements of the contract documents. If the commissioning authority identifies nonconforming work, the contractor is advised through the A/E. After system

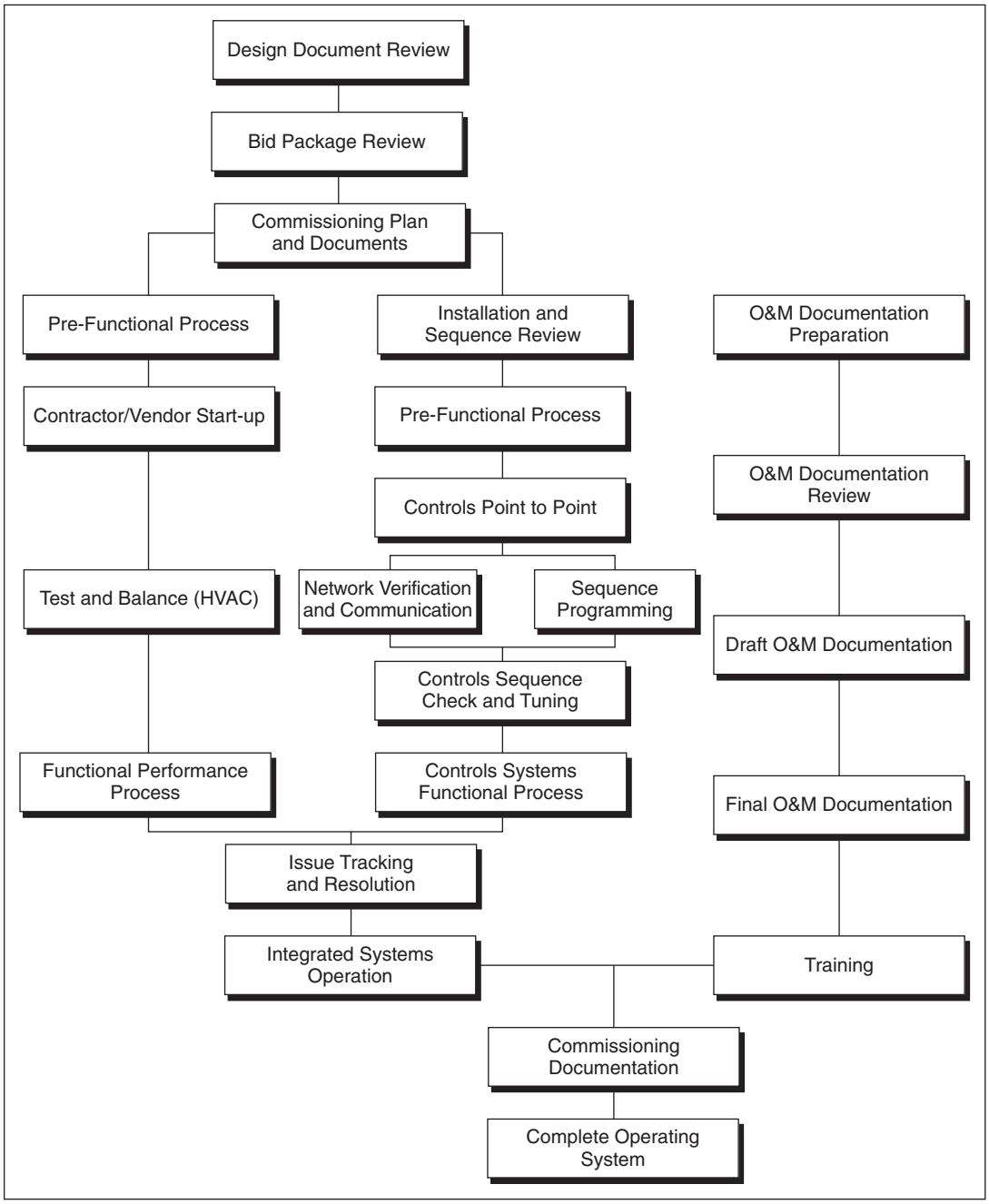


Figure 12.1 Commissioning Process

Source: Jack S. Wolpert and Jeremy Deall: "What Owners Should Know About Building Commissioning," Proceedings of GLOBALCON '99, April 1999, Denver, Colorado.

and equipment installation has been completed, the commissioning authority observes the contractor's start-up procedure and initial operational testing. The commissioning authority then coordinates a detailed operational review of the facility as a whole. The facility is checked against the functional and operational criteria developed during the project conception and design stages. Systems and equipment may be checked for energy efficiency, operating noise levels, smoothness of operation, maintenance accessibility, ability to meet performance requirements, and other predetermined criteria. The commissioning authority typically works closely with the contractor and subcontractors

during this process of checking and adjusting facility systems. Depending on the contract requirements, the commissioning authority may be responsible for making system adjustments or may direct the contractor in making needed adjustments. To avoid the potential for voiding manufacturer or installer warranty provisions, the contractor may perform required system adjustments. The commissioning authority documents the information gathered during the commissioning process and provides system testing reports in a clear, easily understood, and usable format for the facility manager.

If the commissioning authority's involvement is limited to commissioning of one or more building systems, the commissioning authority's role in project closeout will be much less than if total facility commissioning is being provided. It is not uncommon for commissioning to be limited to operational testing of specific facility systems such as the HVAC and HVAC controls systems. In this application, the commissioning authority's involvement may be limited to assisting the mechanical and controls subcontractors in testing the operation of the HVAC system equipment by the controls systems. Even at this limited level, the participation of the commissioning authority as an independent testing agency provides value to the project and the owner. Similar to a more extensive commissioning process, the reports prepared by the commissioning authority document the information gathered during the commissioning process.

The facility manager should be closely involved throughout the commissioning process, including:

- Identifying the systems and equipment to be included in the commissioning process
- Observing and participating in the commissioning process
- Confirming completion of items identified for correction
- Reviewing reports prepared by the commissioning agent
- Considering commissioning authority recommendations
- Ensuring that copies of the commissioning report are available for use in the facility and are archived for future use

The primary purpose of total facility commissioning is to ensure that the completed facility operates as originally intended during the project conception and design stages. The information gathered during the commissioning process assists the facility manager in operating and maintaining the facility's systems. The reports prepared by the commissioning authority provide a valuable resource for routine maintenance, operating adjustments, and future replacement, alteration, or expansion.

12.3.6 Time of Completion

There are two significant dates in project closeout: substantial completion and final completion. *Substantial completion* occurs when the project, or a portion of the project, is sufficiently complete according to the contract documents to allow the owner to use it for its intended purpose. *Final completion* is when the project is complete according to the contract documents and the contractor is no longer involved on the project. Both dates are established by the A/E after conducting inspections of the project. Final completion of the project is evidenced by the contractor's acceptance of final payment from the owner. In the event of an outstanding claim, the contractor may refuse to accept final payment.

12.3.7 Substantial Completion

Most standard general conditions state that the date of substantial completion is the date established by the A/E when the project is sufficiently complete to permit the owner to use it for its intended purpose. The date of substantial completion is established by the A/E and documented by the issuance of a certificate of substantial completion. At substantial completion, the owner (or the facility manager on behalf of the owner) typically assumes responsibility for routine maintenance, utilities, security, property insurance, and liability for the facility and its adjacent grounds. At substantial completion, the one-year correction period begins, and specified product warranties typically begin. If the contractor has been responsible for property insurance during the construction stage, this responsibility typically shifts to the owner at substantial completion. For these reasons, the date is important to the owner, the contractor, and the A/E.

On most projects there is a single date of substantial completion when the owner takes possession and occupies the project. On large and complex projects, there may be different dates of substantial completion for separate portions of the project—for example, when a project is completed on a phased-occupancy schedule or there are different dates of substantial completion for each phase or portion. Once part of the project is certified as substantially complete by the A/E, the owner typically has the right to occupy the substantially completed portion. The responsibilities of the owner and the contractor for utilities, maintenance, security, insurance, and damage are included in the conditions of the contract and Division 01 requirements. If not, they are enumerated in a written agreement prior to occupancy. These responsibilities are stated in the certificate of substantial completion. It is important that trained staff is available and prepared to manage the facility starting on the day it is accepted as substantially complete.

Before the owner occupies the project under the terms established by substantial completion, the A/E verifies that the contractor has submitted the keying schedule and keys to the owner. In cases where a construction-stage keying system was used, the contractor must remove all construction cylinders, install or rekey the permanent cylinders, and deliver the keys to the owner. One of the contractor's closeout submittals should be a signed receipt from the owner verifying that keys have been delivered.

12.3.7.1 Authorities Having Jurisdiction (AHJs)

An important item to be submitted with the contractor's notice of substantial completion is evidence that AHJs, such as the building official, have completed their required inspections and the project meets their requirements. Typically, some form of final inspection is required by each AHJ involved in construction document review and issuance of permits prior to the start of construction. Evidence is often in the form of a certificate of occupancy issued by the AHJ. This evidence may also be in the form of signed-off permits, a temporary certificate of occupancy, or some other written format used by the AHJ. By definition, a project is not substantially complete unless it can be used for its intended purpose. If the AHJs have not completed their inspections and have not authorized occupancy, then the owner may not occupy or use the project. Some commonly required inspections include those performed by the public works inspector, department of transportation, planning inspector, fire marshal, building inspector, health inspector, boiler inspector, electrical inspector, plumbing inspector, and elevator inspector.

The owner is obligated to comply with regulatory requirements not included in the construction contract in order to meet requirements for use and occupancy. Requirements include installation of signage, safety devices, and other owner-furnished items.

The owner needs to provide documents to various AHJs. The facility manager is responsible for collecting and distributing these documents, including the following:

Bonds The owner might be required to provide bonds to ensure future performance, such as the establishment of landscaping, reforestation, or wetlands plantings, especially those done in compliance with mitigation negotiations.

Easements The owner might be required to dedicate easements to local utility providers for current utility service or future utility extensions.

Emergency Plans The owner might be required to submit and post written emergency plans for new or renovated facilities regarding fire equipment and exiting, emergency evacuation, and lockdowns. The International Facilities Management Association's manual, *The Fit Facility,*[1] provides templates for such documents.

Certificates of Occupancy and Inspection The owner is typically required to post certificates issued by the AHJ, such as the Certificate of Occupancy, elevator certificates, and boiler certificates.

Signed-off Permits The owner should obtain from the contractor the originals of permits for the project after final approval or sign-off by the AHJ. Approved permits for projects should be permanently retained and accessible. Some public agencies do not archive permit records; therefore, it is recommended that the owner retain copies in the event of any difficulty with permit processes.

Permit Review Documents The owner should obtain from the contractor the originals of permit review documents showing evidence of review, stamped by the AHJ for the project. These documents should be permanently retained.

12.3.7.2 Punch Lists

Punch lists are lists of items requiring correction or completion by the contractor. The initial punch list is prepared by the contractor prior to requesting substantial completion. During the A/E's inspection to determine substantial completion, the A/E prepares a supplemental punch list. These two punch lists combined are the final punch list. Standard general conditions typically require the final punch list to be attached to the certificate of substantial completion.

The owner and facility manager might not be contractually involved in the punch list process. However, if the owner or facility manager opts to be involved in this process, the owner or facility manager should limit their involvement to avoid interfering with the contractor's and A/E's contractual obligations. Items found by the owner or facility manager can be documented and submitted to the A/E for inclusion in their punch list prior to issuance.

12.3.7.3 Notification by Contractor

The inspection process related to project closeout is initiated by the contractor. As the party responsible for completing the project, the contractor, along with the subcontractors, determines when the project is substantially complete. Both AIA and EJCDC general conditions require the contractor to submit a comprehensive list of incomplete work and items needing correction. This list is commonly known as the initial punch list. When the contractor decides that the project is substantially complete, written notice is prepared and submitted to the A/E, along with the initial punch list.

[1] Victoria Hardy, *The Fit Facility.* IFMA Competency Manual (Houston, TX: IFMA, 2000).

Long punch lists are time consuming and costly to prepare, review, and complete. It is to everyone's advantage that the list be as short as possible. Deficiencies noted by the A/E during the course of construction should be corrected in a timely manner. They should not be allowed to accumulate until the end of the project. The A/E should use the same standards used during the construction process to evaluate the completed project. For example, the A/E should not reject work that has previously been reviewed and accepted.

12.3.7.4 Inspection of Work

Most standard general conditions require the A/E to conduct an inspection to determine whether the project is substantially complete.

Once the A/E has received notice from the contractor, an inspection of the work is scheduled. Though not required, it is often helpful to include the A/E's consultants and representatives of the owner, contractor, and major subcontractors.

The contractor is required to prepare a list of items that are incomplete (initial punch list) and to submit the list to the A/E with the request for inspection. The A/E should respond promptly to the contractor's request for inspection. The A/E, however, may refuse to inspect a project that is obviously not substantially complete, or when it is obvious the contractor and subcontractors have not done their own verification of the completed project. The A/E should not be expected to perform the contractor's inspection functions.

The A/E performs the substantial completion inspection and supplements the contractor's initial punch list. During the inspection, the A/E determines the status of the project, reviews the items of work on the contractor's initial punch list, and prepares a list of any additional items. This supplemental list of items, together with the contractor's initial punch list, is commonly referred to as the *final punch list*. Simply stated, the final punch list is the written record of deficiencies noted during the contractor's and the A/E's inspections of the project to determine whether the project is substantially complete. Refer to Figure 12.2 for a sample punch list.

If, after the inspection, the A/E does not consider the project to be substantially complete, notification is given to the contractor stating the reasons why the project is not ready for its intended occupancy and use. An issue the A/E must consider in determining substantial completion is whether the contractor's ongoing completion of punch items affects the owner's use of the project. The A/E may deny the contractor's request for substantial completion upon discovery of items not in accordance with the contract documents that materially or substantially affect the ability of the owner to occupy the project for its intended use. There may be instances when the date of substantial completion is delayed until a particular item that prevents the owner from using the project as intended is finished. The contractor must complete or correct the causes for denial before the issuance of a certificate of substantial completion. This does not always mean that all items on the final punch list need to be completed before obtaining substantial completion. Items on the punch list that impair the owner's ability to use the project should be corrected before granting substantial completion.

Infrequently, punch list items are listed by the A/E that might be more appropriate in the category of a warranty item. According to the AIA and EJCDC documents, the warranty does not begin until substantial completion. Thus, work needing corrections may be classified as defective work. Certain items may be corrected under the terms of the manufacturer's warranty. Funds withheld for these items may be challenged by the contractor who is of the opinion that the warranty obligations apply and the item so marked does not represent a deficiency as much as an obligation to correct under the

Knowledge for Creating
and Sustaining
the Built Environment

PUNCH LIST

Project: _____ From (A/E): _____

_____ Site Visit Date: _____

To (Contractor): _____ A/E Project Number: _____

_____ Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Form Version: September 1996
CSI Form 14.1A

Figure 12.2 CSI Form 14.1A, Punch List

definition of the manufacturer's warranty or guarantee. Manufacturers' warranties and guaranties can limit the provisions of the conditions of the contract. Care should be utilized to prevent limitations of the owner's rights under the conditions of the contract. Refer to the *CSI Construction Specifications Practice Guide* for information about warranties and guarantees.

12.3.7.5 Certification

If, after this inspection, the A/E agrees that the project is substantially complete, the A/E prepares the certificate of substantial completion. This certificate includes the date of substantial completion, identification of the substantially complete portion of the project, and responsibilities of the contractor and the owner for utilities, maintenance, security, insurance, and damage to the project. The certificate of substantial completion also includes the specified time limit for the contractor to complete outstanding items of work. This certificate is prepared in triplicate, signed by the A/E, and sent to the contractor along with the final punch list. AIA Document G704, Certificate of Substantial Completion, and EJCDC C-625, Certificate of Substantial Completion, are commonly used forms for documenting substantial completion. Refer to Figures 12.3 and 12.4 for sample certificates of substantial completion.

The contractor should carefully review the certificate and accompanying punch list. If there is agreement on the conditions of the certificate and the items on the list, the contractor signs the three certificates and forwards them to the owner. The owner then reviews and signs the certificates, keeps one copy, and distributes the other two to the A/E and the contractor for their records. One difference between AIA and EJCDC standard general conditions concerns the issuance of the certificate of substantial completion. Under EJCDC C-700, the A/E first prepares a tentative certificate of substantial completion and a tentative punch list for the owner's review. After the owner has approved the certificate and punch list, the engineer issues a definite certificate and revised tentative punch list to the contractor. If the owner or contractor objects to any of the terms of the certificates, the owner or contractor immediately notifies the A/E for clarification or resolution.

The contractor distributes copies of the final punch list to the appropriate subcontractors. The contractor and subcontractors then complete the final punch list items. The contractor is responsible for coordinating the remaining work so that it is completed within the time limits typically specified in Division 01 and stated in the certificate of substantial completion. When these items are complete, the contractor submits written notice to the A/E requesting final inspection. The A/E then conducts a final inspection to determine satisfactory completion of the outstanding items. If the project is complete, the A/E notifies the contractor and owner in writing and advises the contractor to submit a final application for payment.

12.3.7.6 Owner's Right to Complete Work

If the contractor fails to correct outstanding items of work, the conditions of the contract establish the following procedures:

- The A/E sends written notice to the contractor noting nonconforming and incomplete work.
- The A/E gives the contractor a specified time to complete work.
- The owner withholds payments to the contractor pending completion.
- The owner may terminate the contract if nonconforming work is not corrected.

AIA® Document G704™ – 2000

Certificate of Substantial Completion

PROJECT: *(Name and address)*

PROJECT NUMBER:

CONTRACT FOR:

CONTRACT DATE:

OWNER ☐
ARCHITECT ☐
CONTRACTOR ☐
FIELD ☐
OTHER ☐

TO OWNER: *(Name and address)*

TO CONTRACTOR: *(Name and address)*

PROJECT OR PORTION OF THE PROJECT DESIGNATED FOR PARTIAL OCCUPANCY OR USE SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated above is the date of issuance established by this Certificate, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

ARCHITECT | BY | DATE OF ISSUANCE

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment.

Cost estimate of Work that is incomplete or defective: $ _____

The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

CONTRACTOR | BY | DATE

The Owner accepts the Work or designated portion as substantially complete and will assume full possession at (*time*) on (*date*).

OWNER | BY | DATE

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows: *(Note: Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)*

Figure 12.3 AIA Document G704, Certificate of Substantial Completion

Instructions for AIA® Document G704™–2000

Certificate of Substantial Completion -2000 Edition

A. General Information

1. Purpose

This document was developed to establish the date of Substantial Completion for the purpose of commencement of applicable warranties and to allow the Owner to occupy or utilize the Work or designated portion thereof.

2. Related Documents

This document was prepared for use under the terms of AIA Document A201, General Conditions of the Contract for Construction; under the general conditions contained in AIA Document A107 and A117; and under other AIA general conditions beginning with the 1987 editions.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Reproductions

B. Completing the G704 Form

1. After the words "Project or Designated Portion shall include:" insert a detailed description of the Project or portion(s) of the Project that have been accepted as being substantially complete.
2. Determine Work to be completed.

   Provide a list of items that are to be completed or corrected.
   Determine dates for completion of the Work.
   Establish an amount to be withheld to complete the Work.

C. Execution of the Document

The G704 document should be executed in not less than triplicate by the Owner, Architect, and Contractor, each of whom retains an original.

Figure 12.3 (*Continued*)

Certificate of Substantial Completion

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

_____

_____

_____

_____

_____

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

_____

_____

_____

Contractor's Amended Responsibilities:

_____

_____

_____

_____

Figure 12.4 EJCDC C-625, Certificate of Substantial Completion

Source: Reprinted by permission of the Engineers Joint Contract Documents Committee (EJCDC). For more information about the EJCDC, please visit www.nspe.org.

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

Figure 12.4 (*Continued*)

If the contractor fails to complete the work, the owner has the right to have the work completed by others. The costs involved are deducted from amounts owed the contractor. If the funds withheld from the contractor are insufficient for completing the work, the owner can make a claim against the contractor for the difference.

12.3.7.7 Adjustment of Retainage

Construction contracts usually allow the owner to retain a percentage of each progress payment until the project is completed. The amount withheld is called *Retainage*. Most construction contracts allow for a reduction in Retainage at some interim stage of construction such as 50 percent complete or once the project is substantially complete. This reduction can be any specified or agreed-upon amount. Retainage held after the date of substantial completion is typically greater than the value of the work remaining to be completed. Retainage is intended to give the contractor and subcontractors an incentive to complete punch list items in a timely manner and to protect the owner from liens filed by subcontractors or workers. A combination of the Retainage and the amount remaining to be paid should supply sufficient funds for the owner to have the work completed in the event the contractor fails to do so.

12.3.8 Final Completion

Final completion occurs when the contractor has completed the contract requirements, the A/E has inspected to determine completion, the owner has made final payment to the contractor, and the contractor has accepted final payment. The final completion procedure begins when the contractor completes work on the punch list. The contractor removes any remaining trash, tools, construction equipment, temporary facilities, and surplus materials from the site. When this is accomplished, the contractor notifies the A/E in writing that the work is completed and submits required closeout documents.

12.3.8.1 Final Inspection

Final inspection is scheduled after the contractor believes all the items on the final punch list have been completed. Final inspection provides verification by the A/E that the contractor has satisfactorily performed all the identified tasks and corrected any deficiencies on the final punch list. The contractor needs to be prudent and make every effort to complete all items on the final punch list prior to requesting the final inspection. There should be only one final inspection on every project. The contractor and the A/E follow the final inspection procedures included in the conditions of the contract and Division 01 of the specifications.

12.3.8.2 Closeout Submittals

At or near completion of a project, a number of submittals are processed. Requirements for these submittals are included in the conditions of the contract and Division 01 of the specifications. These submittals include:

- Written notices of substantial and final completion
- Final application for payment
- Record documents
- O&M data
- Spare parts and maintenance materials
- Certificates of payment
- Releases of liens and waiver of debts and claims
- Consent of surety to final payment
- Special warranties
- Contractor's certification of substantial and final completion

12.3.8.3 Final Change Order

The A/E prepares a final change order if there are outstanding items that have not been included in a previous change order. For unit price work, the change order is a final balancing of specified and actual amounts. Unused allowances are credited back to the owner. Adjustments in the contract sum for liquidated damages and penalty/bonus clauses are also included in the final change order. As the contract time can be changed only by change order, any claims for extension of time must be resolved and included in a change

order. Only after processing this change can the actual date of substantial completion be compared with a required date of substantial completion. Penalties or liquidated damages are then calculated after the dates have been documented.

12.3.8.4 Liquidated Damages—Penalty/Bonus Clauses

Before certifying the contractor's final application for payment, the A/E thoroughly reviews all of the contract requirements relating to liquidated damages and penalty/bonus provisions. Usually, the contract specifies a fixed amount to be assessed or awarded per day of delay or early completion. The A/E calculates the amounts based on the requirements of the contract documents, including specific modifications of time.

12.3.8.5 Final Inspection and Final Payment

After review of the contractor's final application for payment and closeout submittals, the A/E conducts a final inspection to determine completion of punch list items. When the A/E determines that the contractor's work is completed, the final application and certificate for payment is signed and transmitted to the owner recommending final payment, including Retainage. The date of this application for payment becomes the date of final completion, and the owner typically takes full responsibility for the project unless otherwise agreed upon.

12.3.8.6 Warranties and Correction Period

The conditions of the contract, Division 01 requirements, and sections in Divisions 02 through 49 typically provide for a correction period after final completion and extended warranties and guarantees. The correction period is typically identified in the conditions of the contract and Division 01 requirements. This period is a specified period of time in which the contractor is required to correct deficiencies and complete work that was not noted prior to final acceptance. Sections in Divisions 02 through 49 of the specifications frequently include requirements that the contractor, subcontractors, or manufacturers provide extended warranties or guaranties for specific materials, equipment, or systems. These warranty periods typically extend past the expiration of the correction period. Most warranties exclude misuse, abuse, and failure to maintain.

The facility manager should carefully review warranties and guarantees to become knowledgeable of:

- Products and materials included in or excluded by the warranty.
- The warrantor or guarantor.
- The duration of the warranty.
- Conditions and restrictions included in the warranty. Most warranties include provisions that will void the warranty depending on actions taken or not taken by the owner.
- Authorization and activation of the warranty by the warrantor.
- Whether owner acceptance of the warranty is required and whether responsive paperwork has to be filed.
- Coverage limitations that may result from acceptance.
- Requirements for service contracts or approved service providers in order to maintain warranty.

The provisions, restrictions, and limitations of warranties should be clearly explained to maintenance and janitorial staff and service organizations to minimize potential for voiding warranty provisions. The original warranty documents should be maintained in a safe and secure location for easy access. In addition, as an example, the "dos and don'ts" related to roof materials may be posted on the inside of roof access doors or hatches.

The contractor should be notified of warranty and correction items as they occur. Figure 12.5 illustrates a sample warranty action request. This notification allows the contractor to take corrective action, thereby reducing the potential for voiding warranties, further damage to the facility, and loss of productivity. With different project delivery methods, the facility manager contacts different team members. In a design-bid-build contract, the facility manager advises the contractor and the A/E of warranty items. In a design-build contract, the facility manager advises the design-builder of warranty items.

Prior to expiration of the correction period, the facility manager should review:

- Status of the facility with users
- Status of warranty notices
- Correction issues with the A/E
- The facility's condition

The inspection should be scheduled to allow corrections to take place prior to expiration of the correction period.

12.4 Postconstruction Services

Sometimes the services provided by the A/E and the contractor continue beyond final completion. These services may include assistance with occupancy of the facility, more extensive training of owner's O&M personnel, and helping the owner with postoccupancy evaluations and inspections. A/E involvement in the project beyond occupancy can help the owner better understand the operation and performance of the project.

12.5 Facility Evaluation

The facility manager should develop and maintain an ongoing evaluation program. This process begins at occupancy with a postoccupancy evaluation and continues through the life of the facility. The format and content of the evaluations vary greatly, depending on the facility type, and might include the following:

Building Structure, envelope, space allocation, interior and exterior finishes, mechanical and electrical systems, site development, and energy efficiency.

Tenant/User Efficient layout, signage, accessibility, interior finishes, mechanical and electrical systems, and leased area.

Highway Paving, striping, signage, lane width, on-ramps and off-ramps, lighting, shoulders, and landscaping.

WARRANTY NOTICE NO.: 1

PROJECT:	Administration Building 200 Main Street Anywhere, USA 00000	DATE: CONTRACT DATED:	June 20, 2005 May 17, 2003
TO CONTRACTOR:	ABC Construction Company Attention: T. Wilson Fax: (123)555-7890 E-mail: twilson@ abc.co	SUBSTANTIAL COMPLETION: A/B PROJECT NO.:	August 22, 2004 02-125
ISSUED BY OWNER:	123 Corporation Contact: B. Kent Fax: (123)555-4567 E-mail. bkent@ 123corp.co	COPY TO A/E:	XYZ Architects Attention: B. Dawson Fax: (123)555-7899 E-mail: bdawson@xyz.co

Pursuant to the Conditions of the Contract and Division 01 requirements of the Contract, notice is hereby given of an observed defect or deficiency in the Work as outlined below. Commence correction of the said defect or deficiency within ten days, and notify the Owner and A/E upon completion.

Subject: Inoperative Override Button

Location: Conference 207

Description: The black override push button on the thermostat on the east wall of Conference 207 does not appear to operate correctly. We were unable to restart. FC-207 after hours worked on Wednesday. We used the rotary override timer for zone #1, located in Custodial 127, to restart FC-207. Please repair override push button.

CONTRACTOR RESPONSE:

TO OWNER:	123 Corporation Contact: B. Kent Fax; (123)555-4567 E-mail: bkent @123corp.co	COPY TO A/E:	XYZ Architects Attention: B. Dawson Fax: (123)555-7899 E-mail: bdaw.son@xyz.co

Action Taken: _____

_____

_____

_____

Addressed By:_____ Date Addressed: _____

Contractor's Signature: _____ Date: _____

Figure 12.5 Sample Warranty Action Request

Facility evaluations address facility use, effectiveness, efficiency, operational cost, maintenance, and environment. In preparing the evaluation format, the facility manager should try to envision the company's future. The forms need to incorporate relevant information for future decisions. Figure 12.6 illustrates an evaluation of an existing roof.

Facility evaluations assemble information that will assist in planning and scheduling routine and preventative maintenance, capital improvements, facility upgrades, and system and equipment replacement. Standard forms may be used to address component evaluations such as roofing, exterior wall finishes, landscaping, flooring, equipment and systems, and production processes. These forms facilitate quick field review and updating of facility records.

Facility evaluations should be made on a regular basis and records updated at regular intervals. An evaluation cycle should be set up for each facility component. The length of time between evaluations will also be affected by the age of the facility and the frequency of operational changes by facility users.

12.5.1 Postoccupancy Evaluation

Facility managers should perform a postoccupancy evaluation three to six months after initial occupancy. The postoccupancy evaluation becomes the baseline for the ongoing facility evaluation program. The postoccupancy evaluation and subsequent facility evaluations are performed to:

- Assist the facility manager in identifying nonconforming work and warranty items that were not identified prior to occupancy.
- Assist the facility manager in preparing for future projects. Lessons learned from existing facilities and past projects can prevent costly mistakes on future projects.
- Obtain information from facility users that can be used to determine the need for modifications to the facility to improve its usefulness.
- Assist the facility manager in anticipating future maintenance needs.

Effective postoccupancy evaluations record information from users, maintenance personnel, and other employees who use the facility on a regular basis. A separate postoccupancy evaluation is performed for each facility. Postoccupancy evaluations record:

- How the facility functions for the users
- Aesthetic issues that need to be addressed
- Perceived public or customer response to the facility
- Recommended changes to the facility
- Corrections or repairs that require immediate attention

Figure 12.7 illustrates a postoccupancy evaluation for a high school.

12.5.2 Product, System, and Equipment Evaluation

A facility manager is in a position to evaluate the installation and long-term performance of products. Products and systems with acceptable performance are identified for use on future projects. If a product or system fails, it is identified as not being a recommended

ROOF EVALUATION **Date:** June 6, 2002

Building:	Northwest High School		
Address:	800 Fourth Street N.E., Cascadia, WA		
Roof Location:	East Side of Center Roof at Music Building		
Year Roof Installed:	1996	Roof Area:	1.804 s.f.
Year Bldg. Constructed:	1957	Overall Roof Condition:	Very Good

Roof Description

System:	Built-up Modified Bitumen Roofing
Surfacing:	Mineral Cap Sheet
Underlayment:	Modified Bitumen Felt - 2 Plys
Insulation:	Batt Insulation
Decking:	3/8” Plywood on I × 8 Shiplap
Base Flashing:	Mineral Cap Sheet and 2 Plys
Valley Flashing:	N.A.
Edge Flashing:	Painted Galv. Metal
Gutters:	N.A.
Downspouts:	N.A.
Slope/Drainage System:	1/2” per foot Slope Drains to Internal Pipes 8:12 Pitch at Crickets
Venting System:	None
Penetrations:	4 Drains, 2 Mech)., 4 Scuppers
Roof-Mounted Equipment:	None

Roof Condition

Surfacing:	Excellent	Gutters:	N.A.
Base Flashing:	Good	Downspouts:	N.A.
Valley Flashing:	N.A.	Drainage:	Very Good
Edge Flashing:	Very Good	Penetrations:	Very Good
Watertightness:	No Leaks Reported		
Ponding:	At Base of Crickets and Around Drains		
Mechanical Damage:	None		

Additional Comments:
1. Surface cracking present in base flashing at top of N.W. Cricket.
2. No blisters noted.

Prepared By:

Figure 12.6 Evaluation of an Existing Roof

POSTOCCUPANCY EVALUATION FOR NORTHWEST HIGH SCHOOL

RESPONDENT NO.:_____
(to be filled in by Facility Management Dept.)

INSTRUCTIONS

1. We request that this questionnaire be completed by all staff members of Northwest High School.
2. Your response to the following questions will be used to assist the School District in evaluating space, furniture, and equipment requirements for future schools.
3. Please review the entire questionnaire before responding to the questions. The questionnaire is arranged in six parts:
   a. Participant information.
   b. Adequacy of the building.
   c. Adequacy of outdoor areas.
   d. Adequacy of teaching or work station.
   e. Preferences.
   f. Suggested changes.
4. Please complete your questionnaire and return it to the school's Principal by:_____

Thank you for your assistance.

1.00 Participant Information

1.01 Date Survey Completed: _____

1.02 Room Number of your Teaching or Workstation: _____

1.03 Your Position:

a. Classroom Instructor	_____	f. CDS/Therapist/Psychologist	_____
b. Educational Aide	_____	g. Nurse/Health	_____
c. Librarian	_____	h. Custodian	_____
d. Administration	_____	i. Cook	_____
e. Counselor	_____	j. Other	_____

2.00 Adequacy of Building

Please Indicate your opinion about the following items which pertain to the building in general.

2.01 Overall, how would you rate the building as a place for educating students?

(1) Excellent ____ (2) Very Good ____ (3) Fair ____
(4) Poor ____ (5) No Opinion ____

2.02 Overall, how would you rate the building as a place to work?

(1) Excellent ____ (2) Very Good ____ (3) Fair ____
(4) Poor ____ (5) No Opinion ____

2.03 Overall, how would you rate the building for accommodating community activities?

(1) Excellent ____ (2) Very Good ____ (3) Fair ____
(4) Poor ____ (5) No Opinion ____

Figure 12.7 Postoccupancy evaluation

POSTOCCUPANCY EVALUATION FOR NORTHWEST HIGH SCHOOL

2.04 Please indicate your opinion about the adequacy of the following:
(Circle your choice.)

MTA=More Than Adequate A = Adequate LTA = Less Than Adequate
NO = No Opinion DK = Don't Know

		MTA	A	LTA	NO	DK
1)	Location of administration area	1	2	3	4	5
2)	Size of waiting area at administration area	1	2	3	4	5
3)	Size of conference rooms	1	2	3	4	5
4)	Number of conference rooms	1	2	3	4	5
5)	Location of staff lounge	1	2	3	.4	5
6)	Size of staff lounge	1	2	3	4	5
7)	Location of staff workroom	1	2	3	4	5
8)	Size of staff workroom	1	2	3	4	5
9)	Location of staff mailboxes	1	2	3	4	5
10)	Location of gymnasiums	1	2	3	4	5
11)	Size of gymnasiums	1	2	3	4	5
12)	Location of kitchen	1	2	3	4	5
13)	Location of commons	1	2	3	4	5
14)	Size of commons	1	2	3	4	5
15)	Location of library	1	2	3	4	5
16)	Size of library	1	2	3	4	5
17)	Location of maintenance office	1	2	3	4	5
18)	Location of standard classrooms	1	2	3	4	5
19)	Location of music classrooms	1	2	3	4	5
20)	Location of technology classroom	1	2	3	4	5
21)	Location of visual communications classroom	1	2	3	4	5
22)	Location of art classroom	1	2	3	4	5
23)	Location of computer and keyboard classrooms	1	2	3	4	5
24)	Location of science classroom	1	2	3	4	5
25)	Location of special education classrooms	1	2	3	4	5
26)	Location of drama classroom	1	2	3	4	5
27)	Location of field house	1	2	3	4	5
28)	Location of staff restrooms	1	2	3	4	5
29)	Number of staff restrooms	1	2	3	4	5
30)	Location of student restrooms	1	2	3	4	5
31)	Number of student restrooms	1	2	3	4	5
32)	Location of staff telephones	1	2	3	4	5
33)	Number of staff telephones	1	2	3	4	5
34)	Location of public telephones	1	2	3	4	5
35)	Number of public telephones	1	2	3	4	5
36)	Location of central storage rooms	1	2	3	4	5
37)	Amount of central storage for textbooks	1	2	3	4	5
38)	Amount of central storage for supplies	1	2	3	4	5
39)	Location of student lockers	1	2	3	4	5
40)	Number of student lockers	1	2	3	4	5

Figure 12.7 (*Continued*)

POSTOCCUPANCY EVALUATION FOR NORTHWEST HIGH SCHOOL

3.00 Adequacy of Outdoor Areas

Please indicate your opinion about the adequacy of the following: (Circle your choice.)

MTA = More Than Adequate A = Adequate LTA = Less Than Adequate
NO = No Opinion DK = Don't Know

		MTA	A	LTA	NO	DK
1)	Location of exterior student courtyard area	1	2	3	4	5
2)	Size of exterior student courtyard area	1	2	3	4	5
3)	Location of grass playfields	1	2	3	4	5
4)	Size of grass playfields	1	2	3	4	5
5)	Location of track	1	2	3	4	5
6)	Location of staff parking area	1	2	3	4	5
7)	Size of staff parking area	1	2	3	4	5
8)	Location of visitor parking area	1	2	3	4	5
9)	Size of visitor parking area	1	2	3	4	5
10)	Location of bus loading zone	1	2	3	4	5
11)	Size of bus loading zone	1	2	3	4	5
12)	Location of event parking area	1	2	3	4	5
13)	Size of event parking area	1	2	3	4	5

4.00 Adequacy of Workspace or Workstation

Please indicate your opinion about the adequacy of the following within your workspace or workstation: (Circle your choice.)

MTA = More Than Adequate A = Adequate LTA = Less Than Adequate
NO = No Opinion DK = Don't Know

		MTA	A	LTA	NO	DK
1)	Location of room or work space	1	2	3	4	5
2)	Size of room or work space	1	2	3	4	5
3)	Location of whiteboards	1	2	3	4	5
4)	Size of whiteboards	1	2	3	4	5
5)	Location of tackboard space	1	2	3	4	5
6)	Size of tackboard space	1	2	3	4	5
7)	Location of electrical outlets	1	2	3	4	5
8)	Number of electrical outlets	1	2	3	4	5
9)	Amount of open shelving for books and materials	1	2	3	4	5
10)	Amount of cabinet storage	1	2	3	4	5
11)	Amount of counter surface	1	2	3	4	5
12)	Size of hard surface floor area at sink(s)	1	2	3	4	5
13)	Amount of artificial lighting	1	2	3	4	5
14)	Control of artificial lighting	1	2	3	4	5
15)	Amount of natural light	1	2	3	4	5
16)	Ability to darken room for video presentations	1	2	3	4	5
17)	Flexibility of space for alternate furniture arrangement	1	2	3	4	5

Figure 12.7 (*Continued*)

POSTOCCUPANCY EVALUATION FOR NORTHWEST HIGH SCHOOL

		MTA	A	LTA	NO	DK
18)	Ability to supervise students within your space	1	2	3	4	5
19)	Telephone system	1	2	3	4	5
20)	Location of telephone within your space	1	2	3	4	5
21)	Intercom system	1	2	3	4	5
22)	Acoustics within the room	1	2	3	4	5
23)	Acoustic separation from adjacent rooms	1	2	3	4	5

5.00 Suggested Changes

5.01 Are there any changes you would make to your workspace or workstation?

(1) Yes____ (2) No____ (3) No Opinion____ (4) Don't Know____

5.02 If yes, what changes would you suggest?

5.03 Are there any changes you would make to the school?

(1) Yes____ (2) No____ (3) No Opinion____ (4) Don't Know____

5.04 If yes, what changes would you suggest?

END OF EVALUATION

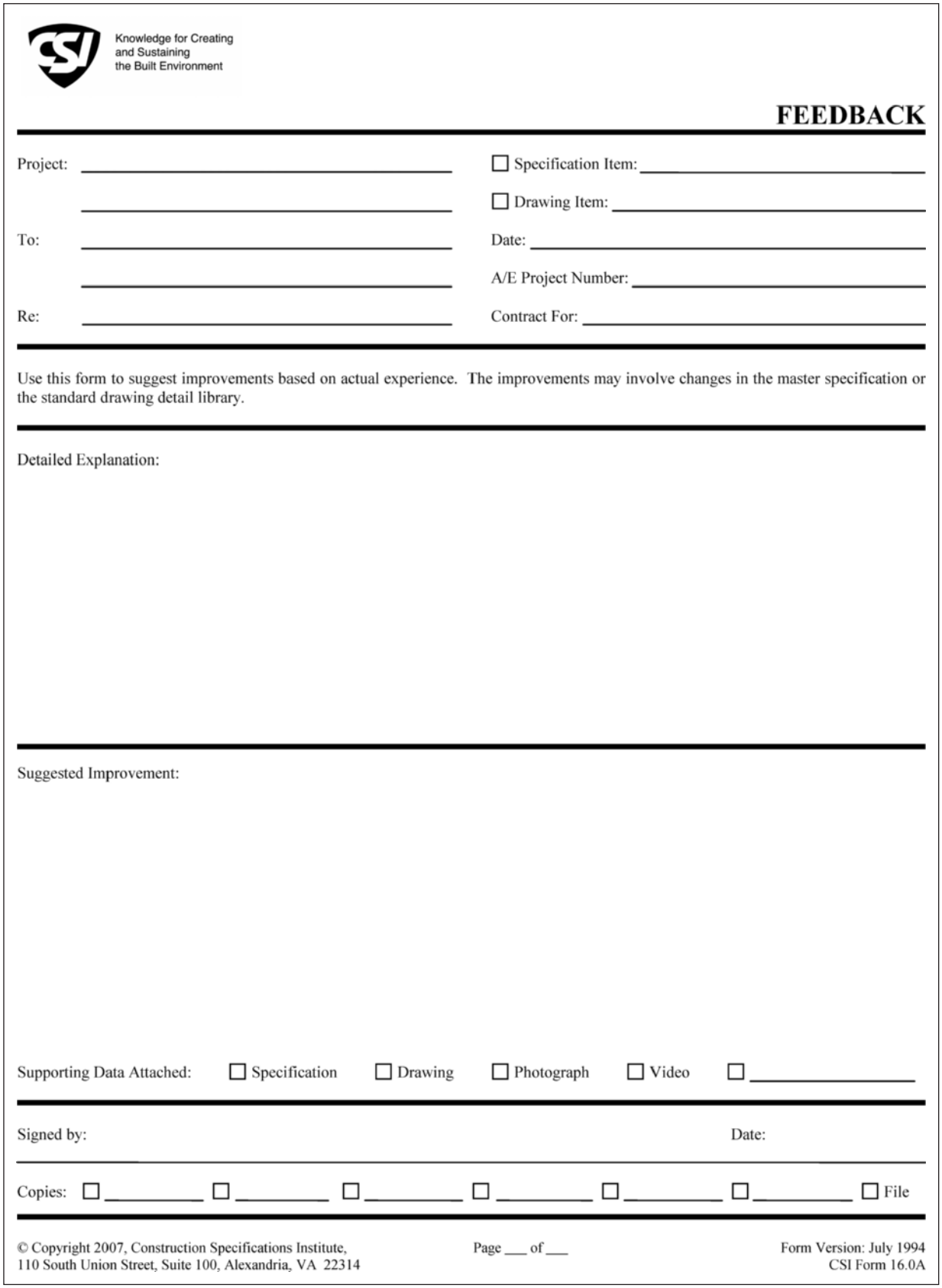
Figure 12.7 (*Continued*)

standard for the facility. Where products and systems have failed or performed unsatisfactorily, the facility manager should advise the owner and may request that the A/E or contractor investigate the problem, prepare a written report, and make remedial recommendations. Depending on the circumstances and applicable warranties, this work may be considered to be included in the contract or an additional service. Product representatives may be asked to provide information on adjusting equipment and systems, their operation and maintenance, and warranties. Product representatives may also be requested to provide additional operation and maintenance training for the facility manager.

12.6 Project Feedback

It is common for the A/E and contractor to perform postoccupancy facility evaluations of completed projects. These evaluations may be performed in conjunction with the owner and the facility manager, or they may be performed to help the A/E or contractor in preparing for future projects. They also communicate to the owner that the A/E and contractor are genuinely concerned about the quality of the project. Lessons learned from a past project can prevent costly mistakes in future projects. These evaluations can also be used to address owner concerns, identify problems, and suggest solutions.

Evaluations commonly involve soliciting feedback from the project owner, users, and the facility staff concerning aesthetics, performance, and operational aspects of the project. Summaries of these evaluations are shared with responsible in-house staff and consultants. Refer to Figure 12.8 for a sample feedback form.



Knowledge for Creating
and Sustaining
the Built Environment

FEEDBACK

Project: _____ ☐ Specification Item: _____

_____ ☐ Drawing Item: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Use this form to suggest improvements based on actual experience. The improvements may involve changes in the master specification or the standard drawing detail library.

Detailed Explanation:

Suggested Improvement:

Supporting Data Attached: ☐ Specification ☐ Drawing ☐ Photograph ☐ Video ☐ _____

Signed by: Date:

Copies: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Page ___ of ___

Form Version: July 1994
CSI Form 16.0A

Figure 12.8 CSI Form 16.0A, Feedback

Chapter 13
Developing a Construction Contract Administration Guide

13.1 Benefits

Creating a construction contract administration (CCA) guide can be beneficial because it requires the architect/engineer (A/E) to think through the CCA process and establish policies and procedures to be used by a firm. A CCA guide is also a means to record the firm's past experiences and to keep from repeating mistakes. It is easier to train new personnel in CCA procedures when office policies are documented in a written guide. A CCA guide also provides a checklist of responsibilities and activities for use on projects where CCA is provided.

13.2 Preparation

The person who prepares a CCA guide should be experienced and knowledgeable in CCA. Likely candidates for the task are experienced specifiers, project managers, and project A/Es. Regardless of who has the primary responsibility for preparation, the guide benefits from the review and contributions of other participants in the CCA process.

The CCA forms included in the appendix provide valuable assistance in preparing a CCA guide. The material should be tailored to the firm's characteristics, including personnel, organizational structure, and type and extent of projects typically administered. Drafts of the guide may be reviewed by staff, quality assurance (QA) personnel, insurance advisers, legal counsel, and other appropriate consultants.

13.3 Production

A CCA guide is a dynamic document. It should be revised and expanded based on the firm's experiences, and revisions should be made so the firm benefits from the firm's experience.

The guide should be produced and maintained using software that will facilitate revisions and additions. A table of contents and an index or a key term matrix with links should be included to allow quick access to information included in the guide. Each of the components of the guide should be dated in order to keep track of revisions and to facilitate identification of items that have not been recently updated and may require revision. It is beneficial to post the CCA guide on the firm's web site or intranet server, and it may also be beneficial to maintain a hard copy in a loose-leaf binder as part of the firm's reference library.

13.4 Implementation

The guide should be made available to everyone in the firm who is involved in CCA. All distributed copies, hard or electronic, should be kept current with revisions. An education program should be provided for the firm's personnel that uses the guide as a part of the curriculum.

The guide's benefits are proportional to its actual use; an unused guide is of little benefit. The creation and distribution of the office guide may establish a standard of practice for the firm as viewed by a court of law. Therefore, the firm may increase its legal exposure if it does not follow the recommendations of its own CCA guide.

Many sources are available for observation and inspection checklists for various types of construction. These lists should be used with caution because they may or may not apply to a particular project. In addition to including materials and methods not included in the particular project, they may also include different standards and workmanship for the same materials and methods of construction. The observation or inspection checklist for each project should be obtained from the contract documents and tailored for the project, rather than an unmodified general source being used.

Figure 13.1 is a suggested table of contents that can be used as a checklist of subjects to be addressed.

Construction Contract Administration Guide

Table of Content

A. Introduction
- 1. What Is Construction Contract Administration?
- 2. Relationships
  - a. Owner
    - (1) Insurance Advisor
    - (2) Geotechnical Engineer
    - (3) Hazardous Material Abatement Consultant
    - (4) Other Consultants
    - (5) Separate Contractors
    - (6) Other
  - b. Contractor
    - (1) Subcontractors
    - (2) Suppliers
  - c. Architect/Engineer and Consultants
  - d. Testing Agency/Laboratory
  - e. Authorities Having Jurisdiction
    - (1) Inspectors
  - f. Others
  - g. Team Approach
- 3. Communication
  - a. Owner-Contractor
  - b. A/E and Consultants
  - c. Subcontractors and Suppliers
  - d. Separate Contractors

B. Contract Award
- 1. Contract Execution
  - a. Agreement
  - b. Bonds
  - c. Certificates
  - d. Allowances
  - e. Alternates
  - f. Unit Prices
- 2. Notice to Proceed

C. Preparation
- 1. Orientation to Project
  - a. Review Project Contract Documents
- 2. Standard Documents
  - a. AIA Documents
  - b. EJCDC Documents

Figure 13.1 Office Construction Contract Administration Guide—Suggested Table of Content

Construction Contract Administration Guide

Table of Content (cont.)

3. Filing System
   a. Project Contracts
   b. Cost Information
   c. Personnel Information
   d. Chronological Information
   e. Correspondence
   f. Memoranda
   g. Communication Reports
   h. Meeting Reports
   i. Field Observation Reports
   j. Test and Inspection Reports
   k. Submittals
   l. Interpretations and Modifications
   m. Construction Closeout
   n. Postconstruction
   o. Feedback
4. Forms (Appendix)
5. Project Contract Documents Review
   a. Owner-Architect/Engineer Agreement
   b. Drawings
   c. Project Manual
      (1) Conditions of the Contract – General and Supplementary
      (2) Division 01—General Requirements
      (3) Divisions 02—49 Product Specifications
   d. Addenda

D. Meetings

1. Progress Meetings
   a. Attendance
   b. Responsibilities
   c. Agenda
   d. Minutes
2. Preconstruction Meeting
   a. Procedural Meeting
      (1) Attendance
      (2) Responsibilities
      (3) Agenda
      (4) Minutes
   b. Site Mobilization Meeting
      (1) Attendance
      (2) Responsibilities
      (3) Agenda
      (4) Minutes
3. Preinstallation Meetings
   a. Attendance
   b. Responsibilities
   c. Agenda
   d. Minutes
   e. Timing
4. Closeout Meeting
   a. Attendance
   b. Responsibilities
   c. Agenda
   d. Minutes
   e. Timing

E. Submittals

1. Submittal Logs and Files
2. Submittal Review
   a. Submittal Stamp
   b. Submittals Received That Are Not Required by Contract Documents
   c. Deviations from Contract Documents
3. Submittal Processing
   a. Timeliness
   b. Reproducibles
   c. Multiple Copies
4. Preconstruction Submittals
   a. Cerificates of Insurance
   b. Surety Bonds
   c. Subcontractor List
   d. Product List
   e. Construction Progress Schedule
   f. Submittal Schedule
   g. Schedule of Values
5. Construction Submittals
   a. Shop Drawings
   b. Coordination Drawings
   c. Product Data
   d. Samples
   e. Quality Assurance and Quality Control Submittals
      (1) Design Data
      (2) Test Reports
      (3) Certificates
      (4) Manufacturer's Instructins
      (5) Manufacturer's Field Reports
   f. Informational Submittals
   g. Construction Photographs
6. Closeout Submittals
   a. Notices of Substantial and Final Completion
   b. Final Application for Payment
   c. Project Record Documents
   d. Operation and Maintenance Data
   e. Spare Parts and Maintenance Materials
   f. Certificates of Payment
   g. Release of Liens and Waiver of Debts and Claims
   h. Consent of Surety to Final Payment
   i. Special Warranties
   j. Contractor's Certification of Substantial and Final Completion
   k. Keying

F. Construction Observation and Inspection

1. Responsibilities
   a. Architect/Engineer
   b. Owner
   c. Contractor
2. Site Visits
   a. Proper Conduct
   b. Project Site Safety
   c. Accidents
   d. Tolerances and Clearances
   e. Defective and Nonconforming Work
3. Record Keeping and Reporting
   a. Field Observation Reports
   b. Project Representative's Documentation
   c. Additional Documentation
   d. Photograph/Video Records
4. Periodic Site Observations
   a. Intervals
   b. Milestones
   c. Checklists (Appendix)
5. Inspections
   a. Substantial Completion
   b. Final Completion
   c. Checklists (Appendix)

G. Contract Document Interpretations and Modifications

1. Requests for Interpretations
2. Interpretation of Contract Documents
   a. Timeliness of Interpretations
   b. Claims Situations
3. Unknown Conditions
   a. Hazardous Materials
   b. Unforeseen Conditions
   c. Alternation Work
4. Contract Document Modifications and Changes to the Project
   a. Construction Change Process and Documentation
   b. Proposal Requests

Figure 13.1 (*Continued*)

Construction Contract Administration Guide

Table of Content (cont.)

Figure 13.1 (*Continued*)

Figure 13.2 is a suggested filing system for CCA. Figure 13.3 is a listing of CCA forms available from the American Institute of Architects (AIA), the Engineers Joint Contract Documents Committee (EJCDC), and the Construction Specifications Institute (CSI). A CSI form is included for each particular function, except in those cases where a similar AIA or EJCDC form already exists. The combination of this set of forms with the appropriate AIA or EJCDC results in a comprehensive set of CCA forms.

Construction Contract Administration Filing System

1.0 Project Contracts
- 1.1 Copy Owner-A/E Agreement
- 1.2 Copy of A/E-Consultant Agreement
- 1.3 Copy of Extra Services Agreements
- 1.4 Copy of Owner/Contractor Agreement
  - Notice of Award
  - Notice to Proceed
- 1.5 Procurement Information
  - Bid Form
  - Bid Tabulation Form
  - Alternates
  - Substitutions
  - Additions
  - Subcontractor List
- 1.6 Bonds
  - Bid Bond
  - Performance Bond
  - Payment Bond
- 1.7 Certificates of Insurance

2.0 Cost Information
- 2.1 Schedule of Values
- 2.2 Payment Requests and Log
- 2.3 Change Order Log with Listing of Costs
- 2.4 Allowance Disbursements
- 2.5 Stored Material
- 2.6 Consent of Surety
  - Reduction or Release of Retainage
  - Final Payment
- 2.7 Contractor's Affidavits
  - Release of Liens
  - Payment of Debts and Claims

3.0 Personnel Information
- 3.1 Project Directory
- 3.2 Contractor List
- 3.3 Subcontractor List
- 3.4 Product/Manufacturer/Supplier List

4.0 Chronological Information
- 4.1 Procurement Dates
- 4.2 Notice of Award Date
- 4.3 Construction Start/Notice to Proceed Date
- 4.4 Progress Schedule
- 4.5 Submittal Schedule
- 4.6 Original Substantial Completion Certificate
- 4.7 Copy of Final Payment
- 4.8 Project Data

Correspondence and Written Documentation

5.0 Correspondence
- 5.1 A/E: To and From
- 5.2 Consultants: To and From
- 5.3 Owner: To and From
- 5.4 Contractor: To and From
- 5.5 Postcontract Information

6.0 Memoranda
- 6.1 A/E Memos
- 6.2 Interdiscipline Design Team Memos
- 6.3 Other

7.0 Communication Reports
- 7.1 A/E Telephone Reports with Log
- 7.2 Interdiscipline Design Team Telephone Reports with Log
- 7.3 Owner Telephone Reports with Log
- 7.4 Contractor Telephone Reports with Log
- 7.5 Other with Log

8.0 Meeting Reports
- 8.1 Preconstruction
- 8.2 Construction
- 8.3 Postconstruction

9.0 Field Observation Reports
- 9.1 A/E Periodic Field Observation Reports
- 9.2 Consultant Field Observation Reports
- 9.3 Site Representative Daily Field Observation Reports
- 9.4 Site Representative Weekly Reports
- 9.5 Site Representative Monthly Reports
- 9.6 Project A/E Photos
- 9.7 Project A/E Videos
- 9.8 Nonconforming Work Reports

10.0 Test and Inspection Reports
- 10.1 Civil
- 10.2 Architectural
- 10.3 Structural
  - Earthwork
  - Concrete
  - Steel
- 10.4 Mechanical
- 10.5 Electrical
- 10.6 Other

11.0 Project Specific Information

Submittals

12.0 Shop Drawings, Product Data, Samples, Certificates, Etc.
(File by Division or Specification Section Number.)
- 12.1 Submittals Transmittal and Log
- 12.2 Submittal Checklist
- 12.3 Progress Photos

Construction Contract Procedures

13.0 Contract Document Interpretations and Modifications
- 13.1 Substitution Requests and Log
- 13.2 Requests for Interpretation and Log
- 13.3 Clarification Notice and Log
- 13.4 Supplemental Instructions/Field Orders and Log
- 13.5 Proposal Requests and Log
- 13.6 Change Order Requests and Log
- 13.7 Change Directives
- 13.8 Change Orders and Log

Figure 13.2 Construction Contract Administration Filing System

Construction Contract Administration Filing System (cont.)

14.0 Construction Closeout
- 14.1 Contract Completion (Punch) Lists
- 14.2 Substantial Completion Certificate
- 14.3 Release of Liens
- 14.4 Project Closeout Information
  - Operation Data
  - Maintenance Data
  - Record Documents
  - Warranties
- 14.5 Copy of Final Payment Certificate

15.0 Project Specific Information

Feedback

16.0 Feedback Forms
- 16.1 Civil
- 16.2 Architectural
- 16.3 Structural
- 16.4 Mechanical
- 16.5 Electrical

Postconstruction Services

20.0 Postconstruction Site Visits

Figure 13.2 (*Continued*)

Construction Contract Administration Forms

AIA Documents
- G701 *Change Order.*
- G701/CMa *Change Order – Construction Manager-Adviser Edition.*
- G702 *Application and Certificate for Payment.*
- G703 *Continuation Sheet for G702.*
- G704 *Certification of Substantial Completion.*
- G704/CMa *Certificate of Substantial Completion – Construction Manager-Adviser Edition.*
- G705 *List of Subcontractors.*
- G706 *Contractor's Affidavit of Payment of Debts and Claims.*
- G706A *Contractor's Affidavit of Release of Liens.*
- G707 *Consent of Surety to Final Payment.*
- G707A *Consent of Surety to Reduction in or Partial Release of Retainage.*
- G709 *Work Changes Proposal Request.*
- G710 *Architect's Supplemental Instructions.*
- G711 *Architect's Field Report.*
- G712 *Shop Drawings and Sample Record.*
- G714 *Construction Change Directive.*
- G714/CMa *Construction Change Directive Construction Manager-Adviser Edition.*
- G715 *Supplemental Attachment for ACORD Certification of Insurance 25-S.*
- G732 *Application and Certificate for Payment, Construction Manager as Adviser Edition.*
- G736 *Project Application and Project Certificate for Payment, Construction Manager as Advisor Edition.*
- G737 *Summary of Contractor's Applications for Payment, Construction Manager as Advisor Edition.*
- G807 *Project Team Directory.*
- G808 *Project Data.*
- G810 *Transmittal Letter.*

EJCDC Documents
- C-510 *Notice of Award.*
- C-550 *Notice to Proceed.*
- C-610 *Construction Performance Bond.*
- C-615A *Construction Payment Bond (interim performance bond).*
- C-620 *Contractor's Application for Payment.*
- C-625 *Certificate of Substantial Completion.*
- C-940 *Work Change Directive.*
- C-941 *Change Order.*

CSI Forms
- 1.4A *Notice to Proceed.*
- 1.5A *Subcontractors and Major Material Suppliers List.*
- 1.5B *Subcontractor/Supplier Bid Form.*
- 1.5C *Substitution Request – During the Bidding/Negotiating Stage.*
- 2.4A *Allowance Authorization.*
- 2.5A *Stored Material Summary.*
- 6.0A *Memorandum.*
- 7.0A *Communication Record.*
- 8.0A *Meeting Minutes.*
- 9.1A *Periodic Field Observation Report.*
- 9.3A *Daily Field Observation Report.*
- 9.4A *Weekly/Monthly Progress Report.*

Figure 13.3 Roster of Construction Contract Administration Forms

Construction Contract Administration Forms (cont.)

- 9.8A *Nonconforming Work Notice.*
- 12.1A *Submittal Transmittal.*
- 12.2A *Submittal Checklist.*
- 13.1A *Substitution Request—After the Bidding/Negotiating Phase (2 pages).*
- 13.2A *Request for Interpretation.*
- 13.3A *Clarification Notice.*
- 13.4A *Field Order.*
- 13.6A *Change Order Request (Proposal).*
- 13.6C *Proposal Worksheet Detail.*
- 13.6D *Proposal Worksheet Summary.*
- 14.1A *Punch List.*
- 16.0A *Feedback.*

CSI Log Forms

- 2.2B *Payment Request Log.*
- 2.4B *Allowance Disbursement Log.*
- 7.0B *Communication Log.*
- 9.6B *Project Photo Log.*
- 9.7B *Project Video Log.*
- 12.1B *Submittal Log (A/E).*
- 12.1C *Submittal Log (Contractor).*
- 13.0B *Supplemental Drawing Log.*
- 13.1B *Substitution Request Log.*
- 13.2B *Request for Interpretation Log.*
- 13.3B *Clarification Notice Log.*
- 13.4B *Minor Change/Field Order Log.*
- 13.5B *Request for Proposal Log.*
- 13.6B *Change Order Request Log.*
- 13.8B *Change Order Log.*

Figure 13.3 (*Continued*)

Figure 13.4 is a list of letters, certificates, and forms that are often used during the CCA process. These forms are available as samples on the Construction Specification Institutes' web site at www.csinet.org.

List of Additional CCA Forms and Form Letters:

1. Bid Tabulation Form
2. Recommendation to Award Bid letter
3. Agreement for Contractor Signature Transmittal Letter
4. Meeting Sign-in Form
5. Guide Preconstruction Conference Form
6. Project Directory Form
7. Application for Payment Transmittal Letter
8. Application for Payment Review Form
9. Certificate of Product Compliance
10. Certificate of Substrate Testing
11. Punchlist Cover Letter
12. Contractor's Final Statement of Completion and Accuracy
13. Contractor's General Warranty
14. Certification of Non-Use of Asbestos Containing Materials
15. Guide for Closeout Documentation Checklist
16. Architect's Declaration

Figure 13.4
Listing of Sample Construction Contract Administration Form Letters

Chapter 14
Summary

Construction is the execution of the work as required by the contract documents. Construction is a team effort that includes the contractor, subcontractors, testing agencies, architect/engineer (A/E), consultants, owner, authorities having jurisdiction (AHJs), product representatives, and others, all working toward the common goal of delivering the completed facility ready for its intended use. The participants in the construction stage can generally be divided into four teams: the construction team, the design team, the owner team, and the supplier team. All four teams participate in the construction stage. Construction activities can be divided into two broad categories. *Construction contract administration* (CCA) includes activities related to administering the contract for construction, typically performed by the A/E. *Contractor project management* includes activities related to managing the construction process, typically performed by the contractor. CCA is a combination of contractual procedures and the implementation of a team approach for the participants in the project. The successful completion of a project is dependent on each participant's being familiar with the documents used in the construction, understanding, and meeting of the participants' contractual obligations and responsibilities, and understanding the project delivery method to be utilized. It is also dependent on the participants establishing and maintaining effective communication and mutual cooperation throughout the construction stage of the facility life cycle.

Preconstruction activities typically begin when the contractor has received a signed agreement and a notice to proceed, and end with completion of mobilization at the site. The contractor's working relationships with subcontractors and suppliers are dependent on negotiations during the preconstruction phase and the execution of subcontractor agreements and purchase orders. Early preconstruction activities include estimating pass-off, awarding subcontracts, buyout, processing purchase orders, and preparing preconstruction submittals. These submittals include bonds, certificates of insurance, subcontractor and supplier lists, and construction progress schedules. The timely completion of the project is dependent on the effectiveness and completeness of the construction progress schedules. These schedules are prepared in close coordination with subcontractors and suppliers, and include timelines for site mobilization, submittal preparation and review, product manufacture and delivery, demolition, construction, and project closeout. The contractor's first activity on the site is typically mobilization. Mobilization entails setting up the temporary facilities that the contractor will need to perform the work required by the project. Timely completion of preconstruction activities allows the contractor to begin constructing the project with means and methods planned in advance and project procedures in place.

Meetings encourage communication between project participants and a team approach where all are working toward common project goals. Project meetings typically include preconstruction meetings, progress meetings, contractor/subcontractor meetings, preinstallation meetings, and closeout meetings. Although some agreements may place responsibility on the A/E to conduct progress meetings and generate the meeting minutes, meetings are primarily the contractor's responsibility and are necessary for proper

project management, control, and coordination of the work. Effective communication is essential, and meetings aid communication. Effective meetings provide a proactive means of bringing project participants together to facilitate the communications process. Meetings are by nature a dialogue and promote a mutual understanding and cooperation among the participants. Meetings must have a purpose, an agenda, and appropriate participants, and be promptly documented in order to be successful. The meetings required for a project are determined by the project extent and project delivery method.

Submittals are necessary communication tools and are important to the coordination and timely execution of projects. Submittals are required during the preconstruction, construction, and construction closeout phases of a project. Construction submittals typically include shop drawings, product data, samples, quality assurance (QA) and quality control (QC) procedures, coordination drawings, informational submittals, and construction photographs. Most submittals are prepared by the contractor, subcontractors, and suppliers for review by the A/E, the A/E's consultants, and the owner. Accurately and expediently prepared submittals complying with the contract requirements need to follow the administrative procedures established within the contract requirements.

Site visits, observations, and inspections to evaluate compliance of the work with the contract documents are among the most important responsibilities of the A/E and the contractor during construction. The need for site visits, observations, and inspections is dependent on the project extent and project delivery method. The owner may participate directly in site visits and observations or may engage a clerk of the works. On many projects, the owner engages independent testing laboratories and inspection agencies to provide testing and inspection required by the contract documents and AHJ, which eliminates any appearance of conflict of interest in having the contractor paying the inspection agency that is inspecting the contractor's work. The A/E may be required to perform periodic site visits to observe the progress of the work, but performs only two inspections to confirm substantial and final completion. The contractor is responsible for ongoing observation and inspection of the project to ensure compliance with the contract documents. Diligently conducted observations and inspections help to give the owner assurance that the project is being constructed according to the contract documents. Timely observations along with proper communication and cooperation allow the project participants to execute their contractual responsibilities.

The responsibilities and performance of each participant affect overall project quality. The success of a project depends on each participant's being committed to a team approach for meeting the requirements. A team approach is a cooperative effort in which each participant is involved in accomplishing the overall goals. The team approach involves procedures that make the achievement of quality a manageable task. The owner must have realistic goals and a reasonable program, budget, and construction schedule. The owner's selection of an A/E and the extent of basic services are essential to the realization of these goals. The A/E's ability to develop the owner's requirements into a documented design is critical to defining the quality. The contractor's performance and the completed project will be evaluated based on conformance to the contract documents.

Quality is defined by the requirements established in the contract documents. QA procedures guard against defects before and during the work. QC procedures evaluate completed work for compliance with requirements. The CCA and contractor project management processes enforce these procedures to ensure adherence to QA and QC requirements, and to ensure the resultant quality in the project.

Contract document interpretations and modifications are an important part of the A/E's responsibilities during CCA. The contract documents have provisions to allow the owner and the contractor to ask for interpretations or to bring suspected errors,

inconsistencies, omissions, and apparent discrepancies to the A/E's attention. The A/E is typically the primary authority for interpreting the contract documents. Decisions must be timely and impartial and consistent with and reasonably inferable from the contract documents. Biased or inadequate interpretations must be avoided because they usually have a negative impact on the project. The project is enhanced when the owner, the contractor, and the A/E work together as a team and treat one another in a fair and equitable manner.

The contractor has primary responsibility for executing the work. The contractor is responsible for determining the means and methods to be used for constructing the project, including compliance with the contract document requirements, and for the construction activities at the site not otherwise performed by the owner. Contractor project management responsibilities include safety, project documentation, field engineering, construction supervision, coordination, sequencing, and scheduling. The contractor's execution responsibilities at the site include examination, verification, preparation, erection, installation, application, cleaning, waste management, testing and inspection, protecting installed work, and correcting deficient work.

Timely communication and effective documentation contribute to expeditious and efficient settlement of claims. Ideally, the decision of the A/E will be mutually acceptable to the owner and contractor. However, when either party feels compelled to take exception to the A/E's decision, negotiation between the parties to find a compromise settlement should be undertaken. Good-faith negotiation should be each party's commitment to avoid having the claim become a dispute decided by others.

There will be times when a claim becomes a dispute. When this occurs, a variety of effective dispute resolution methods may be called upon, whether they have been specified or not. The project team should be committed to exercising these methods at the earliest possible time to avoid the disruptive effect that unresolved claims and disputes can have on the project.

Procedures for the processing of payments by the owner to the contractor are delineated in the contract, conditions of the contract, and Division 01 sections. An orderly and timely approach to payment administration following specified procedures results in the equitable disbursement of progress payments. Payment for work completed is an essential element of the construction contract. Overpayment is not advantageous to the owner, and underpayment impedes the contractor's ability to perform the work. A coordinated and conscious effort by all participants to accomplish equitable compensation for completed work contributes to the success of a project.

One measure of a project's success is how smoothly and quickly it is completed. An orderly transfer of the completed project from the contractor to the owner within the contract time limits will be facilitated by a comprehensive and thorough closeout process being clearly established by the contract documents. Project closeout can also be facilitated with a closeout meeting conducted by the A/E.

The contractor is responsible for the start-up, testing, adjusting, and demonstrating of equipment and systems. The commissioning authority should be integrally involved in observation and record keeping during these contractor activities. These activities include preparation of start-up reports, test reports, commissioning logs, and operation and maintenance (O&M) manuals. These documents are prepared for use by the owner and facility manager in operating the facility.

Two of the contractor's primary responsibilities during project closeout are completion of the punch list and submittal of required closeout documents and materials. The time and cost of punch list completion will be minimized if the contractor corrects deficiencies noted by the A/E during the course of construction and prepares a complete

and detailed initial punch list. The A/E can facilitate punch list completion by bringing deficiencies to the contractor's attention as soon as they are noted and by using the same standards in punch list review that were used during the construction process. Submittal of closeout documents and materials may be expedited by assembling these documents and materials during the course of construction rather than waiting until project closeout.

Substantial completion occurs when the project, or a portion of the project, is sufficiently complete according to the contract documents to allow the owner to use it for its intended purpose. If the AHJs have not completed their inspections, then the owner may not occupy or use the project. Therefore, some form of evidence of final inspection by the AHJ is required. Evidence is often in the form of a Certificate of Occupancy issued by the AHJ.

Prior to final completion, the A/E prepares a final change order to address outstanding items that have not been included in previous change orders. These items often include final adjustments to the contract sum for incomplete modifications or corrections, unit price work, allowances, liquidated damages, and penalty/bonus clauses.

Final completion occurs when the contractor has completed the contract requirements, the A/E has inspected to determine completion, the owner has made final payment to the contractor, and the contractor has accepted final payment.

The construction process depends on effective project management and administration, with good communication critical to the process. With project completion, the roles of the participants change. The involvement of the contractor and A/E is reduced, though they may be involved in postoccupancy evaluations and resolution of warranty issues. Product representatives may continue to be involved in providing technical expertise, products, and materials to the owner and facility manager. The owner and facility manager take the lead in operating, maintaining, and evaluating the facility. As the construction stage is completed, the facility management stage of a facility's life cycle begins.

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