Administering the Construction Project

Produced and Distributed by
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Tallahassee, FL

ADMINISTERING THE CONSTRUCTION PROJECT

I. PROJECT DELIVERY SYSTEMS

A. PROJECT TEAM

There are three types of project delivery systems that are commonly used in North America. They are:

1. Design-Bid-Build (most frequently used in U.S.)
2. Design Build
3. Construction Management

Under the conventional design-bid-build project delivery system, there are three principal participants which are:

- Owner
- Designer
- Builder

With the design-build delivery system, the principal participants are reduced to two – the owner and the design-builder. Under this scenario, the owner may hire independent consultants to assist him in establishing design criteria, cost, and schedules.

Construction Management or CM, while a recognized method of project delivery, can have many meanings. Under the third-party CM or CM agency contact, the CM firm contracts directly with the owner and acts as his agent. The construction manager has supervision over some of the functions of both the design firm and the contractor. While the term CM may have a slightly different meaning with the various professional and technical organizations, (ASCE, AIA, AGC, and ACEC) they all agree in principle on the concept that the construction manager should be a firm that has no connection with either the architect and/or engineer that designs the project or the general contracting firm that constructs it. While the term "Construction Management" is in common usage in the industry, a more appropriate term would be a project management system, since there is involvement from project conception to closeout.

Both the design-build and CM delivery systems are ideal for projects that require either "fast tracking" or "long-lead procurement."

B. PARTNERING

Partnering, while not a project delivery method, is a concept that has emerged in the design and construction industry in the past several years. Partnering is recognition that every contract includes an implied covenant of good faith. The partnering process is

designed to establish strong working relationships among the contracting parties through a mutually developed strategy of commitment and communication.

Some elements of partnering include:

- A commitment by all parties to the concept
- The development of mutual goals and objectives
- The development of a methodology for periodic evaluation of the agreed upon goals
- A timely response by team members to project issues which could lead to disputes
- The development of trust between the parties and avoidance of adversarial relationships

The partnering process involves a major commitment by the senior management of all of the contracting parties since it is management which delegates the responsibility for decision making and problem solving to the on-site project personnel. It is management's responsibility to educate their organization regarding the concept and benefits of partnering and to change attitudes from confrontational to co-operational.

When the owner intends to encourage a partnering relationship, it will usually be specified in the Special Conditions of the contract documents. The partnering relationship must be bilateral in makeup and participation must be voluntary. Costs associated with partnering should be shared equally by the parties.

A major feature of partnering is the timely resolution of disputes in a professional and nonadversarial manner. This is usually accomplished by means of alternative dispute resolution procedures which are nonbinding, but highly successful in resolving a large majority of contract disputes. The Florida Department of Transportation has used alternative dispute resolution extensively on transportation projects in Florida and has an enviable record of resolving conflicts without litigation.

C. CONSTRUCTION ADMINISTRATION

Construction Administration means the management of all project related functions between the parties to a contract. This includes all construction and construction related activities from project commencement to final closeout. Typically, construction project administration is handled by a Project Manager, who may be retained by either the owner or the Architect-Engineer, and a Resident Project Representative, who may supervise several inspectors, technicians, etc. depending on the magnitude of the project. While a Project Manager may be in responsible charge of several projects, the Resident Project Representative is assigned to a single construction project for its duration. It is vital that the Resident Project Representative, designated by the Owner or Architect-Engineer be delegated the authority to be their sole spokesperson for the project. This procedure can eliminate much conflict, reduce exposure to claims, and result in greater efficiency for all parties to the contract. While the principal(s) is (are) the only person(s) with the authority to make the final determination on project

issues, it is important that their decisions and/or orders be transmitted through the Resident Project Representative. Similarly, the Contractor should designate a single management person located at the project site to be his sole agent and speak officially for him. On many projects, this person would be the Contractor's on-site superintendent.

D. KEY PERSONNEL

Key personnel who are inherent to any construction project and their duties are briefly described hereinafter.

Project Manager. The project manager is the person responsible for the management of all phases of the project relating to his or her organization. Whether they are employed by the owner, the designer, or the contractor, they represent their principal on all matters pertaining to the project and perform their duties as directed by their principal.

Professional Construction Manager. This term is used in connection with the Construction Management (CM) project delivery system. The services performed by a PCM can cover a broad range of activities and usually involve both the design and construction phases of a project. Many times, in a CM project, the PCM's responsibilities are on a par with those of the architect-engineer and/or builder.

Resident Project Representative. This title refers to on-site personnel who have been delegated the authority and responsibility of administering certain elements of the field operations of a construction project. These include engineers, architects, inspectors, managers, etc. Depending on the complexity of a project, some of the resident project representatives may be licensed.

Field Engineer, Inspector, Supervisor. These are staff level personnel who usually work under the direct supervision of resident project representatives. They are on-site representatives of the owner, design firm, or builder and have the responsibility for observing the work being performed and reporting variations to their supervisor and/or principal. Personnel in this category have a significant role in the resultant outcome from a construction project.

E. SUMMARY

It is evident from the foregoing discussion that construction administration activities will vary depending upon the type of project delivery system that the owner selects. Once that has been determined, it is incumbent upon the owner (or architect-engineer) to prepare a detailed scope of work for the construction project administration activities so that the resident project representative has a clear understanding of his or her duties, responsibilities and authority.

II. DUTIES, RESPONSIBILITIES AND AUTHORITY

A. LINES OF AUTHORITY

Basically, there are three types of authority. They are:

- Contractual
- Delegated
- Legal

Contractual authority is the authority given the parties to the contract under the terms of the contractual agreement.

Delegated authority means the authority that is transferred by a designated agent to his or her designated representatives(s) such as a resident inspector.

Legal authority is the authority granted to parties pursuant to laws, statutes, codes and ordinances.

When a designated agent allows another party to operate with the appearance of authority, this is known as an implied authority. This relationship can have major contractual implications that an owner and/or architect-engineer should avoid.

In summary, all construction contracts should:

- Establish actual authority with a specific individual
- Disclaim any apparent authority
- Delineate the scope of any limited authority
- Delineate the process whereby authority may be delegated

B. RESIDENT PROJECT REPRESENTATIVE

On many projects, the Resident Project Representative may be referred to as the Resident Inspector or, simply, Inspector. Whatever the title, the person acting as the agent of the Owner and or Architect-Engineer is that person given specific authority in the contract documents.

The American Society of Civil Engineers (ASCE) has published recommended standards for the conduct of the Resident Project Representative on responsibility elements. Briefly, they include the following:

1. A thorough familiarization of the project plans and specifications.

2. Notify the Contractor of any non-conformance with the contract requirements. Notify his or her principal of continuing non-conformance.
3. Perform all duties in a manner that will promote the progress of the work.
4. Avoid any activity that could be construed to be a responsibility of the contractor.
5. Cover any operation to which assigned to its conclusion or until someone else is designated to the operation.
6. Thoroughly document all activities in the daily report and diary.
7. Handle on-site testing in a professional manner and immediately report test failures to the Contractor.
8. Make inspections and conduct tests in a prompt and timely manner.
9. Report unrealistic tolerance requirements to his or her principal.
10. Seek guidance from his or her principal regarding situations where interpretation of the specifications may cause problems.
11. Anticipate problems in advance of their occurrence.
12. Recognize unacceptable work in its early stages and report it to the Contractor.
13. Report problems which are not able to be handled/resolved to his/her principal.
14. Thoroughly investigate situations and/or possible consequences before making decisions.
15. Immediately follow-up on corrected work.
16. Stand behind decisions made on issues concerning the Contractor's work.
17. Be capable of differentiating between essential and non-essential work.
18. Be safety minded. Report unsafe conditions to the Contractor.
19. Be alert and observant. Report situations which may delay the project to his or her principal.

Similarly, ASCE has published recommended standards for the conduct of the Resident Project Representatives on specific authority elements.

1. The Resident Project Representative (RPR) should have the authority to approve materials and workmanship that meet the contract requirements.
2. The RPR should not have the authority to order the contractor to stop operations.
3. The RPR should not have the authority to approve deviations from the contract requirements.
4. The RPR should not require the Contractor to furnish more than that required by the contract documents.
5. The RPR should not attempt to direct the Contractor's work.
6. Instructions should be given to the contractor's superintendent or foreman, not to workers or sub contractors.

Many professional and/or technical societies have published documents that define the Resident Project Representative's duties, responsibilities and limitations of authority. As with any legal document, they need to be modified to fit the requirements for a specific project and reviewed by an attorney.

C. FIELD OFFICE

The requirements for a field office for the Resident Project Representative and his or her staff are usually established in the contract documents. They will describe the type and size of office to be provided by the contractor as well as the furnishings, equipment and services to be included.

Agencies and/or companies that are involved in frequent construction contracts often own their own trailer-type offices and will have one moved to the construction site prior to the commencement of work. Thus, the contractor will not have to include in his bid an allowance for a field office.

Most construction contractors use the trailer-type field office that they either own or lease. If not otherwise prohibited by the specifications, the field office, many times, will be jointly used by the Contractor and the Resident Project Representative.

1. **Equipment.** Equipment for most field offices will include the usual types of office furnishings, copy machines, communications equipment, and support services such as water, power, HVAC, and janitorial. On some projects, the Contractor may be required to furnish a PC computer and printer. The Resident Project Representative is responsible for furnishing all office supplies and equipment such as report forms, stationary, notebooks, writing implements, film, etc. Normally these items would be issued by the RPR's home office.

2. **Staffing.** Staffing a field office is the responsibility of the design firm. The size of the staff will vary according to the magnitude of the project. The Resident Project Representative will usually have the responsibility of supervising the activities of the staff assigned. On smaller projects a single Resident Project Representative might be adequate to protect the owner's interests while on large projects, the staff may consist of the Resident Project Representative, a field clerk to handle administrative tasks, and one or more field inspectors depending on the expertise needed for the project.

3. **Field Communication.** The procedure for handling and transmitting job-related information from one party to another is termed field communication. It is preferable to establish the Resident Project Representative as the only direct link between the contractor and the designer. This provides a positive means of tracking <u>all</u> documents that are transmitted between the parties.

D. ADMINISTRATIVE RESPONSIBILITIES

Once a field office has been established and prior to the commencement of construction, the Resident Project Representative needs to be cognizant of certain basic administrative responsibilities which must be assumed. These include:

1. **Contract Administration.** The RPR should exercise authority on behalf of his or her principal to insure that the contractor's means, methods, techniques, sequences or procedures of construction will result in a project substantially in accordance with the requirements of the contract documents.

2. **Attend All Project Meetings.**

3. **Tabulate Project Milestones.** Compilation of a list in chronological order that shows the date that every milestone event on the project is to take place.

4. **Develop Testing and Inspection Plan.** Develop an outline of all inspections that must be made, a checklist of parameters, and a list of the types and frequencies of all tests that are required.

5. **Manage Inspection Personnel**

6. **Organize Filing System.** Develop a reliable construction field office record-keeping system.

E. OTHER ACTIVITIES

Prior to the start of construction, the Resident Project Representative may become involved in the evaluation of Contractor related elements, such as:

1. Planning and Scheduling of the Construction by the Contractor. The RPR should evaluate the schedule with three principal concerns in mind. These are a.) Start date, b.) Finish date and c.) Overall feasibility
2. Contractor's Plant & Equipment. Occasionally, the RPR may be required to inspect the contractor's equipment as to its serviceability and necessary safety devices.
3. Construction Materials and Methods. Recommendations from this evaluation will be reported only to the RPR's principal who will be the final authority on what, if any, action to take.
4. Contractor's Cost Savings Proposals. Proposals received from the contractor regarding potential cost savings should be evaluated by the RPR and forwarded to his or her principal along with the RPR's recommendation.

5. Other job responsibilities include: a.) Reviewing and processing periodic payment requests, including measurement of quantities on unit-price contracts; b.) Posting as-constructed information for use in compiling record drawings; c.) Handling contractor-generated requests for information and/or clarification and; d.) Filing of notices and certificates, where applicable.

III. DOCUMENTATION

A. WHY DOCUMENTATION?

Early construction administration activities usually involved the assignment of one or more inspectors having many years of experience and knowledge in construction practices. No detailed records were kept and much of the communication with the contractor was verbal in nature. With the advent of modern construction technology, documentation of every construction project has become mandatory for the following reasons:

- To have a written record of the entire construction event.
- For use as evidence in claims and/or disputes.
- To comply with the requirements of project financing institutions.
- To conform with the requirements of most public agencies.

B. FILES AND RECORDS

Usually, the owner, architect-engineer, public agency or other principal party will have already established formats for the record keeping system. If not, it will be the Resident Project Representative's responsibility to develop a format. Record keeping for a construction project should start with the bidding phase and proceed through project close-out and follow-up. The filing system should enable all data to be retrieved easily and quickly. Recently, the use of computers for construction record keeping and contract administration activities has gained popularity. Most of the software programs that are currently available are oriented toward contractors and only a few address the needs of the owner or architect-engineer. While electronic record keeping has merit, there are certain disadvantages that should be recognized. These include the vagaries of computers (breakdown, loss of memory, etc.), the ease by which records may be altered, and the fact that certain key records (daily construction report and construction dairy) need to be "hard" copies.

1. Basic Record Retainage. On virtually any construction project there are certain basic records which need to be saved and maintained for future reference. These include:

- Bidding phase data including opening, evaluation and award
- Specifications, including substitutions
- Record drawings
- Progress Records (Daily and Monthly Construction Report)

- Field diaries
- Photo records
- Certificates and delivery tickets
- Safety records

2. Claims Protection Data. A primary group of files and records which need to be retained are those pertaining to claims. In this regard, it is imperative that documentation be made before a claim is filed. The documentation should include a record of all delays to consist of notices of suspension or resumption of the work, a memorandum of delay and a record of contract time extensions. Delays would usually result in contract change orders which would also be a part of the record. Cost Isolation Records, which break out costs attributable to extra work, should cover not only extra work but work that has to be delayed, disputed work and work required due to unforeseen conditions.

3. Other Records. There are numerous other project records which can be categorized as Administrative, Inspections and Testing.

a.) Administrative Records consist of telephonic logs, log of change orders, non-compliance reports, photographic records, punch lists, closeout records and lien releases.

b.) Inspection Records include fabricating and batch plant inspections, material delivery tickets, and videotape inspections.

c.) Testing records include laboratory test results, materials testing, manufacturer's certificates, pile driving records and other project test records.

C. DAILY CONSTRUCTION REPORTS

A principal construction progress record is the Daily Construction Report which is completed by the Resident Project Representative. Only one Daily Progress Report per day per project is completed and its purpose is to record the true work progress. A daily Construction Report is executed daily even if no work was performed at the site that day. On most projects, the Daily Construction Report is preprinted to show the project name and job number, owner's name, contractor's name and the name of the design firm's project manager.

The following additional information should be included on every report:

- Report number, date and weather
- Head-count of workers (both prime and sub-contractors) and visitors
- List of major equipment at the site, including usage (idle or in-use)
- Description of all work activities and progress
- Signature of RPR

If an electronic reporting system is used, it is mandatory to make the requisite number of hard copies for distribution and filing.

Sometimes monthly reports are required to supplement the daily reports and there are numerous formats to illustrate contract performance versus contract time elapsed.

D. CONSTRUCTION DIARY

Another principal construction reporting document is the construction dairy. A separate dairy is kept by each individual (inspector) assigned to the project. The purpose of the dairy is to record the privileged type of information that occurs on the job. The dairy is the property of the owner and is to be turned in to the Project Manager at the end of a job. It is part of the permanent job record.

The following rules are applicable to keeping a diary:

- Use only a hard cover stitched-binding field book – no loose-leaf notebook.
- Pages should be consecutively numbered in ink.
- No erasures should be made – incorrect information should be crossed out or voided and the correct information entered next to it or following it.
- No pages should be removed from the dairy.
- An entry should be made for every day and all entries should be in ink and signed.
- All entries must be made on the same day that they occur.

While the contents of a construction diary are, to some extent, at the discretion of the inspector, the diary must include the following information:

- All verbal communications (including telephone) between the parties. Include the topic of conversation.
- Record non-conforming work and/or material and action taken.
- Record to whom field orders are delivered and when.
- Note unforeseen conditions.
- Note all extra work to include the data mentioned in III. B.2.
- Record the content of substantive communications with the contractor.
- Record all field errors.

E. PHOTOGRAPHY

The use of photography to document the entire construction event has become routine. Construction photography includes progress photography, photography related to marketing and/or public relations, claims support, and documentation of safety hazards. Normally, the Resident Project Representative would provide the photography however, many times, for marketing and/or public relations purposes, a commercial photographer will be used. Photographic prints should be identified by date taken, identity of subject and number. The use of video cameras and digital cameras for recording construction events is becoming more frequent.

IV. DRAWINGS AND SPECIFICATIONS

The contract drawings or plans for a project normally show the arrangement, dimensions, geometry, construction details, materials and such other information required to delineate the designer's intentions concerning the project. The specifications are the part of the contract documents that define the qualitative requirements of the project. The specifications will normally take precedence over the plans unless it is stated in the specifications that the plans will govern, thus, the specifications set the controlling criteria.

A. SPECIFICATION NOMENCLATURE AND OGANIZATION

Most public agencies use the term "Specifications" to mean a detailed description of requirements, dimensions, materials, workmanship, procedures, etc. to be followed in constructing a project. The term "Contract Book" is used by some public agencies but, the meaning is similar. The Construction Specification's Institute (CSI) and all Architects use the term "Project Manual" which is based on the issuance of a single, all-inclusive project specifications book containing all of the contract provisions that apply to a project, although references to outside sources are permissible. A disadvantage of this concept is that it may not totally bind the contractor to what was intended by the designer. The term "Standard Specifications" and/or "Special Provisions" is preferred by the Federal Highway Administration (FHWA) and the various State Departments of Transportation (DOT). The concept is based upon the premise that a previously published book of Standard Specifications is the actual detailed specification for all applicable work on the project and that the Special Provisions are a supplemental document to provide for items that are changed from the provisions of the Standard Specifications.

Most specifications can be divided into three main parts which are:

- Part I – Bidding and Contractual Documents and Forms
- Part II – Conditions of the Contract
- Part III – Technical Specifications

Part I includes the Advertisement for Bids, Instructions to Bidders, Proposal (Bid) Forms, Contract Agreement and Bonds.

Part II consists of the General Conditions of Contract, Supplementary General Conditions, and, optionally, certain supplements (usually depending on project financing). The General Conditions specify the manner and procedures for administering and implementing the provisions of the construction contract. Standard sets of General Conditions have been developed by various technical and professional societies

associated with the construction industry. Part III, the Technical Specifications, follow the format selected by the designer. Specification format is discussed later in this chapter.

B. TYPES OF DRAWINGS

A construction contract will usually contain three types of drawings:

1. The contract drawings delineate the designer's intentions concerning the project that they have conceived. They show the arrangement, dimensions, geometry, construction details, materials and other information necessary for estimating and constructing the project. Often, the contract drawings are supplemented by standard or index drawings of the agency for which the design is being performed. These reflect details of certain types of construction that have been standardized by the agency. Usually, the designer can refer to these standards by the number which has been assigned by the jurisdictional agency.
2. Shop drawings are prepared by the contractor, material supplier or fabricator to depict, in greater detail, the design concepts shown on the contract drawings.
3. Record drawings are a marked set of prints of the contract drawings prepared by either the Contractor or the Resident Project Representative to record all variations between the actual as-constructed project and the original design. These drawings also reflect all change orders that were executed.

C. SPECIFICATIONS FORMAT

In earlier times, specifications were structured in whatever manner that suited the designer of the project. More recently, specifications have been uniformly formatted to bring some degree of standardization into the general arrangement and method of writing them.

1. **Construction Specifications Institute (CSI)**
   The Construction Specifications Institute has played an important role in standardizing specifications for the construction of buildings. The CSI 16-Division Format has been adopted by the Associated General Contractors (AGC), the American Institute of Architects (AIA), the National Society of Professional Engineers (NSPE) and other organizations in the United States and Canada in the form of a document entitled "Uniform System for Building Construction." Basically, the CSI format breaks all construction into 16 Divisions. The numbers of the divisions never change and, where a project does not use a particular division, it is omitted. Each division is further divided into sections which cover all of the products, workmanship, methods, etc., related to that division. The sections are adapted to the specific needs of each individual project. CSI also

adopted the three-part section format in which each section is divided into three parts, each containing a single type of information. The parts are:

- General – Description of Work
- Products – Technical specifications for all materials, equipment, etc.
- Execution - Qualitative requirements relating to workmanship, methods, etc.

2. **State Highway Departments**

While the CSI specification format is adequate for building construction, it does not lend itself to highway or other types of heavy construction projects. Most state highway departments and the FHWA have adopted a uniform specification format based on the American Association of State Highway and Transportation Officials (AASHTO) model. The model contains ten (10) main divisions which cover all potential types of highway and bridge construction which may be encountered along with all possible acceptable alternatives. The model, as used by virtually all state, federal and even local agencies, consists of a published, bound book of standard specifications that covers in detail all general contract conditions as well as the technical specifications for all types of highway and/or bridge projects. An additional document called the "Special Provisions," "Supplemental Specifications," or "Contract Provisions" is published for each project to adopt the standard specifications to the particular requirements for that project. Most state Departments of Transportation republish their standard specifications every two to three years however, in the interim; they issue amendments to keep them current.

3. **American Society of Civil Engineers**

An ASCE Committee on Specifications has concluded that the current CSI and DOT formats are not satisfactory for civil engineering and heavy construction projects. They are developing a new specifications division-level structure for projects such as airports, treatment plants, landfills, waterways, tunnels, railroads, dams and similar types of heavy construction.

D. CODES AND STANDARDS

1. Standards. Various associations as well as government agencies and product manufacturers have established standards in order to provide uniformity to product design. A designer preparing specifications can, by referring to the published data for the various products, be assured that the product is adequate for the project being designed. Standards become a part of a construction contract if specifically called out in the specifications or drawings. Standards that are frequently used by designers include:

- Federal Specifications
- Military Specifications
- American Society for Testing and Materials (ASTM)
- American National Standards Institute (ANSI)
- American Water Works Association (AWWA)

- American Concrete Institute (ACI)

2. Codes. Building codes have been adopted by virtually all local governments to regulate design and construction of both public and private facilities. All cities and counties in Florida, with the exception of Broward and Dade counties and the cities therein, utilize the Florida Building Code 2001. Broward and Dade counties use the same basic code but, it is modified for high velocity hurricane zones. Both the designer and the contractor are obligated to conform to the provisions of the building code as well as other codes which may be applicable to the project. Codes that are frequently referred to by designers include:

- Florida Building Code 2001
- Southern Standard Building Code
- National Electric Code
- National Plumbing Code

V. CONSTRUCTION LAWS

A. APPLICABLE LAWS

The performance of construction contracts is regulated by law. Designers, Resident Project Representatives and Contractors have many laws to contend with, including federal, state and local laws, rules and ordinances along with rules of the various regulatory and permitting agencies. These laws fall into four major categories:

1. Contract laws and regulations that affect the making of contracts, both public agency and private.

2. Laws governing the execution of the work being performed under the contract such as labor laws and safety standards, workers compensation, permitting rules and conditions, lien laws, and regulations, ordinances and other requirements of jurisdictional agencies.

3. Laws that relate to the settling of disputes that may emerge out of the performance of the contract.

4. Licensing laws that govern business practices and personal qualification standards of the various entities and personnel involved in the construction process. In Florida, this would include engineers, architects, contractors, threshold inspectors and other support professionals.

B. GENERAL CONTRACT REQUIREMENTS

There are two basic types of contracts – those which are publicly funded and/or administered and private contracts. In general, private contracts, such as those between a single owner or entity and a contractor can be more "informal." For instance, the project

does not have to be publicly advertised, the owner can delete the bonding requirements and the contract may be negotiated rather than bid.

Public Contracts. The majority of all publicly funded or administered contracts are required to conform to the general laws governing the execution of public contracts in the jurisdiction in which the project is to be constructed. In addition, contracts performed for a public agency, are limited to the authority which has been granted that agency by law. For example, The Metropolitan Expressway Authority can only do what has been granted under the entitlement act that originally established the Authority. Publicly funded and/or administered contracts usually must comply with the following conditions in most jurisdictions:

1. The project must be publicly advertised in a newspaper of general circulation in the area in which the project lies.
2. Construction bonds (bid, performance, payment, etc.) are required in the amounts specified by law.
3. Prevailing wage rates apply and, if federal funds are involved, federal wage rates will apply.
4. Insurance and/or bonding covering public liability and property damage are required.
5. No sole source materials and/or methods are permitted.
6. The contract award must be made to the lowest responsible bidder.
7. Liquidated damages (or early-completion rewards) will usually apply.

C. LABOR LAWS

Virtually all publicly funded and/or administered contracts and, even many private sector contracts, are subject to the provisions of certain labor laws, the more prominent of which are briefly discussed as follows:

1. **Labor-Management Relations.** The first federal labor law, the Sherman Anti-Trust Act was enacted in 1890. Since that time Congress has passed numerous labor-related laws that outline federal labor policy.
2. **Equal Employment Opportunity Laws.** The first law which was enacted to eliminate discrimination in employment was the Civil Rights Act of 1964. Since that time both Executive Orders and additional laws have been issued and/or enacted to insure that positive action is taken to insure that equal employment opportunities exist for all classes of people. Today, on most public agency projects, it is not uncommon for the using agency to mandate quotas for minority and/or women business enterprises as a condition for contract award.
3. **Americans with Disabilities Act.** This act was enacted in 1990 and prohibits disability-based employment discrimination for all but the smallest employers (14 or fewer employees).
4. **Wage and Hour Laws.** The Davis-Bacon Act of 1931, Copeland Anti-Kickback Act of 1934, and the Fair Labor Standards Act of 1938 all contained provisions relative to minimum wage, maximum hours, employee kickbacks, overtime pay, equal pay and other wage and hour related matters. In the intervening years, Congress has passed

numerous additional acts relating to wage and hour provisions, including non-discrimination on the basis of sex or age for doing equal work.

5. **Worker's Compensation.** The laws of every state require employers to be responsible for the payment of compensation benefits to employees who suffer job-related illnesses or injuries. The payments include costs for both medical care and time lost due to the injury. Contractors transfer these risks by purchasing Worker's Compensation Insurance from insurance companies that offer this type policy. The insurance company pays benefits to an injured employee at rates set by the state law. In Florida, as well as most other states, this insurance has become a major overhead item for most contractors and, in some instances, the premium costs have become prohibitive. This is due to the hazardous nature of construction work, particularly for some trades, the many claims that are filed, and numerous other factors. Obviously, there is a pressing need for Worker's Compensation reform in many jurisdictions.

VI. CONSTRUCTION SAFETY

A. OVERVIEW

Prior to 1970, there were no legally enforceable uniform safety standards in the construction industry. While many contractors placed great value on the importance of construction safety, others offered little or no training and essentially ignored the issue. In 1970, Congress determined that personal injuries and illnesses arising out of construction work activities imposed a substantial burden upon and were a hindrance to, interstate commerce in terms of lost production, wage loss, medical expenses and disability compensation payments. As a result, they passed the Occupational Safety and Health Act of 1970. The Act imposed nationwide safety standards on the construction industry. It also allowed the states to have their own plan as long as it was at least as strict as the federal standards. The Act established the Occupational Safety and Health Administration (OSHA) under the U.S. Department of Labor. OSHA promulgates safety and health standards and the rules and regulations necessary to implement them. "Construction Safety and Health Regulations," Code of Federal Regulations, Part 1926, contains all of the rules and regulations applicable, specifically to construction work. The document covers all working conditions and contains 21 broad categories that are further divided into sections listing specific requirements. It is incumbent upon all contractors to have copies of the OSHA regulations pertinent to their area of expertise available, since substantial penalties may be imposed for non-compliance, including the posting of certain notices and submittal of certain data.

B. PROJECT SAFETY PROGRAMS

Each contractor and subcontractor has a legal responsibility to assure the health and safety of their employees. However, if reference is made in the contract documents to safety obligations of the Contractor, the Resident Project Representative or Inspector

becomes contractually obligated to assure compliance. Thus, it sometimes becomes difficult for an on-site professional to avoid responsibility for safety measures, as numerous case studies will attest.

There are two basic philosophies regarding owner or designer participation in project safety programs. They are:

1. The owner's or designer's personnel should avoid direct involvement in the contractor's safety program, with few exceptions. This approach is followed by many local public agencies and sponsors of private projects. Under this concept, except for chance observation of a safety hazard by the RPR or inspector, no direct action would be taken by the owner's or designer's personnel. If this approach is chosen, the following guidelines should be observed:

- Do not review or participate in the development of the Contractor's safety program.
- Do not review the contractor's safety performance lest you incur a "duty of care." A "duty of care" is incurred as a result of a voluntary acceptance on the part of the RPR or inspector with regard to any aspect of project safety. Once incurred, it must continue for the duration of the project and the owner is automatically involved in the safety program.
- In the event of normal business (inspection) operations a serious safety hazard is encountered, appropriate action must be taken. It must be reported. Avoid the "See no evil" approach.

2. The other approach is to take an active part in the approval and monitoring of the Contractor's safety program. This approach is followed by most federal and state agencies and utility companies. Their theory is that by participating in the Contractor's safety program, their exposure to risk is reduced because of increased control at the project side. Usually, agencies that choose to get involved have the resources to employ a team of well-trained, knowledgeable, and experienced safety professionals. Thus, they are willing to trade off their increased risk of potential loss as a result of sharing responsibility for the hazards on the construction site in return for increased involvement in safety and safety planning and review of the contractor's safety performance.

C. ACCIDENT DOCUMENTATION

Accidents, to some lesser or greater degree, occur on virtually every construction project. While the contractor has the primary responsibility for job-site safety, it is important that the Resident Project Representative and/or the Inspector, completely document all accidents. This documentation can be a valuable record in the event of subsequent claims and/or litigation by parties to the contract or subsequent litigants arising out of the event. In the event of any accident, the Resident Project Representative or Inspector must take the following action:

- Report the accident to OSHA pursuant to their guidelines and regulations.

- Prepare a written report describing the accident, its primary cause, safety regulations violated, if any, recommendations for corrective action and other basic information relative to the event. Many times, accident report forms are available for this use.
- Photograph the accident site. Many times, this is a case where "A picture is worth a thousand words." Accident site photographs are commonly called into evidence in cases which end up in litigation.
- Document all facts pertaining to the accident in the field diary. Record all conversations with the Contractor's personnel or others investigating the scene of the accident.
- Document related Contractor accidents which may have previously occurred on the project.

D. PROCEDURAL GUIDELINES

Certain guidelines are suggested depending upon the hazard classification which either the Resident Project Representative or Inspector observe.

1. **Imminent Hazard.** A condition that if not corrected may result in an accident causing severe or permanently disability injury or death.

Procedure. The Resident Project Representative should immediately order the Contractor to suspend the work activity affected and not permit work to resume until the hazardous condition has been corrected. The condition should be photographed and all parties should be notified of the hazardous condition and the action taken. A letter describing all details of the event should be submitted to the Project Manager and appropriate entries made in the diary.

2. **Dangerous Condition.** A condition that does not pose an immediate threat to works, but if not corrected could develop into an immediate hazard.

Procedure. Notify the Contractor in writing of the condition and allow a reasonable period of time for correcting the condition. Certain additional action may be taken should the Contractor not correct the dangerous condition.

3. **Minor or Nonserious Condition.** A condition that could result in minor or less serious injuries, or that are small in nature, but that may still be classified as a threat to health.

Procedure. The resident Project Representative should advise the Contractor of the condition and the necessity of eliminating it. Follow-up action should be taken if the condition persists or if the Contractor fails to correct the problem.

VII. BIDDING AND CONTRACT AWARD

Often the Resident Project Representative is not involved in the project during the bidding and contract award phase. Recently, owners and designers have opted to have the Resident Project Representative involved during this phase so that they will be knowledgeable concerning matters relating to the pre-bid conference, questions which have been raised by bidders, addenda which may have been issued, and the evaluations used to recommend the contract award. This pre-contract award experience will be highly beneficial to the Resident Project Representative during the subsequent stages of construction.

A. ADVERTISING PHASE

During the advertising phase, the Resident Project Representative should review the contract documents to ensure that all important field considerations have been provided for in the specifications. If omissions or conflicts are noted, an addendum can be issued prior to the bid opening.

During the advertising phase, the Owner may deem it advisable to conduct a pre-bid conference and/or a tour of the project site. Many public agencies follow this practice and even, in some cases, make attendance by the Contractor a condition of being able to submit a bid. If a pre-bid conference is scheduled, there are certain protocols that must be followed; which include:

- Do not consider <u>any</u> request to substitute products which are specified.
- When products are specified by a certain manufacturer or provider "or equal" do not allow adding another "or equal."
- Do not attempt to interpret or clarify the contract documents.
- Do not accept questions unless they are in writing. Contractors should be notified of this requirement in advance.
- Avoid oral responses to questions of plans and specifications. Notify everyone that a response will be in the form of an addendum, if warranted.

In summary, if a pre-bid conference is conducted, it is vitally important that each bidder receive the same data and information and that it be in writing. Usually, this is accomplished by sending a copy of the minutes of the meeting to each attendee.

B. BIDDING AND EVALUATION

1. **Issuing Bidding Documents**. Certain important details need to be handled during the bidding phase of a project. They include:

- Keeping an accurate log of all sets of contract documents issued. Normally, the sets are numbered and set number (s) issued should also be entered into the log.
- Addenda, if issued, should be attached to the contract documents when issued. If a bidder has already obtained the contract documents the addenda should be sent by certified mail, return receipt requested. Addenda should be accompanied by a revised form of proposal showing a place for acknowledgement of receipt of the addenda by the bidder. It is important that addenda be issued far enough in advance of the bid opening date to allow for mail delivery and extra work required by the bidder to comply with the addenda. If ample time does not exist then the addenda should also extend the bid opening date.
- A reproducible copy of the project drawings, as issued, should be made. It is vitally important that all bidders receive identical sets of bidding documents. Bidding irregularities on the part of the owner or designer should be avoided at all costs.

2. **Opening of Bids**

In the private sector, bid openings, as well as many other contract administration elements, tend to be informal. However, in the public sector the rules are somewhat inflexible. The following procedures usually govern the opening of bids for public agency projects.

- Sealed bids are received at a designated time and place.
- Bids must be responsive – the bid must be on time and contain all of the required documents, fully executed. All addenda must be acknowledged.
- Bids must be accompanied by either a bid bond or other form of bid security in the amount specified. If a bid bond is provided it should have the bonding company's executed Power of Attorney attached.
- Once a bid has been determined to be responsive, it should be read aloud. Bids from non-responsive bidders should not be read. For unit-price bids, a summary of all line-item prices may be read after all bid totals have been read.
- In an effort to minimize bid shopping, many designers will require the contractor to list major subcontractor and/or equipment suppliers on the bid proposal form. This is an optional item and is not required by most public agencies.
- Prepare a tabulation of bids and a roster of everyone attending the bid opening.
- If the project is in a jurisdiction that requires the contractor to be licensed, require the bidders to include a copy of their current license with their bid.
- After all responsive bids have been read, identify the apparent low bidder subject to later confirmation.

3. **Bid Evaluation**

Following the close of the bid-opening session, there are certain tasks which must be performed to comply with the requirements of most public agencies.

- Tabulate all bids. If the contract is a unit-price one, bids can best be tabulated on a spreadsheet. This is helpful in detecting unbalanced bids.
- Evaluate each bidder for financial responsibility, past record of performance, reputation, and licensing (where required).
- Document all actions and save all bidding records. Avoid a premature recommendation to the owner for bid award.
- After a thorough evaluation of all bids and all bidders, prepare a "Bid Tabulation and Report" for the owner which includes a recommendation for award of the contract.
- Subject to the owner's concurrence, issue a "Notice of Award" to the successful contractor.
- Return bid securities to the unsuccessful bidders, but retain those bid securities necessary to protect the owner pending receipt of properly executed contract, bond documents, and insurance certificates from the contractor to whom the award was made.

C. CONTRACT AWARD AND PROJECT STARTUP

1. The Preconstruction Conference. Once a "Notice of Award" has been issued, the owner or designer should schedule a pre-construction conference. The conference can be held either before or after the Contractor has returned the executed contract and bond documents. Initially, the pre-construction conference enables the key personnel from all parties to become acquainted. Many times, the contractor will want his key subcontractors and product suppliers to be in attendance. If the project involves construction in public rights-of-way, the owner and/or designer will want companies having utility lines therein will want those companies to attend. The purpose of the preconstruction conference is to discuss all aspects of the project, identify the individuals in responsible charge for each of the entities involved, discuss procedural matters, and answer any questions which may be pertinent. The construction schedule should be discussed and, assuming it was mentioned in the specifications, the Contractor should be made aware that, "Time is of the essence". At the preconstruction conference, the schedule and frequency of job site and management meetings should be confirmed. Complete minutes (record) should be kept by the owner and/or designer of <u>all</u> matters discussed, including action items, and a copy of the minutes should be provided to <u>all</u> who attended the conference.

2. Project Startup

Once the contractor submits the fully executed contract and bond documents, in the requisite number of copies, the project is ready to commence. The bonds will include a performance bond, which protects the owner in the event of a default by the Contractor and a payment (labor and materials) bond, which guarantees payment of all legitimate labor and materials bills that result from the performance of the contract. The bonds must be accompanied by a Power of Attorney unless they are signed by an officer of the surety company issuing them. Normally, at the time of submittal of the executed contract and bond forms, the Contractor would also submit insurance certificates for the various types of liability and risk policies which were specified in the contact documents and which are necessary for the proper protection of the owner and/or contractor.

At the beginning of the project, the Resident Project Representative should ascertain that all permits that are required to be obtained by the owner (such as environmental permits) are in hand and the permit conditions are noted.

Once the owner signs the contract, an executed copy is returned to the contractor and it is usually accompanied by a formal "Notice to Proceed." The "Notice to Proceed" formalizes the date that the work is to officially begin, reiterates the number of days allotted in the contract documents for completion, and establishes a contract completion date. If liquidated damages apply, the daily amount is generally stated in the notice. Under no circumstances should a "Notice to Proceed" be issued until all owner required permits have been obtained. Failure to follow this procedure could results in delays to the Contractor, for which he would be entitled to additional time or compensation or both.

VIII. PLANNING AND SCHEDULING

A. PLANNING AND SCHEDULING

The purpose of construction planning is to gain an orderly control of the project. The process of planning is an application of the thought process that must be entered into before the actual scheduling can commence. Construction planning consists of:

1. Applications of common sense.
2. Logical analysis of a project.
3. Knowledge of construction materials, methods and practices.

There are many elements to consider when planning a construction project. Some of these include:

1. Are there any long lead procurement items?
2. Utility considerations, including relocation of utilities
3. Work and storage areas
4. Traffic routing and detours
5. Vehicular and pedestrian access
6. Environmental constraints and concerns
7. Time constraints
8. Coordination with other contractors in the area (not subcontractors)
9. Interdependency of tasks being performed by others

After determination of the various limitations and constraints on the conduct of the work, as well as other "special" conditions that might be applicable to the project, the task of planning the actual construction effort can commence. Once the planning is complete, the actual scheduling of the work can begin. A construction schedule is a graphic depiction of the various work activities, their sequencing in the project and their times of beginning and anticipated completion.

B. SCHEDULING METHODS

Generally, scheduling methods can be classified into four (4) major categories, which are:

- Bar charts
- Velocity charts
- Line-of-balance charts
- Network diagrams.

A brief explanation of each method follows:

1. Bar Charts, or Gantt charts as they are sometimes named after one of the men who popularized their use, is a work activity versus time graphical representation. A bar chart does not show the interrelations or dependences that one work activity has on another work activity and therefore, cannot be used alone in scheduling a project. However, a bar chart is an excellent means of depicting job progress information and often accompanies monthly progress payment requests. The depiction of actual work completed (solid bar) and work remaining (dashed bar) of each of the major elements of construction plotted along a corresponding time scale provides the owner with a clear and concise representation of the project status.

2. Velocity charts (diagrams), usually know as "S" curves, depict the actual construction velocity (rate of progress) versus the scheduled velocity. The duration of the project is plotted along the abscissa of the chart and the ordinate usually shows total job cost. The slope of the actual construction velocity (rate of progress) line will indicate whether the progress is lagging or accelerating. "S" curves are usually used on smaller projects and as a management reporting tool.

3. Line-of-balance charts are used to plan the construction of a number of similar items. The technique is based on the concept of keeping all of the resources (labor, materials, plant, equipment, etc.) in balance to make optimum use of all resources. This scheduling method was designed for the manufacturing industry but, it could also be used, for example, by a developer who is building 100 homes in a subdivision.

4. Network diagrams are systems that record the graphical work-versus time relationships of each phase of the work and enable the user to see the interrelation and dependencies that control the project. Network planning came into being in the mid-1950's. Network diagrams can be divided into two basic categories, Critical Path Method (CPM) and Program Evaluation Review Technique (PERT). PERT is a statistical or event oriented system that is mainly used in the Research and Development (R&D) industry. CPM is an activity oriented system that was developed specifically for construction planning by the Dupont Corporation. Since CPM is the most reliable scheduling method for construction and is widely used through the construction industry, it will be discussed in greater detail in the following Section C.

C. CRITICAL PATH METHOD (CPM)

Since arrow diagramming is the most frequently used CPM format, it will be the basis for the following discussions.

1. **Format.** Each network diagram consists of a number of activities and events. Each individual major work item in a project might be designated as an activity, while an event is the instant of time that an activity is either just starting or finishing. Every activity is dependent upon the premise that the preceding activity has been completed. Time durations are established for each activity and the activities are joined together in a logical sequence of construction operations to form a network. The completed computer generated diagram will show the particular series of activities that are on the "critical path." Non-critical activities will depict "float" time, which is sometimes described as scheduling leeway. There are many nuances in developing a CPM diagram and experienced construction professionals are best equipped for that task.

   In summary, the following are the basic procedures for set-up for CPM:

   - Identify work activities including mobilization.
   - Estimate time durations.
   - Determine predecessor activities.
   - Prepare a time-scaled diagram of the dependency network.
   - Determine critical path and float times.

2. Advantages of CPM

CPM is an excellent project scheduling and planning method and there are many good project scheduling computer programs using a variety of operating systems. Some of the advantages of CPM are:

- The almost instant availability of hard-copy reports that reflect changes in the project and its completion schedule
- The ability to make accurate estimates of project cost, schedule both activity and project time and determining resources required and making resource allocation.
- Enhanced cost accounting
- The ability to generate computerized progress payments. By including mobilization in the CPM network, the front loading of bids is minimized, since the contractor receives the cost of bonds and insurance sooner.

3. Specifying CPM

There are a number of sources available for guide specifications for preparing a CPM specification. One specification in general use in the construction industry is published by the Associated General Contractors of America (AGC). Some factors to consider in using the guide specifications are:

- The type of network diagram to be furnished. Many specifiers prefer a time-scaled diagram.
- Float for each activity. Usually both free float and total float should be shown on the reports.
- The frequency of the reports (printouts) should be specified. Many specifiers prefer monthly to coincide with progress payments.
- The payment of the initial mobilization expense is tied to the submittal of the schedule.

There are a number of software programs available for developing a CPM schedule but, one program that is particularly Architect-Engineer friendly, is Primavera Software.

IX. CONSTRUCTION OPERATIONS

It is the duty of the Resident Project Representative to control the work and to require proper workmanship and materials as well as compliance with drawings, specifications and other contract documents. He or she should be fair in all dealings with the contractor and should provide as much assistance as possible without "supervising" the construction activity. This chapter covers some of the, more or less, routine activities that the RPR is expected to perform.

A. ADMINISTATION

The following is a summary of the principal administrative activities for which the Resident Project Representative is responsible:

1. Coordinate and provide general direction of the work and progress
2. Regularly review contractor's schedules and track job progress
3. Promptly return contractor's submittals and respond to requests for information. Establish a log for submittals, which is consecutively numbered, and shows submittal content, date received, date returned and comments (approved, approved as noted, disapproved, resubmit, etc.) All contractor submittals should be submitted and returned through the Resident Project Representative.
4. Develop and administer an inspection plan. Establish procedures for notice for inspections. Inspect the project as the work progresses. Follow procedures covering inspections that have been established in the General Conditions of the contract. Observe all tests and maintain a record of all test reports. Inspect the construction regularly and supervise the inspection forces assigned to the project.
5. Reject unsatisfactory work. Any disapproval or rejection of the work should be communicated to the contractor in writing, stating the reasons

for the disapproval. This should be done as early as possible after rejecting the work. In this regard, the Resident Project Representative should not stop the work except in the case where the work is being conducted in an unsafe manner. Stopping the work is best left to the discretion of the owner, who is a signator to the contract.

6. Assist scheduling and ordering the required field services.
7. Attend and participate in field management meetings. Document the meetings and record actions taken and/or decisions reached.
8. Insure that all project documentation is properly maintained and filed. This includes the daily and monthly construction reports and the daily diary(ies).
9. Immediately report observed serious safety hazards.
10. Review contractor value engineering proposals and make recommendations to the Project Manager and owner regarding their implementation.
11. Review and verify payment requests. On unit price contracts, check quantities carefully. Verify work completion percentages with the contractor. Expedite the processing of payment requests.
12. Immediately report field conditions that create conflicts with the original plans and may necessitate their alteration.
13. Change order administration – review contractor's change order requests and make recommendations to the Project Manager. Provide negotiation assistance on contractor claims.
14. Maintain data compiled for record drawings and assure preparation of record drawings.

B. PROGRESS PAYMENTS

There are many different types of construction contracts, distinguished primarily by the method of determining the final contract prices. However, both private and public agency contracts are predominantly either lump-sum or unit-price contracts. A lump-sum contract is one in which the contractor agrees to do certain specified construction for a fixed price while, in a unit-price contract, the Contractor agrees to a unit price for each unit of work constructed with the final contract amount being determined by the actual number of units installed

1. Partial Payments

The General Conditions of the Contract documents usually stipulate the manner of payments to the contractor for work performed. Virtually all contracts call for monthly progress payments to the contractor throughout the job. Typically, the contractor will submit a request for payment approximately 10 days before the payment due date. Usually, the Resident Project Representative and the contractor will have mutually agreed in advance on the percentage of work completed and its value if the contract is a lump-sum or on the units of work installed at their respective unit prices if the contract is unit price. Assuming the formal pay request forms are in proper order, the RPR will forward the pay

request to the Project Manager with a recommendation and back-up documentation as necessary. The Project Manager will forward the pay request to the owner, and once approved by the owner's governing body, lending institutions or other approving authority, the funds will be disbursed to the contractor. It is customary, on the first progress payment, to include payment to the contractor for mobilization costs. This amount should be established by the designer and included in the bid form as a fixed allowance. This will prevent bid imbalances and at the same time pay the contractor for the "front end" costs incurred by entering into a contract. As a protection to the owner, payment requests should be accompanied by the contractor's partial waiver of lien along with partial waivers of lien from subcontractors covering work performed on the preceding pay request. Since lien laws vary between states, it is advisable to consult with an attorney regarding the administration of waivers of liens.

2. Other Pay Items

In addition to partial payments for work performed under the original contract, the pay requests may include payments for additional items which could include:

a. Approved lump-sum change orders
b. Approved change orders for work to be performed on a cost-plus basis
c. Equipment and/or materials delivered to the job site, but not yet incorporated into the work.

In recommending payments for additional work and/or materials, it is incumbent on the Resident Project Representative to insure that the work has been done and/or the equipment/materials have been delivered. Normally, the General Conditions to the contract will stipulate the procedure for payment of equipment and/or materials stored at the job-site. Payment for these items must be supported by invoices to the contractor and attached to the payment request. The RPR should be cognizant of the fact that the provisions of the specifications control such payments. A good procedure to follow is that payment request for <u>any</u> additional work items must be supported by the proper documentation from the contractor.

3. Retainage

The majority of construction projects, particularly those in the public sector, involve retention of a portion of earned funds of the contractor as a protection to the owner against failure by the contractor to perform. The amount to be withheld will be stipulated in the contract documents and, typically, has been 10% of the value of completed work. In recent years, there has been a tendency to reduce the amount of retainage for two reasons:

a. On large projects which stretch over a long period of time the retainage can accumulate to a large sum, the withholding of which, might hinder the contractor's ability to conduct normal business operations.

b. The project is already protected against claims by the payment and performance bonds furnished by the contractor.

One recent method of computing retainage that has gained support in both the private and public sectors is the withholding of 10% retainage up to the 50% project completion stage and no further retainage during the latter half of the project. Thus, the retainage at the completion of the project would amount to 5%. It should be remembered that any adjustment to the retainage must be approved by the contractor's surety company.

4. Final Payment

The application for final payment will be on the same form used for partial payments and should indicate "Payment Number _____ (Final)" on the form. The final payment will consist of all amounts due the contractor, including retainages, less the following:

a. Liquidated damages due.
b. An amount sufficient to cover the value of all outstanding punch-list items.
c. The value of any lien claims on file.
d. Any other disputed values.

Before the Architect-Engineer issues a final certificate for payment, the following requirements must be met:

a. The Certificate of Completion or Substantial Completion has been issued and filed.
b. All lien releases have been obtained.
c. Consent of surety has been obtained.
d. Final affidavits of payments have been obtained from the contractor.

C. CONSTRUCTION MATERIAL AND METHODS

1. Materials

The materials to be used on a project are selected by the designer (sometimes with input by the owner) and are delineated on the drawings and specified in the specifications. Thus, a certain standard of quality is set forth in the contract documents. The Resident Project Representative's and/or Inspector's authority is limited to requiring the contractor to provide what has been agreed upon in writing in the contract documents – nothing either of a greater or lesser quality. Sometimes the quality of materials and/or products specified is determined by the owners' budget constraints.

One of the most frequent requests received on the job will be requests by the contractor to substitute materials for those specified by the designer. On a private project the designer may specify proprietary items and is not obligated to accept a substitute. However, on public sector projects, particularly those funded by federal agencies, there are limitations on specifying a single name brand of a product if equivalent products are on the market. In virtually all jurisdictions specifications for proprietary products must name one or more brand names followed by the words "or equal." The designer is considered to be the final judge of the quality of a product. Accordingly, unless a product and/or material furnished by the contractor has either been specified or a substitute product and/or material approved by the designer, in writing, the substitute product and/or materials must be rejected. The evaluation and acceptance of a substitute "or equal" product should never occur during the bidding and contract award phase of a project. Many times, designers will further limit the times for considering substitute "or equal" products to avoid delays in procurement.

2. Construction Methods

Selection of the type of equipment required and methodology to perform a job task is the responsibility of the Contractor. In some instances, due to the constraints of the work, the use of certain types of equipment and/or methodologies may be inappropriate. Also, the use of certain equipment might have job safety implications. When these situations occur, it is the responsibility of the Resident Project Representative to inform the Contractor of the unsuitability of the equipment and/or methodology, but not to tell him what equipment or method to use. It is still up to the Contractor to select equipment and methods that are capable of doing a satisfactory job within the terms of the specifications and the constraints imposed by the project.

3. Quality Assurance

Quality level can be defined as the grade of excellence of a product or thing. It is a characteristic or standard that is established as being minimally acceptable for a project. Quality levels are usually established by the owner and/or designer.

Each quality level requires sufficient quality control to assure that the established quality standards are met. It is the responsibility of the Resident Project Representative to assure that the quality standards set forth in the contract documents are met. A principal means to assure quality is by means of the field inspections performed by the Resident Project Representative and/or his or her Inspectors. Other means to assure satisfactory performance include:

a. Testing as called for in the specifications
b. Installation in accordance with the product manufacturer's instructions
c. Minimum experience qualification for performing certain types of work
d. Factory inspection of products before shipping and delivery

e. Certified laboratory test reports for certain products
f. Manufacturer's mill test reports
g. Matching samples approved during the bidding phase
h. Construction of a mock-up assembly
i. Proven successful use of a product or equipment
j. Qualified products list – products that have previously been tested and approved and have demonstrated satisfactory performance.

Quality assurance is further achieved in the construction project by means of warranty and guarantee provisions in the contract documents. A warranty, either implied or expressed, covers products which are furnished pursuant to the contract and guarantees cover both labor and material for a specified period of time.

X. CHANGES IN THE WORK

A change order, also known as a supplemental agreement on Federal projects, is a document that alters some condition of the original contract documents. Once it has been executed by the parties it becomes a part of the contract documents. A change order is justified when it becomes necessary to alter the original plans and/or specifications, the contract price, the schedule of payments, or the contract completion date. Change orders are usually initiated by personnel at the project site when conditions arise that are in conflict with the original plans and specifications. While any of the parties can propose a change order, only the owner can authorize it. A change order can be issued at any time after the agreement (contract) has been signed. Changes required prior to the opening of bids are made by addenda and there should be no changes between the bid opening and contract execution dates.

A. TYPES OF CHANGE ORDERS

Change orders fall into two broad categories which are described as follows:

1. A bilateral change order is a bilateral agreement between the owner and the Contractor to effect a change in the terms of the contract.
2. A unilateral change order is usually referred to as a work change or construction change directive. It is issued by the owner to expedite the work with the understanding that a regular bilateral change order will be issued at a later date to address payment and time allowances.
3. Sometimes field orders are issued by the Resident Project Representative which consist of mutually agreed upon items by the RPR and the Contractor that involve no change in the contract documents.

With regard to a change clause in a contract, there are two basic types of change: directed and constructive.

4. A directed change is one in which the owner directs the contractor to perform work that differs from that specified in the contract or, adds to or deducts from, the original work specified.
5. A constructive change occurs when the contractor claims that something either the owner or designer has done, or failed to do, has resulted in changed conditions for which he is entitled to additional compensation or time extension or both. This must be claimed in writing by the contractor within the time specified in the contract documents. Constructive changes are a major source of construction disputes and can be mitigated if the designer provides a detailed set of plans and specifications that clearly outline the scope of work.
6. Oral changes. While the contract documents require that all changes be in writing sometimes, the actions of either the Resident Project Representative or the Contractor, or both, can serve to constructively waive that requirement. Implying that something needs to be done can be construed to mean that it should be done. This can lead to misunderstandings which can result in legitimate contractual disputes.
7. Shop drawings. Corrections marked by the designer to shop drawings submitted by the Contractor do not constitute changes unless they require additional work beyond that called for on the plans and in the specifications.

B. WHEN CHANGES ARE REQUIRED

There are several conditions or reasons for which contract change orders are needed and which are enumerated as follows:

1. When there is any substantial departure from the original contract documents.
2. Design changes which may be instituted by the owner or where mandated by regulatory agencies.
3. Errors and/or omissions in the plans and/or specifications such as ductwork/lighting conflicts in a building where the mechanical and electrical designers did not coordinate their work.
4. In unit price contracts, excessive quantity variations from those estimated might constitute grounds for revising the unit prices. Also, on unit price contracts, a final change order is required to reconcile the final measured quantities of work with the original estimated quantities.
5. Differing site conditions such as soils or other physical conditions that differ from what is shown. The presence of underground utilities not shown or not known. With regard to geotechnical or other site reports, the owner must disclose the data, but the reports should not be included as a part of the contract documents. It should be stated that these reports will be made available for the convenience of the bidders, but that the owner or designer makes no representations regarding the data.

6. Any change affecting contract time or money, including adverse weather conditions affecting completion time.
7. Changes that might result due to field emergencies.

C. CHANGE ORDER CONTENT

A change order is a written agreement between the owner and contractor authorizing certain revisions to the work within the limits of the terms of the construction contract that was originally executed. Virtually all of the technical and/or professional societies (EJCDC, AIA, AGC, etc.) have pre-printed change order forms which can be used for preparing change orders.

A change becomes part of the contract documents and should include the following information:

1. Identification of change order. They should commence with Change Order Number One and be numbered consecutively throughout the duration of the project. This makes it easy for the Resident Project Representative to maintain the Change Order Log.
2. Description of change. This describes, in some detail, the additional work which is to be done. In many instances sketches or even drawings will be attached to the change order to depict the work required.
3. Reason for change. Usually the reason for the change will come from one or more of the items listed in Section B above.
4. Change in contract price. Almost all change orders result in an adjustment to the contract price. For extra work paid for on a lump sum basis, the owner will want a complete breakdown of costs, including labor and materials and the contractor's percentages for overhead and profit. Sometimes, the overhead and profit percentages will be determined in the bidding process. The contractor may want to pay for impact costs which are the indirect delays or interference that a change on one phase of the work may create on another phase. If the Contractor claims impact costs the owner should allow him to file and then, subsequently, negotiate the cost.
5. Change in unit prices. If there is a substantial variation in quantities on a unit price contract (usually $\pm$ 25%) the Contractor might be entitled to adjust the unit price.
6. Change to contract time. Usually, all change orders which call for additional work require that the Contractor be granted additional time. A review of the CPM schedule is often beneficial in evaluating time allowances.

7. A statement that secondary impacts that the change order will have on other work elements, subcontractors, etc. is included in the additional cost being requested.
8. Approvals. Usually, the Architect-Engineer will sign change orders since they are involved in preparing them and in negotiations with the parties. However, it is mandatory that the change order be signed by the owner and contractor, since they are the signatories to the original contract.

XI. CLAIMS AND DISPUTES

Construction contract documents usually require a contractor to notify the owner and/or designer within a certain number of days of any protest or dispute which might result in a claim. The owner must then have an opportunity to correct and/or alleviate the problem once it has become known. If the owner fails to correct the problem or, if the owner feels that the Contractor's allegations regarding the dispute are unfounded, then the contractor may file a claim. A claim is the result of a potential claim arising out of the performance of the work which cannot be resolved by the parties. The Contractor must file claims in accordance with contractual requirements and the owner and/or designer must follow the procedures in the contract documents in handling the claim and/or dispute. The administrative procedures outlined in the contract document for claims resolution must be followed by all parties to the contract before resorting to other legal remedies.

A. CONTRACT INTERPRETATION

There are five basic principles of contract interpretation that are important in the administration of construction contracts.

1. The contract documents (plans, specifications, contract, etc.) must be considered in their entirety. The law recognizes that the intentions of the parties cannot be defined by examining one small part of a document.
2. The contract documents will be construed against the drafter. The reasoning is that the party that prepared the documents had ample opportunity to avoid ambiguity and clearly express the intended meaning. Thus, the Contractor's reasonable interpretation of the documents will usually prevail over that of the owner.
3. The contract documents supersede all previous discussions. The documents speak for themselves and oral communications are non-binding.

4. Specific terms govern over general terms. Where there is a conflict between two different provisions in the documents, the more specific term shall govern over the general term.
5. The contract documents must be read in the context of the trade which means the construction industry.

B. SOURCES OF CONSTRUCTION CLAIMS

Most construction claims fall into the following general categories with many variations possible within each category:

1. Delays in the work. Delay claims are of three types: nonexcusable, excusable or compensable. Nonexcusable delay is one that is caused by factors within the Contractor's reasonable control. An excusable delay is one caused by factors beyond the Contractor's control, but is not the result of the owner's actions. An excusable delay would entitle the contractor to an extension of time. A compensable delay occurs where the owner has failed to meet an obligation in the contract and entitles the Contractor to both additional time and money.

2. Schedule Changes. When the owner elects to either accelerate or decelerate the work schedule, the Contractor may have a valid basis for a claim due to impacts on resources, additional labor costs (for overtime), construction sequencing, materials and equipment deliveries and many other factors. Any scheduling change can have an effect on project operations and, if created by the owner, may entitle the Contractor to additional compensation.

3. Differing Site Conditions. Changed or unforeseen subsurface and latent physical conditions at the site are frequently the cause for significant claims for additional work by the Contractor.

4. Constructive Changes. A constructive change authorizes a modification to the contract due to an act or failure to act caused by the owner or designer. Types of typical constructive changes include:

- Defective plans and/or specifications
- Changed standard of performance
- Change in construction sequence
- Designer's interpretation of documents
- Improper inspection and rejection
- Owner nondisclosure of pertinent facts

5. Unusually severe weather conditions. Weather events that are a clear departure from the normal weather occurrences and cause conditions that are detrimental to the Contractor's operations might be considered excusable, but not compensable.

6. Failure to agree on change order pricing. If the owner and contractor cannot agree on a price for additional work, the Contractor's only recourse is to file a claim.

7. Miscellaneous problems such as breach of contract, owner's failure to make payments, work beyond contract scope, etc., may constitute grounds for filing a claim.

C. CLAIMS AVOIDANCE

Recent trends in the construction industry, which include factors such as highly competitive bidding, increased competition (greater number of firms), and the growing trend toward more litigation, have resulted in more and more projects being affected by claims and disputes. While it is impossible to produce a "perfect" set of contract documents, there are very positive actions that can be taken to minimize claims. They include:

1. Properly assign and allocate risks. In preparing the contract documents, the risks should be allocated to the party having the most competence to assess the risk and the expertise and resources necessary to control or minimize it or to insure against it.

2. Properly document all facets of the planning, design and construction project. See Chapter III.

3. Insure that the project is subjected to a thorough constructability analysis during the planning and design phases.

4. Insure that the plans and specifications are project specific – avoid "generic" documents and "boiler-plate." See Chapter IV.

5. Staffing. Maintain sufficient staffing at the project site that is commensurate with the magnitude of the project. Be sure that the Resident Project Representative and staff are properly trained and have experience in projects of a similar size, type, and scope.

6. Have an effective inspection plan that is specifically tailored for the project and a quality assurance program that contains a record of all quality control requirements for the project.

D. METHODS FOR DISPUTE RESOLUTION

There are four principal methods available for the resolution of construction claims. In two of theses, negotiation and mediation, the

findings are non-binding. In arbitration the findings may be either binding or non-binding depending on the language in the contract. In disputes which are litigated, the findings are binding, but subject to the appeals process.

1. Negotiation. The negotiation process involves:
   - Presentation of each party's position
   - Analysis and evaluation of the other party's position
   - Adjustment of positions between the parties – in other words, compromise.

   The advantages of negotiation are that settlement costs are usually minimal and the time taken to reach an agreement can be very short.

2. Mediation. Mediation involves the utilization of a trained third-party neutral to assist disputing parties in reaching an agreement that resolves the dispute. In Florida, the Florida DOT has modified the mediation process to a process termed dispute resolution where, instead of a single mediator, there are three; one selected by the owner (FDOT), one selected by the Contractor and a third selected by the other two. The dispute resolution process has resulted in the settlement of approximately 99% of the disputes generated within the FDOT construction program. The advantages of negotiation/dispute resolution are that it is relatively fast to complete and settlement costs are minimal. Although the process is non-binding, there is a certain amount of moral pressure on the parties to reach an agreement. In general, the mediation process is more informal and less structured than arbitration. Another significant difference is that a mediator has no power except persuasion while an arbitrator has final power of decision.

3. Arbitration. Arbitration is the voluntary submission of a dispute to one or more impartial persons for final and binding determination. It is an orderly proceeding governed by the rules of procedure and standards of conduct that are prescribed by law. The American Arbitration Association has adopted "Construction Industry Arbitration Rules" which are in widespread use in the construction industry to resolve disputes. The arbitrator (or arbitration panel) has broad powers to determine matters of fact, law, and procedure and has final power of decision. While arbitration is generally faster to conclude than litigation, the process can take several months for scheduling, preparation, extended hearings, etc. Arbitration is not as economical as either negotiation or mediation since both arbitrator's and attorney's fees can be involved, filing fees are required and other costs such as charges for a hearing room, written transcripts and administrative expenses are incurred.

Commercial arbitration agreements are recognized by statute by the U.S. Arbitration Act and, in most jurisdictions (44 states) arbitration laws provide that all agreements to arbitrate are valid, irrevocable, and enforceable.

4. Litigation. Litigation is self explanatory. If the parties cannot resolve a claim or dispute by any of the methods described above, then litigation is the only remaining recourse. It is very expensive in terms of attorney's fees and time costs and it requires months and even years for a case to reach a trial. In addition, the time spent by both the owner's and Contractor's key personnel in litigating a claim is lost to productive work on future projects. As a general rule, litigation should be the last resort in a claims resolution.

XII. PROJECT CLOSEOUT

A. PROJECT COMPLETION

In the construction industry, there are various nuances to the definition of the word "completion" and "stages of completion." The contract documents under which the project is being constructed will usually govern "completion" or "substantial completion" unless there is a substantial departure from the wording used in contract law.

1. Substantial Completion. Substantial completion is recognized as contractual fulfillment of the obligation of the Contractor to the owner, with regard to the project, and that the existence of small defects or omissions will not jeopardize that premise. It means that the project is complete to the point that it can be used for the purpose intended and that all remaining incomplete work consists of relatively minor items that the contractor agrees to correct while the facility is being used. The issuance of a "Certificate of Completion" releases the Contractor of all responsibility and obligation for further maintenance, security, and safety of the work/workplace and ownership of the project passes to the owner.

With the establishment of substantial completion, the following project events occur:

- The guarantee and/or warranty provisions of the contract commence.
- Construction insurance policies expire.
- The assessment of liquidated damages ends.
- The lien/stop notice filing period commences.

- The final progress payment is due.

2. Beneficial Occupancy/Partial Utilization. By a general definition, the owner's occupancy of a project prior to its being 100 percent complete may be defined as "beneficial occupancy." Accordingly, the terms "substantial completion" and "beneficial occupancy" are complementary. On many projects, it may be necessary for the owner to use completed portions of the new work before the total project is complete. When partial utilization of the new facilities becomes necessary, the owner should take the following actions:

- Advise the Contractor, in writing, of the specific portion of the work that is to be utilized. The description of the partial utilization limits should be precise.
- The owner should be prepared to accept the responsibility for maintenance, security and safety within the limits of partial utilization.
- The owner should advise the Contractor that he is still responsible for correcting any "punch list" items that are located within the partial utilization limits. The owner should avoid the use of the terms "beneficial use" or "preliminary acceptance".
- The effect of partial utilization on warranties and liquidated damages should be resolved.
- The owner's partial utilization of the work should not result in delays to the contractor in completing the remaining portions of the project.

B. PRINCIPAL CLOSEOUT ACTIVITIES

The principal closeout activities for a typical project are summarized below:

1. Punch List. During the finishing stages of the work, the Resident Project Representative, Contractor, and relevant subcontractors should make frequent and careful inspections of the work to assure the correction of any faulty or deficient work that has been noted in previous progress inspections. These inspections will form the basis for the pre-punch list and mark the commencement of the punch list activity. Briefly, the punch list obligations of the parties are:

Contractor

- Carefully check both the prime Contractor work and that of the subcontractors.
- Correct all unsatisfactory and/or non-conforming work immediately.
- Insure that subcontractors correct deficient work before they leave the project site.
- When the project has been completed satisfactorily, send the Resident Project Representative a Certificate of Completion.

Resident Project Representative

- Inspect the work as it progresses.
- Perform a prefinal inspection of the work.
- Establish dates for equipment and systems testing and performance.
- Prepare punch list(s). The list(s) should be dated and signed and all items consecutively numbered for subsequent easy identification.
- Meet with the Contractor, as necessary to resolve discrepancies and project issues.
- Conduct and document the final inspection.
- Authorize the issuance of a Certificate of Substantial Completion noting the uncompleted punch list items.

2. Other action items. In preparing to closeout a project, there are other action items which the Resident Project Representative must undertake and which are enumerated below:

- The record drawings should be checked to insure that all changes and departures from the original contract drawings have been noted and marked on the printed set of drawings.
- Obtain all submittal documents from the Contractor that were required in the contract documents such as operating and maintenance manuals, special tools, keys, spare parts, and similar items.
- Prepare a notice of completion.
- Receive the final payment request from the contractor.

C. FINAL PAYMENT

Once the owner accepts the work and the Notice of Completion has been executed and filed, final payment(s) can be made to the Contractor. Normally, on private sector projects, there would be one final payment covering the remaining funds due, while on public projects the retainage would continue to be withheld for a specified time, usually 30 days. The following closeout steps with respect to final payment are applicable on most projects

- Get unconditional waivers of lien from all parties. If stop notice claims have been filed, get lien waivers wherever applicable.
- If stop notice claims have been filed either withhold pro-rata amounts of claims for distribution or accept stop notice release bond.
- If liquidated damages are to be assessed, deduct the amount of accumulated liquidated damages from the sum due the Contractor.

- If there are punch list items remaining to be completed, withhold 1.5 times the value of uncompleted work.
- Once punch list items have been completed, verify that all subcontractors and suppliers have been paid.
- After deducting withheld amounts, make final payment to the contractor excluding retainage.
- Obtain consent of surety before releasing retainage.
- After the holding period, if applicable, release balance of retainage.

The making of final payment and release of retainage by the owner will normally constitute a waiver of further claims by the owner, except those arising from:

- Unsettled liens or stop notice claims.
- Terms of special guarantees required by the contract documents.
- Failure of the work to comply with the requirements of the contract documents.
- Faulty or defective work appearing after substantial completion.

ADMINISTERING THE CONSTRUCTION PROJECT

EXAMINATION

After you have completed answering all of the questions, go back and check your work. Make certain that you have marked only one answer for each question. There is only one correct answer to each question. Make certain that you have answered each question. Any question that is left blank will be counted as incorrect.

A score of 70% is required to complete the course. Failing to achieve a 70% score all your answers will be erased. You will have three opportunities to achieve a passing grade. Failing to score a passing grade on the third attempt will block you from further attempts and your course fee returned to you.

Once you have successfully completed exam you will be able to print out your completion certificate. We suggest you file it electronically or print it out should be audited by your licensure board for compliance with continuing education requirements. At that time you will also be able to compare your answers to the school answers on questions you may have missed.

1. _____ is not a project delivery system.

   a. Design-Bid-Build
   b. Design Build
   c. Partnering
   d. Construction Management

2. The type of authority to be avoided in a contractual relationship is _____.

   a. legal
   b. implied
   c. contractual
   d. delegated

3. The process whereby authority may be delegated is _____ _____.

   a. stated in a written directive from the owner
   b. delineated in the construction contract
   c. issued by the Project Manager
   d. stated at the preconstruction conference.

4. With regard to the construction diary, which of the following is incorrect?

   a. use only a hard cover stitched-binding field book.
   b. no erasures should be made
   c. an entry should be made for every day the contractor performs work.
   d. all entries must be on the same day that they occur.

5. The Advertisement for Bids would be found in:

   a. Part I of the specifications
   b. conditions of the contract
   c. the legal notice section of a newspaper
   d. technical specifications

6. Specifications for a building construction project in Florida would generally use which of the following formats:

   a. Florida Building Code 2001
   b. Associated General Contractors (AGC)
   c. Southern Standard Building Code
   d. Construction Specifications Institute

7. Labor laws applicable to the construction of a building would fall into the category of:

   a. laws governing the execution of the work
   b. Davis Bacon Act of 1931
   c. Worker's Compensation Provisions
   d. equal employment opportunity laws

8. Publicly funded or administered contracts:

   a. are not limited to the authority granted to the public agency by enacting legislation.
   b. may be negotiated.
   c. are usually "informal" and minor technicalities may be waived by the agency.
   d. must conform to the general laws governing contracts in the jurisdictional area in which the project lies.

9. If an inspector is asked to review or participate in the development of the Contractor's safety program, he or she should:

   a. decline
   b. take an active role
   c. be guided by his or her principal's philosophy regarding safety programs
   d. review the program only as it complies with OSHA requirements.

10. Job site accidents should be:

    a. reported to OSHA
    b. completely documented
    c. described by means of a written report
    d. left up to the Contractor to take appropriate action

11. At the pre-bid conference, an owner should:

    a. not consider requests to substitute products
    b. answer questions regarding the plans and/or specifications
    c. respond to requests for clarification of the contract documents
    d. accept questions from the Contractor

12. At a bid opening for a public agency project, the agency shall:

a. after all bids have been read, designate the firm to which a contract award will be made.
b. read all bids received
c. waive minor technical irregularities in the bidding
d. not read bids received from non-responsive bidders.

13. The scheduling method that is generally used in the construction industry is:

a. velocity charts
b. line-of-balance charts
c. critical path method
d. bar (Gantt) charts

14. A good method of depicting job progress is by means of:

a. network diagrams
b. velocity charts
c. bar charts
d. Program Evaluation Review Technique (PERT)

15. Retention of a portion of earned funds of the contractor as a protection to the owner against failure by the contractor to perform is known as:

a. liquidated damages
b. retainage
c. the amount sufficient to cover the value of outstanding work items to be completed
d. the amount sufficient to cover the value of lien claims on file

16. The standard of quality of a project

a. is set forth in the contract documents
b. can be controlled by the Resident Project Representative
c. varies depending upon the expertise of the Contractor
d. depends upon the materials and construction methods used

17. A change order is required when

a. it is necessary to confirm a field order
b. to alter some condition of the original contract documents
c. to confirm oral changes
d. for directed changes only

18. Which of the following would not be considered as a constructive change?

a. defective plans and/or specification
b. changed standard of performance
c. change in construction sequence
d. a delay in the work

19. If the principals to a contract wanted to settle a dispute in a short period of time and with minimal cost, they would probably agree to:

a. litigate
b. arbitration
c. negotiate
d. mediation

20. The issuance of a Certificate of Completion

a. indicates that all punch list items have been completed
b. means that the final progress payment, including withheld retainage, is due
c. does not constitute substantial completion
d. releases the Contractor of responsibility for maintenance, security and safety of the work