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BUILDING DESIGN AND CONSTRUCTION HANDBOOK

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SECTION SEVENTEEN
CONSTRUCTION PROJECT MANAGEMENT

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Construction project management encompasses organizing the field forces and backup personnel in administrative and engineering positions necessary for supervising labor, awarding subcontracts, purchasing materials, record keeping, and financial and other management functions to ensure profitable and timely performance of the job. The combination of managerial talents required presupposes training and experience, both in field and office operation of a construction job. Proper construction project management will spell the difference between a successful building or contracting organization and a failure.

This section outlines practical considerations in construction project management based on the operations of a functioning general contracting organization. Wherever possible, in illustrations given, the forms are from actual files for specific jobs. These forms, therefore, not only illustrate various management techniques, but also give specific details as they apply to particular situations.

17.1 TYPES OF CONSTRUCTION COMPANIES

The principles of construction project management, as outlined in this article, apply equally to those engaged in subcontracting and those engaged in general contracting.

Small Renovation Contractors. These companies generally work on jobs requiring small amounts of capital and the type of work that does not require much estimating or a large construction organization. They usually perform home alterations or small commercial and office work. Many small renovation contractors have their offices in their homes and perform the ''paper work'' at night or on weekends after working with the tools of their trade during the day. The ability to grow from this type of contractor to a general contractor depends mainly on the training and business ability of the individual. Generally, if one is intelligent enough

to be a good small renovation contractor, that person may be expected to eventually move into the field of larger work.

General Contractors. These companies often are experts in either new buildings or alteration work. Many building contractors subcontract a major portion of their work, while alteration contractors generally perform many of the trades with their own forces.

Some general contractors specialize in public works. Others deal mainly with private and commercial work. Although a crossing of the lines by many general contractors is common, it is often in one or another of these fields that many general contractors find their niche.

Owner-Builder. The company that acts as an owner-builder is not a contractor in the strict sense of the word. Such a company builds buildings only for its own ownership, either to sell on completion, or to rent and operate. Examples of this type of company include giants in the industry, and many of them are listed on the various stock exchanges. Many owner-builders, on occasion, act in the capacity of general contractor or as construction manager (see below) as a sideline to their main business of building for their own account.

Real Estate Developer. This is a type of owner-builder who, in addition to building for personal ownership, may also build to sell before or after completion of the project. One- and two-family home builders are included in this category.

Professional Construction Manager. A professional construction manager may be defined as a company, an individual, or a group of individuals who perform the functions required in building a project as the agent of an owner, but do so as if the job was being performed with the owner's own employees. The construction management organization usually supplies all the personnel required. Such personnel include construction superintendents, expediters, project managers, and accounting personnel.

The manager sublets the various portions of the construction work in the name of the owner and does all the necessary office administration, field supervision, requisitioning, paying of subcontractors, payroll reports, and other work on the owner's behalf, for a fee. Generally, construction management is performed without any risk of capital to the construction manager. All the financial obligations are contracted in the name of the owner by the construction manager. (See Art. 17.9.)

Program Manager. A general contractor or construction manager may expand services by undertaking program management. Such services will include: demolition of existing buildings on the site; devising and providing financial analyses of new buildings or a program to replace what was there, or for the acquisition of a new site; hiring an architect and other design professionals on behalf of the owner and supervising their services; performing preconstruction services during the planning stage; advertising for and receiving bids from contractors for the new work; consulting on financing and methods of payment for the work; supervising the contractor; obtaining tenants, whether commercial, residential, or industrial for the completed project; helping to administer and manage the complete project.

Obviously, the comprehensive services outlined above will require that the general contractor or construction manager augment his staff with trained architects, accountants, real estate professionals, and management and leasing experts.

Package (Turnkey) Builders. Such companies take on a contract for both design and construction of a building. Often these services, in addition, include acquisition of land and financing of the project. Firms that engage in package building usually are able to show prospective clients prototypes of similar buildings completed by them for previous owners. From an inspection of the prototype and discussion of possible variations or features to be included, an approximate idea is gained by the prospective owner of the cost and function of the proposed building.

Package builders often employ their own staff of architects and engineers, as well as construction personnel. Some package builders subcontract the design portion to independent architects or engineers. It is important to note that, when a package builder undertakes design as part of the order for a design-construction contract, the builder must possess the necessary professional license for engineering or architecture, which is required in most states for those performing that function.

Sponsor-Builder. In the field of government-aided or subsidized building, particularly in the field of housing, a sponsor-builder may be given the responsibility for planning design, construction, rental, management, and maintenance. A sponsor guides a project through the government processing and design stages. The sponsor employs attorneys to deal with the various government agencies, financial institutions, and real estate consultants, to provide the know-how in land acquisition and appraisal. On signing the contract for construction of the building, the sponsor assumes the builder's role, and in this sense functions very much as an owner-builder would in building for its own account.

17.2 CONSTRUCTION COMPANY ORGANIZATION

How a construction company organizes for its work depends on number and size of projects, project complexity, and geographical distribution of the work.

Sole Proprietor. This is a simple form of organization for construction contractors. It is often used by subcontractors, including those licensed in plumbing, electrical, or mechanical work. The advantage of operating as a sole proprietorship is that taxes on profits are much lower for individual owners. But there is the disadvantage of having the personal exposure to potential debts associated with a disastrous job.

Partnership. This is the joint ownership and operation of a company by two or more persons. Each partner, however, is personally liable for all the debts of the partnership. Profits and losses are shared in some manner predetermined by the partners. A partnership comes to an end with the death of one of the partners. (For typical provisions to be included in a partnership agreement, see Richard H. Clough, "Construction Contracting," John Wiley & Sons, Inc., New York.)

Corporation. This is the most common form of organization used by general contractors. A corporation is an entity that has the power to act as a separate body and enter into contracts. It has perpetual life and is owned by stockholders, each of whom has a share in the profits and losses of the corporation. An important advantage of the corporate form of ownership for general contractors is the absence of personal liability of the stockholders. This is desirable because of the risks of

the contracting business, and is more than recompense for the additional burden of taxes that those taking part in corporate ownership must bear. (Small corporations can obtain some relief from Federal taxes, however.)

Corporations formed in one state must obtain, as a foreign corporation, a certificate of authority to do business in other states. This is important when bidding jobs in locations other than the home state of the contractor.

Some general contractor corporations are large enough to find it advantageous to raise capital by becoming public corporations, with shares sold over the counter or on the various stock exchanges. Such corporations publish financial reports yearly for the benefit of the stockholders, as required by law. A study of such reports is often helpful for those engaged in the contracting business.

Limited Liability Company. A form of organization known as the **limited liability company (L.L.C.),** permitted in most states, combines many of the attributes and advantages of the corporation and of the partnership. For example, the owners of an L.L.C., who are known as ''members'' after executing the required legal Articles of Organization, enter into an operating agreement in which one of their number is designated as the manager of the company.

The company does not pay taxes on its profits, but rather the individual members have the pro rata share of their percentage of ownership of the company added to their income for taxation purposes. On the other hand, there is no individual liability of any of the members for losses or debts of the company as there would be if the ownership were in the form of a partnership. Additional members may be added to or dropped from the company by a vote or written consent of 100% of all of the members.

No member, other than the manager, has any power or authority to bind the company, unless such a person has been specifically authorized in writing by the manager to act on behalf of the company. A manager may be removed in the event of his or her willful or intentional violation or reckless disregard of the manager's duties to the company. The manager's replacement will be selected by the members who originally selected the manager. Such replacement will be decided by a majority vote of the members.

Joint Venture. Often when an individual job is too large to be undertaken by one company, or the risks involved are too great for one company to want to assume (although it may be capable of doing so), a joint venture is formed. This is an association between two or more contracting firms for a particular project. It joins the resources of the venturers, who share the financing and management of the job and the profits or losses in some predetermined manner.

Generally, there are specific reasons for the formation of a joint venture between specific companies. For example, one may possess the equipment and the other the know-how for a particular job. Or one may possess the financing and the other the personnel required to perform the contract. Joint ventures do not bind the members to any debts of the coventurers other than for those obligations incurred for the particular jobs undertaken.

Staff Organization. An organization chart for a typical job by a medium-size general building contracting company is shown in Fig. 17.1. The organization shown is for a company that subcontracts most of its work and is engaged mainly in new construction.

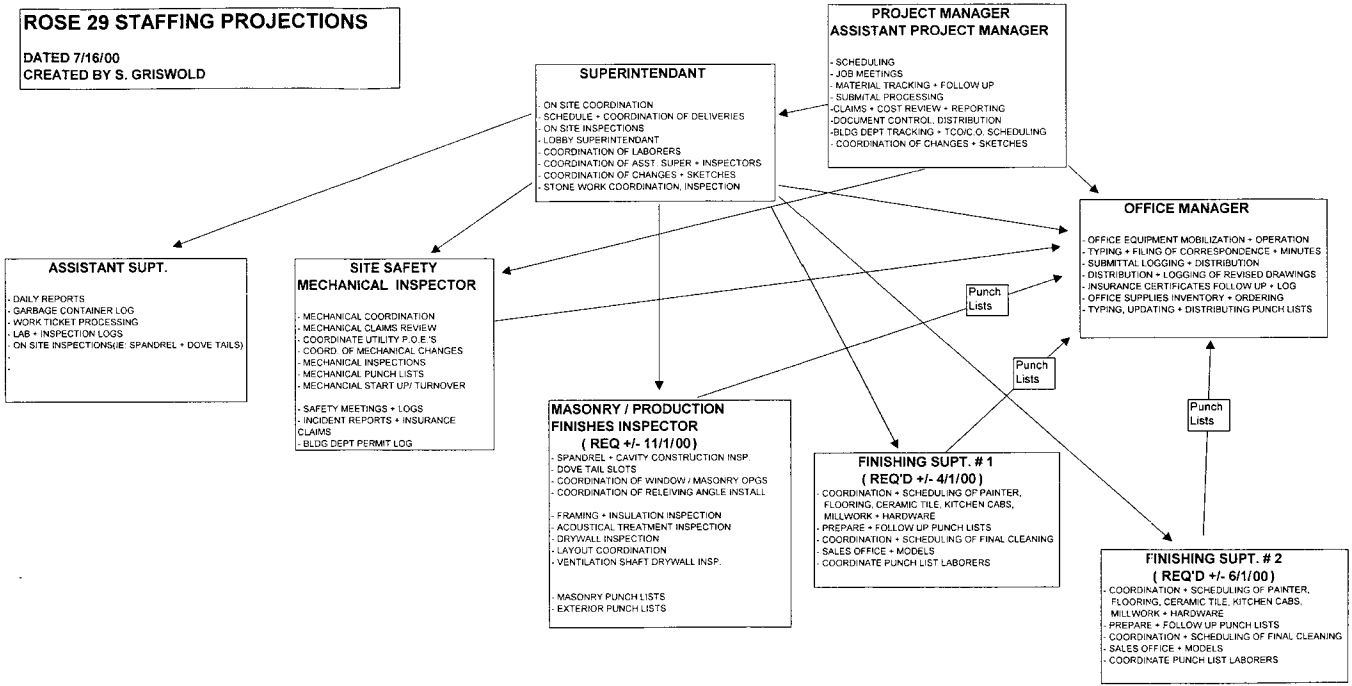

FIGURE 17.1 Organization chart for a medium-size general contracting company.

17.3 CONTRACTORS' BUSINESS CONSULTANTS

Construction contractors often have to engage experts from various disciplines to advise and assist them in conducting their business. In addition to architectural and engineering consultants, contractors usually consult the following:

Accountant. The accountant selected by a construction company should preferably be one who has had experience in contracting and construction accounting. This accountant will know the generally accepted principles of accounting applying to construction projects, such as costs, actual earnings, and estimated earnings on uncompleted construction contracts. In addition, the accountant should have an understanding of management's role to help formulate the financial picture of the firm. This role of management involves estimating the probable earnings on uncompleted jobs and the amounts of reserves that should be provided for by the accountant for contingencies on jobs that have already been completed but for which final settlements have not yet been made with all the subcontractors and suppliers.

Attorney. A construction company may find that it needs more than one attorney to handle all of its affairs. For example, it will in all likelihood have an attorney who will be retained for most of the routine matters of corporate business, such as formation of the corporation, registration by the corporation in other states, routine contract advice, and legal aid in the general affairs of the business. In addition to this, however, many construction companies require different attorneys for such phases of their activities as claims, personal affairs and estate work, real-estate and tax-shelter matters, and government programs and processing. Many of these functions are performed by attorneys who specialize in that type of work and can offer the most up-to-date advice.

Insurance and Bonding. An insurance broker who has a fairly sizable volume of business is the preferred source of insurance. Such a broker will have the greatest amount of leverage with insurance companies when questions arise about claims for losses or about requirements by insurance companies for premium deposits on policy renewals. Most general insurance brokers with a fairly large clientele should be able to handle construction company insurance.

When it comes to bonding, however, it may be advisable to deal with a firm that specializes in general contractors and their bonding problems. Often, general insurance brokers do not have much experience in this field. While surety companies, who issue bonds, are generally subsidiaries of insurance companies, bonding and insurance are guided by entirely different principles. A broker who has many clients requiring performance and payment bonds is to be preferred for meeting bonding requirements. Such a broker will be able to offer advice on the bonding companies best suited for the contractor's specific business. Also, the broker should be able to aid the contractor and the contractor's accountant in preparation of financial statements so as to show the contractor's financial position in the most favorable light for bonding purposes.

Banking. Bank accounts needed for the company's affairs should preferably be divided between two or more banking institutions. A banking relationship with more than one bank could be advantageous at times. For example, it could facilitate

a request for banking references for credit; for a bank to be available for temporary loans or for writing letters of credit; for equipment loans; and for advice on investments or for custodian accounts for the handling of surplus funds of the contractor.

Trade Associations. Many contractors find it advantageous to become a member of a local trade association or local branches of national organizations, such as the Associated General Contractors of America and the Construction Management Association of America. Before doing so, however, the contractor should investigate and be thoroughly acquainted with the rules of such associations, particularly with regard to labor bargaining.

In most cases, membership in a local trade association binds the contractor to permit that association to do all of its labor-contract bargaining with local labor unions and the various construction trades. Furthermore, if there is a strike by any of the local labor organizations, the members must obey the dictates of the association and may be required to join in the association's stand against the strikers. On the other hand, a contractor who is not a member of the local association is free to bargain individually with the trade unions involved and can sign their contract as an *independent.* Often, labor unions, during a strike, will be willing to offer an interim contract to independent contractors under which terms the contractor will be able to resume work on agreeing to be bound by the terms of the labor agreement consummated to settle the strike, effective retroactively.

17.4 SOURCES OF BUSINESS

For continuity of operation, a construction organization needs a supply of new projects to build. After a company has been in existence for a long time and built up a reputation, new business may come to it with less effort. But most companies must work hard at obtaining new jobs. Furthermore, work that happens to come in may not be of a type that the organization prefers. To find that type requires serious, skillful efforts.

To be successful, a contracting company should have a person specifically assigned to attract new business. This person might be the proprietor of the construction company. In large firms, a complex organization with sales and public relations personnel, backed up by engineers and cost estimators, is used. The organization should be geared to follow up on all possible sources of new business.

Public Works. The following sources for leads to new jobs and submitting proposals can be used for public work bids:

Dodge Bulletin, or other construction industry newsletters.

ENR—"Pulse" and "Official Proposals" sections.

Bid invitations, as a result of requests to be placed on bid-invitation mailing lists of various government agencies.

Newspaper and trade-paper announcements and articles.

Official publications of government agencies that contain advertisements of contracts to be bid.

Private Contracts. All the sources for public works.

Contacts with and letters to architects and designers.

Contacts with and letters to owners and facilities personnel.

Personal recommendation.

Sponsorship. Applying for sponsorship of any of the following:

Government-encouraged housing programs.

Urban redevelopment.

Purchase of land, with financing of building construction to be provided by various government programs.

Owner-Builder/Developer

Construction and rental of apartment buildings.

Construction and rental of commercial and office facilities.

Construction and leasing of government buildings.

Professional Construction Manager

Applications to city and state agencies or large corporations awarding this type of contract.

All the sources for obtaining private contracts.

Program Manager

Applications to city, state, and federal agencies who are awarding this type of contract.

All resources for obtaining private contracts as well as government contracts.

Uses of Dodge Bulletin. From a typical *Dodge Bulletin* (McGraw-Hill Information Systems Company, New York), a subscriber to this daily information bulletin can gain the following information:

Contracts for which general contract and prime bids for mechanical and electrical work, etc., are being requested. A contractor interested in any of these types of work can obtain the plans and specifications from owners or designers, whose names and addresses are given, and submit a bid.

For contracts awarded, lists of names of contractors and amounts of contracts. Subcontractors or material suppliers who are interested in working for the contractors can communicate with those who have received the awards.

Lists of jobs being planned and estimates of job costs. Contractors and subcontractors who are interested in jobs in those locations and the sizes indicated can communicate directly with the owner.

Additional information that may be obtained from the *Dodge Bulletin* includes lists of subcontractors and suppliers being employed by general contractors on

other jobs that are already under way, and tabulation of the low bidders on jobs bid and publicly opened.

17.5 WHAT CONSTITUTES THE CONTRACT DOCUMENTS?

Generally, plans and specifications for a project are completed before issuance to contractors. This, however, is not always the case. For example, during the course of design, the architect may distribute progress plans and specifications for review by government agencies or for pricing by contractors. Sometimes, the owner may be anxious to enter into a contract or start a job before the plans and specifications have been totally completed or approved. Therefore, to the general contractor, the most important thing to be alert to regarding plans and specifications is: What constitutes the agreed-upon plans and specifications and other contract documents that pertain to the project?

It is surprising how often this question is neglected by those entering into construction contracts and by attorneys and others concerned with signing of contracts. A clear understanding of what constitutes the contract documents and the revisions, if any, is one of the most urgent aspects of construction contracting. Furthermore, a precise list of what constitutes the contractor's obligation under the contract is essential to proper performance of the contract by the contractor.

In general, the contract documents should be identified and agreed to by both parties. A listing of the contract documents should be included as part of every contract. Contract documents generally include the following:

Plans (list each plan and revision date of each plan, together with title)

Specifications, properly identified, a copy initialed by each party and in the possession of each party

The agreement, or contract (Art. 17.8)

General conditions

Soil borings

Existing site plan

Special conditions

Original proposal (if it contains alternatives and unit prices, and these are not repeated in the contract)

Invitation (if it contains data on completion dates or other information that is not repeated in the contract)

Addenda (if any)

The contractor should repeat and list the contract documents in each subcontract and purchase order (Arts. 17.10.1 and 17.11).

It is essential to have a properly drawn and understood list of the contract documents agreed to by all parties if construction management is to proceed smoothly and if changes and disputes are to be handled in an orderly manner (Art. 17.14). To prevent misunderstandings and doubts as to which documents are in the possession of various subcontractors and suppliers for estimating, a properly drafted

TRANSMITTAL

Kreisler Borg Florman
CONSTRUCTION COMPANY
97 Montgomery Street, Scarsdale, New York 10583 / Telephone (914) SC 5-4600

TO: Lipsky & Rosenthal, Inc.
155 Utica Avenue
Brooklyn, N Y 11213

ATT: Mr. D. G.
Mr. A. H.

DATE February 25,

RE: Combined School and Apartment, New York, N Y

WE ARE SENDING YOU THIS DATE THE FOLLOWING:

- [X] BLUEPRINTS
- [ ] BOOKLETS
- [ ] TEST REPORTS
- [ ] SPECS
- [ ] CATALOGUE CUTS
- [ ]
- [ ] SAMPLES
- [ ] LETTERS

SENT FOR THE FOLLOWING REASON:

- [ ] YOUR APPROVAL
- [ ] APPROVED AS NOTED
- [X] YOUR INFORMATION
- [ ] YOUR FINAL APPROVAL
- [ ] DISAPPROVED
- [ ] YOUR USE
- [ ] APPROVED
- [ ] RESUBMIT
- [ ]

NUMBER COPIES	DRAWING NUMBER	PREPARED BY	DESCRIPTION
1 Set	A-1 thru A-10 Dated 2/18/	Carl Puchall & Assoc.	School Preliminary Plans
1	7 of 12 Rev. 10/18/	" " "	Typical Apartment Floor Plan
1	9 of 12 Rev. 1/17/	" " "	Sub. Cellar Garage

REMARKS: We would appreciate your budget figure for referenced project, as soon as possible. Price must be broken down to School portion and Residential portion.

Thank you.

Kreisler Borg Florman
CONSTRUCTION COMPANY

BY _____

TITLE Estimator

FIGURE 17.2 Form for submittal of contract documents to subcontractors and suppliers.

transmittal form should accompany each transmission of such documents (Fig. 17.2).

17.6 MAJOR CONCERNS WITH BUILDING CODES

Contractors should have a working knowledge of a variety of building codes. In most cities and municipalities, there is a local building code. It also may be the same as the state code.

Local and state codes usually govern most of the construction activities of a contractor, in addition to the requirements of the plans and specifications. The contractor's task of satisfying code regulations, however, is made more difficult because most building codes continually undergo significant changes. Consequently, contractors should be alert to such changes and have sources that provide them with information on the new regulations.

In addition, local and state building codes provide means for enforcing compliance of contractors with code requirements. Usually, such enforcement takes the form of inspections by building inspectors, affidavits by architects and engineers that construction has been performed consistent with the code, and submission of plans, specifications, and details to building officials for their approval before construction starts.

It is only after all code requirements have been complied with and all required approvals have been obtained that a contractor will receive a Certificate of Occupancy for a completed building. Before this, however, approval of the work may also have to be obtained from other local officials: Fire Department for sprinklers, fire alarms, and exit and elevator safety; Health Department for food-handling and kitchen equipment; Environmental Protection Agencies for boiler and incinerator emissions; Police Department for fire and sprinkler alarms.

See also Art. 1.10.

17.7 ESTIMATING, BIDDING, AND COSTS

Methods of preparing cost estimates for building construction are described in Sec. 19. It is advisable to have the routine to be followed in preparing cost estimates and submitting bids well established in a contractor's organization.

Particular attention should be given to the answers to the question: For whom is the estimate being prepared and for what purpose? The answers will influence the contractor as to the amount of time and effort that should be expended on preparation of the estimate, and also indicate how serious the organization should be about attempting to negotiate a contract at the figure submitted. Decision on the latter should be made at an early date, even before the estimate is prepared, so that the type of estimate can be decided.

Bid Documents. The documents should be examined for completeness of plans and specifications, and for the probable accuracy that an estimate will yield from the information being furnished. For example, sometimes contract documents are sent out for bid when they are only partly complete and the owner does not seriously

intend to award a contract at that stage but merely wishes to ascertain whether construction cost will be acceptable.

Preparation of the Top Sheet. This is usually based on an examination of the specifications table of contents. If there are no specifications, then the contractor should use as a guide top sheets (summary sheets showing each trade) from previous estimates for jobs of a similar nature, or checklists.

Subcontractor Prices. Decide on which trades subbids will be obtained, and solicit prices from subcontractors and suppliers in those trades. These requests for prices should be made by postcard, telephone, or personal visit.

Decide on which trades work will be done by the contractor's own forces, and prepare a detailed estimate of labor and material for those trades.

Pricing. Use either unit prices arrived at from the contractor's own past records, estimates made by the members of the contractor's organization, or various reference books that list typical unit prices (''Building Construction Cost Data,'' Robert Snow Means Co., Inc., P.O. Box G, Duxbury, Mass. 02332). Spreadsheets of unit prices for various types of work on different structures may be maintained by a contractor. These can be updated electronically with new wage and material costs, depending on the program used, so that prices can be applied nearly automatically.

Hidden Costs. Carefully examine the general conditions of the contract and visit the site, so as to have a full knowledge of all the possible hidden costs, such as special insurance requirements, portions of site not yet available, and complicated logistics.

Final Steps. Receive prices for materials and subcontracts.

Review the estimate and carefully note exclusions and exceptions in each subcontract bid and in material quotations. Fill in with allowances or budgets those items or trades for which no prices are available.

Decide on the markup. This is an evaluation that should be made by the contractor, weighing factors such as the amount of extras that may be expected, the reputation of the owner, the need for work on the part of the general contractor, and the contractor's overhead.

Finally, and most importantly, the estimate must be submitted in the form requested by the owner. The form must be filled in completely, without any qualifying language or exceptions, and must be submitted at the time and place specified in the invitation to bid. Figure 17.3 shows part of an estimate and bid summary produced for a multistory apartment building by a computer.

17.8 TYPES OF BIDS AND CONTRACTS

Contractors usually submit bids for a lump-sum contract or a unit-price-type contract, when based on complete plans and specifications.

When plans and specifications have not yet advanced to a stage where a detailed estimate can be made, the type of contract usually resorted to is a cost-plus-fee type. The bid may be based on either a percentage markup the contractor will receive over and above costs, or may include a lump-sum fee that the contractor charges over and above costs. Sometimes an incentive fee is also incorporated,

sys #	trade / description	qty	unit	u/p	cost	cost/sf
02	**Demolition and Removals**					
	demolition & removals	n.i.c.			0	
	sub-total demolition and removals				**0**	**0.00**
03	**Foundation and Slab On Grade**					
	site clearing, grubbing & removal	21,640	sf	0.25	5,410	
	sheeting	12,820	sf	25.00	320,500	
	underpinning	720	cf	25.00	18,000	
	basement excavation, backfill & dispose	11,200	cy	35.00	392,000	
	foundation excavation, backfill & dispose	1,000	cy	45.00	45,000	
	pits & trenches excavation, backfill & dispose	1	ls	10,000.00	10,000	
	xc rock excavation	1,200	cy	60.00	72,000	
	porous fill under building slab on grade	400	cy	35.00	14,000	
	foundation drainage system	700	lf	10.00	7,000	
	concrete footings	470	cy	450.00	211,500	
	concrete piers	280	cy	500.00	140,000	
	concrete foundation walls	580	cy	600.00	348,000	
	concrete slab on grade	21,640	sf	6.50	140,660	
	concrete pit walls & slabs	32	cy	500.00	16,000	
	sub-total foundation and slab on grade				**1,740,070**	**6.72**
04	**Superstructure**					
	concrete slabs, shear walls, beams & columns	259,000	sf	23.00	5,957,000	
	miscellaneous metals	259,000	sf	2.00	518,000	
	sub-total superstructure				**6,475,000**	**25.00**
05	**Exterior Walls**					
	face brick	69,200	sf	18.00	1,245,600	
	cmu back-up walls	69,200	sf	12.00	830,400	
	granite building base	820	sf	75.00	61,500	
	limestone columns panels	460	sf	175.00	80,500	
	canopy	1	ea	15,000.00	15,000	
	roll-up doors	3	ea	3,500.00	10,500	
	aluminum & glass storefronts	2,300	sf	60.00	138,000	
	xc a/g entrance doors	8	pr	3,500.00	28,000	
	xc a/g revolving door	1	ea	35,000.00	35,000	
	aluminum & glass double-hung windows	36,170	sf	36.00	1,302,120	
	caulking	112,000	sf	0.75	84,000	
	sub-total exterior walls				**3,830,620**	**14.79**
06	**Moisture Protection and Skylight**					
	mechanical room waterproofing	1,030	sf	12.00	12,360	
	waterproofing parking deck surfacing	6,240	sf	4.00	24,960	
	metallic waterproofing	350	ea	20.00	7,000	
	bituminous dampproofing	13,560	sf	1.00	13,560	
	roofing / roof insulation / sheet metal flashings	21,640	sf	18.00	389,520	
	roof garden allowance	1	ls	250,000.00	250,000	
	sub-total moisture protection and skylight				**697,400**	**2.69**
07	**Interior Partitions, Doors and Finishes**					
	cmu walls	21,100	sf	12.00	253,200	
	rough carpentry & drywalls	265	du	10,000.00	2,650,000	
	finish carpentry, wood doors & bi-fold doors	265	du	1,000.00	265,000	
	h.m. door frames & h.m. doors	265	du	500.00	132,500	

FIGURE 17.3 Output from a computer spreadsheet program of an estimate and bid summary (partial).

allowing owner and contractor to share, in an agreed-on ratio, the cost savings achieved by the contractor, or to reward the contractor for completing the project ahead of schedule.

Evaluation of bids by an owner may take into consideration the experience and reputation of the contractor, as a result of which awards may not be made on a strictly low-bid basis.

Budget Estimate. Often, an owner in preparing plans and specifications will want to determine the expected construction cost while the plans are still in a preliminary stage. The owner, in that case, will ask contractors for a cost estimate for budget

purposes. If the estimate from a specific contractor appears to be satisfactory to an owner, and if the owner is desirous of establishing a contractual relationship with the contractor early in the planning stage so as to benefit from the contractor's suggestions and guidance, a contract may be entered into after the submission of the estimate.

On the other hand, the owner may refrain from formally entering into the contract, but may treat the contractor as the "favored contractor." When requested, this contractor will assist the architect and engineers with advice and cost estimates and will expect to receive the contract for construction on completion of plans and specifications, if the cost of the project will lie within the budget estimate when plans and specifications have been completed.

Separate Prime Contracts. Sometimes an owner has the capability for managing construction projects and will take on some of the attributes of a general contractor. One method for an owner to do this is to negotiate and award separate prime contracts to the various trades required for a project. Administration of these trades will be done either by the owner's own organization or by a construction manager hired by the owner (Art. 17.9).

Sale Lease-Back. This is a method used by some owners and government agencies to obtain a constructed project. Prospective builders are asked to bid not only on cost of construction, but also on supplying a completed building and leasing it to the prospective user for a specified time. This type of bid requires a knowledge of real estate analysis and financing, as well as construction. Contractors who bid may have to associate with a real estate firm to prepare such a bid.

Developer/Sponsor-Builder. In this type of arrangement (Art. 17.1), the contractor may not only have to prepare a construction-cost estimate but may also need a knowledge of real estate and be prepared to act as owner of the completed project, in accordance with the terms of a sponsor-builder agreement with a government agency, or government-assisted neighborhood or nonprofit group.

The following types of contracts are used for general construction work:

Letter of Intent. This is used where a quick start is necessary and where there is not sufficient time for drafting a more detailed contract. A letter of intent also may be used where an owner wishes material ordered before the general contract is started, or where the commitment of subcontractors requiring extensive lead time must be secured immediately.

Lump-Sum Contract. (For example, Document A-101, American Institute of Architects, 1735 New York Ave., N.W. Washington, D.C. 20006.) Basis of payment is a stipulated sum. Progress payments, however, are made during the course of construction.

Cost-plus-Fixed-Fee Contract. (For example, A-111, American Institute of Architects.) This type of agreement is used generally with an "up-set" or "guaranteed maximum" price. The contractor guarantees that the total cost plus a fee will not exceed a certain sum. (See types of bids, preceding.) Generally, there are provisions for auditing of the construction costs by the owner.

Cost-plus-Percentage-of-Fee Contract. (For example, A201, American Institute of Architects.) Similar to cost-plus-fixed-fee contracts, but the fee paid, instead of being a lump sum in addition to the cost, is a percentage of the costs.

Unit-Price Contract. This type of agreement is used where the type of work involved is subject to variations in quantities and it is impossible to ascertain the total amount of work when the job is started. Bids will be submitted by the contractors on the basis of estimated quantities for each classification of work involved. On the basis of the unit prices submitted and the estimated quantities, a low bidder will be chosen for award of the contract. After the contract has been completed, the final amount paid to the contractor will be the sum of the actual quantities encountered for each class of work multiplied by the unit prices bid for that class.

Design-Construction Contracts. This type of agreement is used for turnkey projects and by package builders (Art. 17.1). Cost estimates must be prepared from preliminary plans or from similar past jobs. Preparation of these estimates requires high skill and knowledge of construction methods and costs, because the usual methods for preparing cost estimates do not apply.

Construction Management Contracts. Under this type of agreement, the construction entity serves as construction manager, acting as an agent of or consultant to the owner, for a fee plus reimbursement of General Conditions items. The construction manager may negotiate an additional fee for extras (Art. 17.9).

Program Management Contracts. This type of agreement contemplates that the program manager will serve as the agent or consultant to the owner or the government agency. Usually the compensation is a fee plus reimbursement of all costs and General Conditions items. The program manager may negotiate an additional fee for additional services that may be requested by the owner.

17.9 PROFESSIONAL CONSTRUCTION MANAGERS

A professional construction manager (CM) is an individual or organization specializing in construction management or practicing it on a particular project as part of a project management team that also includes an owner and a design organization. A prime construction contractor or a funding agency may also be a member of the team. (See Art. 1.13.)

As the primary construction professional on the project management team, the CM provides the following services or such portion thereof as may be appropriate to the specific project:

1. The CM works with the owner and the design organization from the beginning of the design concept through completion of construction and closeout, providing leadership to the construction team on all matters relating to construction, keeping the project management team informed, and making recommendations on design improvements, value engineering, construction technology, schedules, and construction economies.

2. The CM proposes construction and design alternatives to be studied by the project management team during the planning phase and analyzes the effects of these alternatives on the project cost, schedule, and life-cycle cost.

3. After the project budget, schedule, and quality requirements have been established, the CM monitors subsequent development of the project to ascertain that those targets are not exceeded without knowledge of the owner.

4. The CM advises on and coordinates procurement of equipment and materials and the work of all contractors on the project. Also, the CM may monitor payments to contractors, changes ordered in the work, contractors' claims for extra payments, and inspection for conformance with design requirements. In addition, the CM provides current cost and progress information as the work proceeds and performs other construction-related services required by the owner, such as furniture, fixtures, and equipment interfacing.

The CM normally engages other organizations to perform significant amounts of construction work but may provide some or all of the site facilities and services specified in the General Conditions of the construction contract and is usually reimbursed by the client for these costs.

The advantages of engaging a CM over conventional construction with a general contractor (see Art. 1.4) are as follows:

The CM treats project planning, design, and construction as integrated tasks, which are assigned to a project management team. The team works in the owner's best interests from the beginning of design to project completion. The contractual relationships between the members of the team are intended to minimize adversary relationships and to contribute to greater responsiveness within the team. In this way, the project can be completed faster and at lower cost. (See also Art. 2.19.)

(D. Barry and B. C. Paulson, ''Professional Construction Management,'' Journal of the Construction Division, American Society of Civil Engineers, September 1976.)

17.10 CONTRACT ADMINISTRATION

Administration of construction contracts requires an intimate knowledge of the relationship of the various skills required for the construction, which involves labor, material suppliers, and subcontractors. Feeding into the job are all of the life-supplying services. Whether the contractor combines one or more of the jobs in more than one person is immaterial.

Construction project management that will result in a profitable, on-time job involves the organization and interplay of many talents. Activities of engineers, architects, field supervisors, construction labor, material and equipment suppliers, and subcontractors, aided by accountants, attorneys, insurance and bonding underwriters, design professionals, and the owner, must be organized and carefully coordinated.

Those who succeed in this complex and difficult business are the ones who familiarize themselves thoroughly with the daily operations of their jobs. They are constantly learning by reading the latest professional journals, keeping abreast of legislative developments and governmental regulations affecting the construction business, and attending seminars on industry functions. They are alert and open-minded about new ideas. They understand the needs of different clients and design professionals and are able to tailor services to them.

The task of the contractor, principal, or partner is to be familiar with and have responsibility for legal, bonding, insurance, and banking requirements of the firm. The contractor feeds into the job necessary organization and policy decisions. This contribution, when added to what is fed into the job by the project manager (progress), bookkeeping (money), superintendent (progress), clerical (correspondence and records), architect and engineers (plans and approvals), building department (approvals and inspection), and the owner (money), is essential for job progress.

Planning of the job is dealt with in Art. 17.10.2. Profit and loss of the job are controlled in the manner described in Art. 17.19.

17.10.1 Subcontracts

A contractor who engages others (subcontractors) to perform construction is called a general contractor. General contractors usually obtain subcontract bids as well as material-price solicitations during the general-contract bidding stage. Sometimes, however, general contractors continue shopping after award of the general contract to attain budget goals for the work that may have been exceeded during the initial bidding stages. In such cases, additional bids from subcontractors are solicited after the award of contract.

Purchasing Report. Contractors would find it advantageous to approach purchasing of subcontracts with a purchasing report (Fig. 17.4). This report should list everything necessary to be purchased for the job, together with a budget for each of the items. As subcontracts are awarded, the name of the subcontractor is entered, and the amount of the subcontract is noted in the appropriate column. Then, the profit or loss on the purchase is later entered in the last column; thus, a continuous tabulation is maintained of the status of the purchases.

These priorities are indicated in Fig. 17.4 by the numbers in the left column.

Bid Solicitation. Bids are generally solicited through notices in trade publications, such as *Dodge Bulletin,* or from lists of subcontractors that the contractor maintains. Solicitation also can be by telephone call, letter, or postcard to those invited to bid. Where the owner or the law requires use of specific categories of subcontractors, bids have to be obtained from qualified members of such groups.

After subcontractor bids have been received, careful analysis and tabulation are needed for the contractor to compare bids fairly (Fig. 17.5).

Kreisler Borg Florman General Construction Company, Inc.
Purchasing Report

Project Project Name
Location Project Location

spec #	trade / description	purchasing budget	s/c	contract amount	difference
02200	earthwork	1,695,000	awarded s/c name	1,687,500	7,500
02520	concrete sidewalks	139,000	awarded s/c name	180,000	-41,000
03300	cast-in-place concrete (foundations)	in 02200	awarded s/c name	in 02200	0
03310	cast-in-place concrete (superstructure)	6,000,000	awarded s/c name	6,000,000	0
04200	masonry	2,015,000	awarded s/c name	2,015,000	0
04405	exterior standing stonework	253,000	awarded s/c name	249,500	3,500
05500	metal fabrications	410,000	awarded s/c name	409,500	500
05700	ornamental metal work	in 07500	awarded s/c name	in 07500	0
05710	ornamental railings	in 05500	awarded s/c name	in 05500	0
05720	exterior canopy	15,000	awarded s/c name	15,000	0
20002	light fixtures allowance	200,000	awarded s/c name	200,000	0
20003	roof garden / landscaping allowance	200,000	awarded s/c name	200,000	0
20004	lobby allowance	250,000	awarded s/c name	250,000	0
20005	health club allowance	100,000	awarded s/c name	100,000	0
		28,074,000		27,474,009	599,991

FIGURE 17.4 Purchasing report. Numbers in first column indicate specification sections in purchasing subcontracts, materials, and equipment.

Work	Bids Received			Comments	Low Bid	Difference from Budget
Roofing	Abbott Sommer	Kings County	Colonial			
Roof & terrace	146, 500		152, 896			
	Parapet		4-ply 133, 976			
	Al. coping		Al. coping 18, 920			
	Scupper		Sidewalk & tenant			
Pavers			garden			
Sidewalk-tenant	MRMRCD 23, 000	13, 950	waterproofing			
Garden waterprfg.	1/4 Prot. Bd.	3" Rig. Ins.	included.			
	Insulation?	1/8" Bd.	No insulation.		152, 896	7, 898
Moisture Protection	Abbott Sommer	Kings County				
Spandrel flashing	20 mil 21, 500	17, 050*		*Window sill flashing		
Dampproofing	6, 500	7, 800		If supply only		
Caulking		36, 600		-4, 200.		
Backer rod		13, 500				
		74, 950			74, 950	4, 950
Window	Mannix	Loxscreen	Traco			
	945, 000	1.014, 750	949, 700			
	(tax included)					
	Include louver					
	Al. stools (inside)	Al. stools?	Al. stools?			
	Excludes Al. copings	Al. coping?	No			
	If windows are full					
	height (-100.000)				945, 000	20, 000
Doors & Bucks	Acme	Firedoor				
	Tower 46, 750	48, 750				
	YMCA 6, 250	6, 250				
	53, 000	55, 000 + tax				
	Seam on edge (-1, 900)					
	Tower: 543 Fr.2x3 door					
	2 borrow lites					
	YMCA: 53 Fr. 19 doors				53, 000	3, 000
	3 panel				Tax 4, 372	

FIGURE 17.5 Analysis of subcontractor bids.

In a complicated trade, such as Moisture Protection, shown in Fig. 17.5, it is necessary to tabulate, from answers obtained by questioning each of the bidders, the exact items that are included and excluded. In this way, an evaluation can intelligently be made, not only of the prices submitted but also as to whether or not the subcontractors are offering a complete job for the section of work being solicited. Where an indication in the subcontractor's proposal as in Fig. 17.5 shows that a portion of the work is being omitted, it is necessary to cross-check the specifications and other trades to be purchased to ascertain that the missing items are covered by other subcontractors.

Subcontract Forms. Various subcontract forms are available for the written agreements. A commonly used form is the standard form of agreement between contractor and subcontractor (Contractor-Subcontractor Agreement, A401, American Institute of Architects). A short form of subcontract with all the information appearing on two sides of one sheet is shown in Fig. 17.6*a* and *b*. Changes may be made on the back of the printed form with the permission of both parties to the agreement.

Important, and not to be neglected, is a subcontract rider (Fig. 17.7), which is tailored for each job. Only one page of the rider is shown in Fig. 17.7. The rider takes into account modifications required to adapt the standard form to the specific project. The rider, dealing with such matters as options, alternatives, completion dates, insurance requirements, and special requirements of the owner or lending agency, should be attached to all copies of the subcontract and initialed by both parties.

One additional clause that should appear in all subcontracts is the following:

Kreisler Borg Florman

CONSTRUCTION COMPANY (INC.)

97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600 DATE August 31,

TO: Brisk Waterproofing Co Inc
720 Grand Avenue
Ridgefield, New Jersey

PROJECT: East Midtown Plaza Stage II, Project #HRB 66-14B
24th & 25th Sts betw. 1st & 2nd Aves, New York, NY

SUBJECT TO CONDITIONS ON REVERSE SIDE HEREOF, YOU ARE AUTHORIZED TO PROCEED WITH THE WORK AS DESCRIBED BELOW IN CONNECTION WITH THE ABOVE PROJECT, THE COST OF WHICH IS TO BE $ 4,000.00

FOUR THOUSAND DOLLARS

DESCRIPTION

HYDROLITHIC IRON TYPE WATERPROOFING (Specification Division 5, Section 35) and all such work shown on the Plans, Specification, Specification Addenda 1, 2, 3 and 4, Construction Contract, General Conditions of the Contract, Invitation, Contractor's Loan Agreement, Bid Form, Performance and Payment Bond, and Subcontract Rider. If Performance and Payment Bond is required premium is to be paid by Contractor.

As a condition precedent to the duty of performance of the work hereunder the Contractor shall be awarded and execute a contract for the work of the project.

Subcontractor agrees to include at no additional cost any further details or corrections to the plans and specifications resulting from requirements of the Building Department or Housing and Development Administration and agrees to be bound by final plans and specifications when they are completed and approved.

This work includes the H.I.T. waterproofing of two elevator pits, 1 ejector pit and laundry troughs and curbs as indicated on plans. In connection with this work, light, water, heat, pumping and power to be furnished to us without charge. Floor slabs to be left raked by others.

PLEASE SIGN EXTRA COPY OF THIS ORDER AND RETURN TO KREISLER-BORG AT ONCE.
PLEASE SEND US CERTIFICATES OF INSURANCE FOR WORKMEN'S COMPENSATION, PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE.

ALL OF THE ABOVE MATERIALS TO BE DELIVERED OR THE WORK COVERED BY THIS ORDER ARE TO BE COMPLETED IN ACCORDANCE WITH PLANS, SPECIFICATIONS AND ALL CONTRACT REQUIREMENTS BETWEEN US AND THE OWNER, BY ALL OF WHICH YOU AGREE TO BE BOUND UPON ACCEPTANCE OF THIS ORDER.

Kreisler Borg Florman (CONTRACTOR)
CONSTRUCTION COMPANY (INC.)

BY R F Borg
Robert F. Borg, President

ACCEPTED:
BRISK WATERPROOFING CO INC
SUBCONTRACTOR

BY R W Ehrenberg
R. W. Ehrenberg, V.P.

DATE: 9/6/

(over)

FIGURE 17.6*a* Front side of short form for a subcontract.

CONDITIONS OF CONTRACT

Within five days after the date of this contract and before commencement of the work, the subcontractor agrees to furnish the contractor with a certificate showing that he is properly covered by Workmen's Compensation Insurance as required by the law of the State where the work is to be performed and with such other insurance that may be required by Contractor, the specifications and terms of contract between Contractor and the Owner.

Where the order covers the furnishing of labor and materials on a time and material basis, it is distinctly understood the subcontractor will furnish daily vouchers for verification and signature to an authorized representative of Contractor showing labor used and materials installed in the work. A copy of these signed vouchers to be presented with invoice, together with duplicate bills for materials furnished. Contractor shall have the right to examine all records of the subcontractor relating to said charges.

Where this order is issued to a subcontractor, and purports to cover labor and materials in addition to the original contract, it is given with the express understanding that, should it subsequently be proven that the work covered herein is in the subcontractor's original contract, this order becomes null and void.

Should the subcontractor or material dealer at any time refuse or neglect to supply an adequate number of properly skilled workmen or sufficient materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, the Contractor shall in its exclusive opinion be at liberty after three days' notice to the subcontractor or material dealer to provide any such labor or materials in accordance with such notice and to deduct the cost thereof from any money then due or to become due to the subcontractor or material dealer under this contract, any excess cost to Contractor will be immediately paid by the subcontractor or material dealer.

Where this order covers materials only, it is agreed that the materials will be delivered F. O. B. job unless otherwise ordered, in such quantity and at such times as may be authorized by this company's representative. It is further understood that in all cases, quantities of materials mentioned herein are approximate only and the dealer agrees that deliveries will be based upon actual needs and requirements of the work.

It is understood that no claims for extra work performed or additional materials furnished shall be made unless ordered in writing by an officer or authorized representative of the Contractor.

TERMS OF PAYMENT: Payments to subcontractors will be made monthly to the amount of 85% of the value of the work and materials incorporated in the building during the previous calendar month. Final balance to become due and payable within sixty days after the subcontractor has completed his work to the entire satisfaction of the architects, engineers, other representatives of the Owner and Contractor.

All payments covering subcontractor's work and/or material shall be payable only after the Contractor has received corresponding payments from the Owner.

The subcontractor hereby accepts exclusive liability for the payment of all taxes now or which may hereafter be enacted covering the labor and material to be furnished hereunder, and any contributions under the New York State Unemployment Insurance Act, The Federal Social Security Act, and all legislation enacted either Federal, State or Municipal, upon the payroll of employees engaged by him or materials purchased for the performance of this contract, and agrees to meet all the requirements specified under the aforesaid acts or legislation, or any acts or legislation which may hereafter be enacted affecting said labor and/or materials. The subcontractor will furnish to the Contractor, any records the Contractor may deem necessary to carry out the intent of said acts or legislation and hereby authorizes the Contractor to deduct the amount of such taxes and contributions from any payments due the subcontractor and to pay same direct or take any such precaution as may be necessary to guarantee payment.

Samples and details are to be submitted to Contractor, if requested, and approval must be secured before proceeding with the work.

If inferior work or material is installed or furnished and allowed to remain, the Owner and/or Contractor at its option, may reject such work and/or material or are to be allowed the difference in value between cost of work and/or material installed or furnished and cost of work and/or material specified or ordered.

The subcontractor will furnish all labor, materials, tools, scaffolds, rigging, hoists, etc. required to carry on the work in the best and most expeditious manner and furnish protection for his and other work, and will do all necessary cutting and patching and also remove and replace any interfering work, for the proper installation of his work. The subcontractor will remove all rubbish from premises in connection with his work. The subcontractor agrees to perform work in a safe and proper manner and save the Owner and Contractor harmless against all penalties for violation of governing ordinances and all claims for damages resulting from negligence of the subcontractor, or his employees, or accidents in carrying on his work.

The subcontractor agrees to repair, replace or make good any damages, defects or faults resulting from defective work, that may appear within one year after acceptance of work or for such additional period as may be required by Owner or by the specifications relating to same.

Time is of the essence of this agreement.

All labor employed shall be Union labor of such type and character as to cause no Union or jurisdictional disputes at the site of the work.

The subcontractor shall furnish all labor, material and equipment and permits and pay all fees and furnish all shop drawings, templates, and field measurements incidental to the work hereby let to it that the Contractor is required to perform and furnish under the General Contract, and whatever the Contractor is required to do or is by the General Contractor bound in and about the work hereby let to the Subcontractor shall be done by the Subcontractor without any extra charge.

Any controversy or claim arising out of or relating to this contract, or breach thereof, shall be settled by arbitration in the City of New York in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any Court having jurisdiction thereof.

The Subcontractor expressly covenants and agrees to file no lien of any nature or kind for any reason whatsoever arising out of this contract for matters and things related thereto and does hereby expressly and irrevocably constitute the Contractor as its agent to discharge as a public record any lien which may have been filed by it for any reason or cause whatsoever.

FIGURE 17.6*b* Back side of the short form for the subcontract.

This subcontract shall be subject to all the terms and conditions of the prime contract between the general contractor and the owner insofar as that contract shall be applicable to the work required to be performed under this subcontract, it being the intention that the subcontractor shall assume to the general contractor all obligations of the general contractor to the owner insofar as the work covered by this subcontract is concerned and that the subcontractor shall be bound by all rulings, determinations, and directions of the architect and/or owner to the same extent the general contractor is so bound.

Also, the list of drawings (Fig. 17.8) should not be neglected. The content of the exact contract drawings should never be left in doubt. Without a dated list of

Canaan IV Apartments
115th St. and Lenox Ave.

The printed part of this contract is hereby modified and supplemented as follows. Wherever there is any conflict between this rider and the printed part of the subcontract, the provisions of this rider are paramount and the subcontract shall be construed accordingly:

31. *ARTICLE 3 shall be amended by the addition of the following:*
The reference herein to payments to the contractor for the owner shall be deemed to be absolute conditions precedent to the contractor's obligation to pay the subcontractor herein, it being understood distinctly that said provision shall not be deemed to relate solely to the timing of the payments due from the contractor to the subcontractor, but, shall be deemed to relate to the contractor's liability therefor. The contractor shall not be liable to the subcontractor until and unless it receives the said payments from the owner.

32*a* *ARTICLE 10 OF STANDARD FORM OF SUBCONTRACT, eliminate and replace by:*
The subcontractor agrees to indemnify and save harmless the Owner and the Contractor against loss or expense by reason of the liability imposed by law upon the Owner, Contractor, their partners, representatives, agents, employees, officers, and directors, for damage because of bodily injuries, including death at any time resulting therefrom accidentally sustained by any person or persons or on account of damage to property arising out of this work, whether such injuries to person or damage to property are due or claimed to be due to any negligence of the subcontractor, the Owner, Contractor, their partners, representatives, agents, employees, officers and directors, or any other person. The foregoing, however, shall not be deemed a covenant, promise, agreement, or understanding that the subcontractor shall indemnify and save harmless the Owner, Contractor, their partners, representatives, agents, employees, officers, and directors, for damage resulting from their sole negligence.

32*b* The subcontractor agrees to obtain and maintain at his own expense and until the completion of this project the following insurance:

(I) Worker's Compensation with Employer's Liability coverage as required by State Statute.

(II) Comprehensive General Liability covering the Subcontractor's operations, sublet operations, completed operations and contractual [as described in 10*a* above]. This insurance shall be in the minimum amount of:
With respect to bodily injury $3,000,000 each occurrence
With respect to property damage $1,000,000 each occurrence
With respect to property damage, coverage for explosion, collapse and damage to underground utilities shall be included.

(III) Fire, extended coverage, theft insurance, etc. on subcontractor's equipment, forms, and temporary facilities.

FIGURE 17.7 Subcontract rider.

the drawings that both parties have agreed to have embodied in the subcontract, disputes may later arise.

See also Arts. 17.11 and 17.14.

17.10.2 Project Management

In a small contracting organization, project management is generally the province of the proprietor. In larger organizations, an individual assigned to project management will be responsible for one large job or several small jobs.

A project manager is responsible in whole or in part for the following:

2/1/99

10 EAST 29TH STREET
47-STORY BUILDING
LIST OF DRAWINGS

Dwg.#	Title	Date	Rvsd.
	Lovell-Belcher Survey	5/1/89	
	Lovell-Belcher Survey	6/24/93	
	Lovell-Belcher Survey	3/5/98	
	Roland Link Survey	6/1/96	
Z-1	Zoning Calculations	4/20/98	
Z-2	Fl.Areas & Dwelling Unit Sched.Av.Curb Level	4/20/98	
Z-3	New Building Gross Floor ARea	4/20/98	
A-1	General Notes, Legend, Drawing List	4/20/98	1/25/99
A-2	Survey	4/20/98	1/25/99
A-3	Site Plan	4/20/98	1/25/99
A-4	Handicapped Requirements	6/12/98	1/25/99
A-101	Subcellar Plan/Cellar Floor Plan	4/3/98	1/25/99
A-102	lst Floor Plan	4/3/98	1/25/99
A-203	West Elevation	4/3/98	1/25/99
A-204	South Elevation	4/3/98	1/25/99
A-205	Building Sections	6/19/98	1/25/99
A-206	Detail North Elevation (at base)	8/11/98	10/22/98

FIGURE 17.8 List of drawings (partial) for construction of a project.

Progress schedule (Fig. 17.14 or 17.15).

Purchasing (Arts. 17.10.1 and 17.11).

Arranging for surveys and layout.

Obtaining permits from government agencies from start through completion of the job.

Familiarity with contract documents and their terms and conditions.

Dealing with changes and extras.

Submission of and obtaining approvals of shop drawings and samples, and material certifications.

Conducting job meetings with the job superintendent and subcontractors and following up decisions of job meetings. Job meetings should result in assignments to various individuals for follow-up of the matters discussed at the meetings. Minutes kept of the plans of action discussed at each meeting should be distributed as soon as possible to all attending. At the start of the following job meeting, these minutes can be checked to verify that follow-up has been properly performed. Figure 17.9 illustrates typical job-meeting minutes. Figure 17.16 is a computer printout of a program "Expedition," registered by Primavera Systems, Inc., which shows the submittal status of drawings for a building project.

Construction Productivity. One of the principal tasks of the construction manager is coping with labor availability and productivity. Added to this is the increased complexity of modern construction, particularly in the structural and mechanical phases. These increasingly complex factors, however, can be kept within the contractor's control by efficient management tools, including scheduling and monitoring techniques.

KBF JOB MEETING

Kreisler Borg Florman Date: August 19,

UNITED CEREBRAL PALSY

Present: Robert F. Borg, John V. Cricco, John A. Nowak, Robert W. Hewet, Barbara Brandwein

Spec. Section	Item of Work	Remarks	RWH	JVC	JAN	BB	GR
2A	Preliminary Work						
2B	Excavating, Bckfl., Grading/HOWNOR:	PH check subs & suppliers paid before check issued.					
2C	Site Improvement LA STRADA:	see page 3					
2D	Topsoil, Seed, Plant.	RWH push for decision w/Vella.	X				
3A	Concrete & Cement HOWNOR:	Make open items/omissions list.					X
3B	Precast Con. Plank KOEHLER:						
4A	Masonry KOEHLER:	see page 3					
5A	Misc. Metal UNITED:	One section stair rail still remains					X
5B	Struct. Steel UNITED:						
6A	Carpentry BE-MI:	RWH call Bellona re: pulls. Install. bi-fold heads & shelves. Expedite 6th & 1st	X				X
6A	Millwork METALOC	fl. bi-folds. Measure handrail.					X
6B	Kitchen Cabinets BOISE CASCADE:	Follow up approval of pull.				X	
7A	Roofing & Sheet Metal/ COLONIAL:						
7B	Dampproof KINGS COUNTY:	Waterprf. lobby flr. at main entrance					X
7C	Wall Wtpf. KINGS COUNTY:						
7D	Caulking & Sealants KINGS COUNTY:	Make open items list.					X
8A	HM Door Frames WILLIAMSBURG:	Expedite 3 missing frames					X
8B	HM Doors WILLIAMSBURG:	Expedite 6 missing doors.					X
8C	Alum. Entrances LOXCREEN:	Expedite install. Q.T. & entrances.					X
8D	Alum. Windows LOXCREEN						
8E	Glass & Glazing LOXCREEN:	Make open items list.					X
8F	Finish Hardware SEECO:	Make open items list.					X

FIGURE 17.9 Minutes of a job meeting.

On a complex construction project for which thousands of items are to be procured, approved, manufactured, delivered, and installed, satisfactory use of computers can be made. An effective system for monitoring the time and cost of a project from design through procurement and installation, consisting of one data bank from which four reports are drawn, is as follows:

Purchasing/Cost Report. This report lists the various items to be procured and sets target dates for bidding and award of contracts. It keeps track of the budget and actual cost for each item. A summary prepared for top management provides totals in each category and indicates the status of the purchasing.

Expediting/Traffic Report. This report lists the items once they are purchased and gives a continual update of delivery dates, shop drawing and approval status, shipping information, and location of the material when stored either on or off the site.

Furniture, Fixture, and Equipment List. This report, which is normally used when the job involves a process or refinery, can also be used for lists of equipment in a complex building, such as a hospital or hotel. The report describes all the utility information for each piece of equipment, its size, functions, intent, characteristics, manufacturer, part number, location in the finished job, and guarantees, as well as information relating to its source, procurement, price, and location or drawing number of the plan it appears on.

Accounting System. The system consists of a comprehensive series of accounting reports, including a register for each supplier, and shows all disbursements. This information is used in preparing requisitions for progress payments. It also can be used to report costs of the job to date and to make predictions of probable costs to complete.

All of the above reports can be integrated from start to finish and synchronized with each other.

Project Time Management. After construction operations commence, there should be a continual comparison of field performance with the established schedule. When the schedule is not being met, some method should be used to make management aware of this and correct schedule lags. The corrective actions and rescheduling phases are known as project time management.

The monitoring phase of time management involves periodic measurement of actual job progress and comparison with the planned objectives. The only way that this can be done positively is to determine the work quantities put into place and to report this information for comparison with work quantities anticipated in the job schedule. Then, a determination can be made of the effect of the current status of the job on the completion date for the project. Any corrective actions necessary can then be planned and implemented, after which the schedule can be updated.

Computer-calculated network activities provide a convenient basis for measuring progress and for issuance of reports (Art. 17.12). The network diagram should be corrected as needed so that the current job schedule reflects actual job status.

(R. H. Clough and G. A. Sears, "Construction Project Management," John Wiley & Sons, Inc., New York.)

Computerized Project Management Control System. This system combines project scheduling with cost controls, resource allocation controls, and a contract-progress statistical reporting system so as to yield total control over time, cost, resources, and statistics.

Time. The time aspect of the system is designed to produce, through project scheduling, a set of time objectives, a visual means of presenting these objectives, and the devising and enforcing of a corrective method of adhering to the objectives in order that the desired results will be achieved, as described previously (Project Time Management).

Cost. These are summary costs monitored by budget reports, produced monthly and distributed to the owner. In addition, detailed reports for construction company management list costs under each class of construction activity and are used by

project managers and field, purchasing, and top management personnel. A report on probable total cost to complete the project is intended for all levels of construction company personnel but is used primarily by those responsible for corrective action.

Resource Allocation. For the purpose of resource allocation, a graphical summary should be prepared of projected monthly manpower for individual activities and also of the estimated quantities of work to be in place for all trades on a cumulative basis. An update of these charts monthly will indicate which trades have low work quantities in place, so that these lagging trades may be augmented with the proper number of workers to permit them to catch up with and adhere to the schedule.

Statistics. From the information received from the preceding reports, an accurate forecast can be made of the probable construction completion date and total cost of the project.

Software and programs for computerized preparation of all the preceding reports can be developed by company personnel or by outside consultants.

17.10.3 Field Supervision

A field superintendent has the most varied duties of anyone in the construction organization. Responsibilities include the following: field office (establishment and maintenance); fencing and security; watchmen; familiarity with contract documents; ordering out, receiving, storing, and installing materials; ordering out and operation of equipment and hoists; daily reports; assisting in preparation of the schedule for the project; maintenance of the schedule; accident reports; monitoring extra work; drafting of backcharges; dealing with inspectors, subcontractors, and field labor; punch-list work; quality control; and safety.

Familiarity with contract documents and ability to interpret the plans and specifications are essential for performance of many of the superintendent's duties. (The importance of knowing the contract documents is discussed in Art. 17.5.) Should work being required by the architect, owner, or inspectors exceed the requirements of the contract documents, the superintendent should alert the contractor's office. A claim for pay for extra work, starting with a change-order proposal, may result (Art. 17.14.2).

The daily reports from the superintendent are a record that provides much essential information on the construction job. From these daily reports, the following information is derived: names of persons working and hours worked; cost code amounts; subcontractor operations and description of work being performed; materials received; equipment received or sent; visitors to the job site; other remarks; temperature and weather; accidents or other unusual occurrences. Figure 17.10 shows a typical daily report.

Back-Charges. Frequently, either at the request of a subcontractor or because of the failure of a subcontractor to perform, work must be done on behalf of a subcontractor and the subcontractor's account charged. If the work performed and the resultant back-charge is at the request of the subcontractor, then obtaining the information and the agreement of all parties to a back-charge order (Fig. 17.11) is easy.

If, however, there is a dispute as to whether or not the work is part of the obligation of the subcontractor, then the task becomes more complicated. Backcharges in this situation should be used sparingly. Sending a back-charge to a subcontractor under circumstances that are controversial is at best only a self-

DAILY REPORT

Kreisler Borg Florman
CONSTRUCTION COMPANY (INC.)
97 Montgomery Street. Scarsdale. New York 10583
Telephone (914) SC 5-4600

JOB No. 182 SHEET 1 OF 1
JOB NAME Coney Island Site 17 WEATHER Fair
SUPTS NAME H. L. TEMP. A.M. 38° P.M. 49°

KREISLER BORG FLORMAN OPERATIONS

	CLASS	EMPLOYEE'S NAME	HRS.	COST CODE	EXPLANATION	TOTAL HOURS	RATE	AMOUNT
1	Proj. Mgr.	J. C.						
2	Secty	M. R.						
3	Secty	P. W.			UTSCO deliv. 500' of .018 S/S base flashing			
4	Supt.	H. L.			for Sepia			
5	Asst.	D. W.						
6	Lab.	J. F.	7		Sweeping & scraping 10th & 11th fl.			
7	Lab.	V. C.	7		Sweeping & cleaning floors for bathroom layout			
8	Lab.	B. M.	8		on the 17th & 18th fls.light salamanders and			
9	Lab.	C. T.	7		change propane cylinder on 2nd, 3rd & 4th fls.			
10	Lab.	E. M. (1)	7		Cleaning "C" type window for installation of hopper frame on the 6th & 7th floors			

SUBCONTRACTOR OPERATIONS

SUB'S NAME & WORK FORCE	WORK PERFORMED
Island Security (4) 4 ~~Watchmen~~	2 shifts, 3PM to 5AM
Alwinseal 2 ~~Ironworkers~~	setting 19th floor windows;installing hopper frames on 6th fl. level Bldg "C"
Lieb 2 Ironworkers (1) (1) (1)	Setting roof level lintels;Stair platform frame at Mech.Rm.
Lipsky 1-15-3-17 Plb.	C.I.test 13th fl. thru roof Bldg B;installing gas risers 16th, 17th fls Blds.A,B,C; setting tubs 16th fl;maint.temp. water
Lefferts Waterproofer	Spandrel waterproofing south end "C" east side of B & A at roof level & mech.room slab level at bldg C.
Public Improvement (5) (5) 2-12-8 elec.	Installing conduits & corrective work 2nd & 3rd fl. working with sheetrock crew;misc.corrective work on 6th flr; pulling wire on 10th flr. bldgs B & C; nippling on 14th & 15th fl; layout for nippling on 15th & 16th flr; fabrication work;maint. temp. lights
Star-Circle 2-26 (4) Carp	Sheetrock 2nd flr; framing stairs 2 to 3 & 3 to 4 flr; framing kit.3 fl; sheetrock bathrms 3 fl; installing insul & sheetrock back of stairs 4 fl; fire cod'g duct risers 5 flr & framing 5 flr.apts; layout of bathrooms on 17 & 18 flrs.
Bafill 26-2-27 Brklyrs (7) (2)	Laying face brick and backup block to roof level at Building A West side of Building B
1-19 M.Tender 1 Hst.Eqr. (7)	Brickwk. at bulkhead to mech.rm. slab level at building C
	Block work at elev.shafts 7 & 8 flr. of buildings A,B & c
Dic 2 carp. 4 lab.	Framing & grouting pipe & duct openings on 10th flr; cleaning inserts at roof level.

REMARKS

Reid - 3 engr. Took settlement readings with Raamot's Engr.
Active - 2 carp. Installing storefront frames at 1st flr. of Bldgs B & C
Tropey Continue excavating for Con Edison vault at 24th St near Bldgs B & C

MATERIAL RECEIVED	VISITORS
	F. B - UDC
153 men on jobsite	F. F - Bafill
40 minority	

DATE Jan. 16 20 DAY Tuesday
PROJ. MGR. INITIAL
REPORT No. 266 OVER ☐
SUPT. SIGNATURE Superintendent

FIGURE 17.10 Daily report, prepared by a construction superintendent.

BACK CHARGE ORDER

PAGE 1 OF 1

Kreisler Borg Florman
CONSTRUCTION COMPANY
97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600

NAME OF COMPANY TO BE BACKCHARGED Universal Ductwork Corporation
LOCATION Bronx Municipal Hospital Center Pelham Parkway So & Eastchester Rd, Bronx, NY (JOB NAME) JOB NO. 173
PERFORMED BY General Contractor (INSERT GENERAL CONTRACTOR OR NAME OF SUBCONTRACTOR) DATE January 22,

LABOR

NAME OF EMPLOYEE	OCCUPATION	HOURS WORKED	RATE OF PAY	AMOUNT
John M	Laborer	7		

MATERIALS, SUPPLIES AND/OR EQUIPMENT

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
2	Ballpoints	$7.50	

COMPLETE DESCRIPTION OF WORK DONE THIS DATE

Chopped holes in existing wall for new ducts, Room 301

THIS BACK CHARGE WORK HAS BEEN PERFORMED AND THE COST HAS BEEN DEDUCTED FROM THE MONEY DUE YOU ON THIS JOB

(SIGNED) _____ (SUBCONTRACTOR'S SUPERINTENDENT OR TRADE FOREMAN)

UNIVERSAL DUCTWORK CORP. (NAME OF SUBCONTRACTOR)

BY _____ (SIGNATURE OF K-B REPRESENTATIVE)

January 22, (DATE) Superintendent (TITLE)

NUMBER 173-6

AT YOUR REQUEST ☒
BECAUSE OF FAULTY WORK BY YOU ☐
BECAUSE OF YOUR FAILURE TO DO THE WORK DESCRIBED ☐
OTHER, AS FOLLOWS: ☐

UNLESS WE RECEIVE YOUR WRITTEN PROTEST WITHIN 3 DAYS IT WILL BE ASSUMED THAT YOU ACCEPT THE CHARGE.

FIGURE 17.11 Back-charge order for work done by a contractor on behalf of a subcontractor.

serving declaration, and in all likelihood will be vigorously disputed by the subcontractor.

17.11 PURCHASE ORDERS

Issuance of a purchase order differs from issuance of a subcontract (Art. 17.10.1). A purchase order is issued for material on which no labor is expected to be performed in the field. A subcontract, on the other hand, is an order for a portion of the work for which the subcontractor is expected not only to furnish materials but also to perform labor in the field. An example of a purchase order form, front and back, is shown in Fig. 17.12*a* and *b*.

For the specific project, a purchase order rider (like Fig. 17.7) and list of contract drawings (Fig. 17.8) should be appended to the standard purchase order form. The rider describes special conditions pertaining to the job, options or alternates, information pertaining to shop drawings, or sample submissions and other particular requirements of the job.

Material-price solicitations are handled much in the same manner as subcontract-price solicitations (Art. 17.10.1). Material bids should be analyzed for complicated trades in the same manner as for subcontracts (Fig. 17.5).

To properly administer both the subcontract and the purchase orders, which may number between 40 and 60 on an average building job, it is necessary to have a purchasing log (Fig. 17.13) in which is entered every subcontract and purchased order after it has been sent to the subcontractor or vendor. The entry in the log is copied from the file copy of the typed document, and an initial in the upper right-hand corner of the file copy indicates that entry has been made. The log serves as a ready cross reference, not only to names of subcontractors and vendors but also to the amounts of their orders and the dates the orders were sent.

Computers in Purchasing. On a large-scale construction project, which costs many millions of dollars, thousands of items may have to be procured. Also, information, shop drawings, and part lists may have to be distributed and revised, redistributed, approved, and distributed again. Systems have been developed to use computers to keep track of all equipment and materials and related purchase information, such as specifications, quotations, final orders, shipment, and delivery dates.

The systems are based on the concept of critical-path items, and the various tasks that must be performed are assigned due dates. For example, a computer report could be by project and show all open purchase-order items for one project, or by buyer name, with all open purchase-order items for each buyer, including all projects.

In negotiating and awarding either a subcontract or a material purchase, the contractor should take into account the scope of the work, list inclusions properly, note exceptions or exclusions, and, where practicable, record unit prices for added or deleted work. Consideration should be given to the time of performance of units of work and availability of workers and materials, or equipment for performing the work. Purchase orders should contain a provision for field measurements by the vendor, if this is required, and should indicate whether delivery and transportation charges and sales taxes are included in the prices.

KBF Nº 3002 **PURCHASE ORDER**

Kreisler Borg Florman

97 Montgomery Street, Scarsdale, New York 10583 Telephone (914) SC 5-4600 **CONSTRUCTION COMPANY, INC.**
(herein referred to as "Purchaser")

TO Construction Products Co.
Route #7 Att: Mr. Alan Fishkin
Brookfield, Connecticut

DATE 180

(referred to herein as "Vendor") JOB NO.

Please enter our order for the following materials, subject to the terms and conditions and all of the provisions set forth herein and in accordance with all pertinent provisions of the contract dated 6/9/81 entered into between purchaser and Construction for Progress, Inc.
(referred to herein as "The Owner") for the construction of (Name of project and shipping address)
13-Story Apartment Building, 170th Street to 172nd Street and 93rd Avenue, Jamaica New York

(Which contract, together with all plans, specifications and all provisions and documents incorporated or referred to therein is referred to herein as the "Principal Contract").

QUANTITY	DESCRIPTION	PRICE (Unit or Lump Sum)
	REFUSE CHUTE HOPPER DOORS, ACCESS DOOR AND SPARK ARRESTOR (Specification Division 23, Section 10), furnished, fabricated, and delivered, and all such work shown on the Plans, Specifications, AIA General Conditions, Modifications to AIA General Conditions, General Conditions, Contract and Rider.	
	This order is based on the following:	
	Twelve (12) 15"x18" hopper doors and frames One (1) 12"x12", 1-1/2 hr. fireproof self-closing access door and sleeve One (1) explosive vent	
	Five (5) hoppers to have sprinkler heads installed.	
	The price for this material FOB job site will be	$1,350.00
	Shop drawings and sample hopper door to be submitted immediately.	

The price(s) set forth above shall constitute payment in full for the prompt and proper furnishing of the materials hereunder in accordance with the terms of this Purchase Order. If unit prices are set forth above, Vendor agrees to be bound by the quantities of such items which may be certified by the Owner as having been properly furnished under the terms of the Principal Contract, it being understood in such event that unit quantities set forth above are estimated and used only for convenience in determining the approximate amount of this Purchase Order and that the actual quantities required may substantially vary, upward or downward from the estimated quantity.

If no price is set forth above, it is agreed that Vendor's price will be the lowest prevailing market price and in no event is the order to be filled at higher prices than last previously quoted or charged without Purchaser's consent.

This order shall not become effective unless within ten (10) days from the date of execution hereof by Purchaser as set forth below, Purchaser receives the acknowledgment copy hereof, unconditionally executed by an officer of Vendor. If Purchaser does not so receive the executed acknowledgment hereof, the offer contained herein is withdrawn and shall thereafter be renewed only by written statement to such effect made by Purchaser.

TIME OF DELIVERY: approximately six to eight weeks.

THE ABOVE IS HEREBY ACCEPTED
VENDOR CONSTRUCTION PROD. CO. INC.
BY [signature] VICE PRES
DATE 9/28/82
(Name and Title)

TERMS OF PAYMENT: Regular
Kreisler Borg Florman CONSTRUCTION COMPANY, INC.
BY [signature]
(Name and Title) President

1. ACKNOWLEDGMENT MUST BE SIGNED AND RETURNED BEFORE INVOICES WILL BE PAID. 2. PURCHASE ORDER NUMBER MUST APPEAR ON ALL INVOICES.
3. THERE MUST BE A SEPARATE INVOICE FOR EACH PURCHASE ORDER.

VENDOR

FIGURE 17.12*a* Front side of a purchase order.

TERMS AND CONDITIONS

The purchase orders is subject to the following terms and conditions and by accepting this Purchase Order, Vendor agrees to be bound by each and every of said terms and conditions.

1. Acceptance of this Purchase Order by Vendor in time and manner hereinbefore specified shall constitute the only possible manner of acceptance hereof and Purchaser will in no way be responsible or indebted to Vendor for any materials or samples thereof furnished by Vendor or for any work or services performed by Vendor in the absence of such acceptances, it being understood that Vendor shall in such event make no claim against the Purchaser.

2. This Purchase Order may only be accepted by Vendor unconditionally and exactly as written. Any additional or different terms or conditions stated by Vendor are hereby objected to and rejected and the statement by Vendor of such additional terms and conditions shall be deemed to constitute a rejection of the offer contained therein, even if accompanied by the acknowledgement copy hereof executed by Vendor.

3. The principal contract has been, is and will be available for review by Vendor at Purchaser's office during normal business hours. By accepting this order, Vendor acknowledges that it has read the Principal Contract and is fully aware of each and every of its provisions which in any way bear upon or relate to the materials to be furnished hereunder and Vendor understands and agrees that all of such provisions of the Principal Contract are applicable hereto and made a part hereof as if expressly set forth herein in full, including but not limited to the general provisions of the Principal Contract dealing with the subject project as a whole as well as the special provisions and parts thereof specially relating to the materials to be furnished hereunder and Vendor agrees to furnish said materials as if it were the contractor named in the principal contract, with Vendor hereby assuming the same obligations, undertakings, warranties, guarantees, risk and liabilities to the Purchaser as Purchaser has assumed to the Owner in addition to any other obligations, undertakings, warranties, guarantees, risks and liabilities provided for herein or otherwise provided as a matter of Law. In the event of any conflict between the Provisions of this Purchase Order and of the Principal Contract, this Purchase Order shall control. It is understood that if the Principal Contract affords to the Owner the right to approve a Vendor, then the Purchase Order is conditioned upon such approval and in the event the Owner does not so approve, then this Purchase Order shall be null and void and of no force or effect and Vendor shall have no rights whatsoever against Purchaser and of all the materials hereunder and/or any samples thereof, if any, which have previously been furnished by Vendor, may be returned to Vendor at Vendor's sole risk and expense and Vendor shall have no claim of any sort against Purchaser.

4. All materials hereunder shall be furnished in strict accordance with the Principal Contract and to the satisfaction of both Purchaser and the Owner. Both the Owner and Purchaser have the right to inspect the materials hereunder at Vendor's place of manufacture and/or at any time prior to delivery to the job and/or after delivery to the job and/or after installation in the project and in the event that the materials are rejected in whole or in part by the Owner and/or the Purchaser as not conforming to the requirements hereof, such materials may be returned to Vendor at Vendor's sole risk and expense. In such event all costs incurred by Purchaser in testing and/or inspecting the materials shall be for the account of Vendor. Purchaser reserves the right to elect to keep non-conforming materials or some portion thereof rather than returning them to Vendor. In such event, in addition to all other liabilities provided for hereunder and under the law otherwise, Vendor shall be charged for the difference between the value of the delivered non-confirming materials and the value of such materials would have had had they conformed to the requirements of this purchase order. Notwithstanding anything to the contrary hereunder or under the Law otherwise, Purchaser is not required to inspect and/or reject the materials hereunder within any particular period of time and delay in such inspection and/or rejection shall in no way limit Vendors obligation to furnish materials which strictly conform to the requirements hereof and shall in no way constitute an acceptance of non-conforming goods, nor shall payment to Vendor for or utilization by Purchaser of any or all of the materials hereunder be deemed an acceptance thereof. Vendor shall, at its own expense, arrange for an assist in all testing of materials hereunder as required under the Principal Contract or when requested by Purchaser and/or the Owner.

5. Unless hereinbefore expressly stated to the contrary, Purchaser shall, within ten (10) days after receiving payment therefor from the Owner, pay to the Vendor eighty-five (85%) percent of the amount due in accordance with the prices set forth above, for materials furnished and delivered by Vendor and Vendor shall not be so entitled to said payment or any portion thereof unless and until Purchaser is paid by the Owner for such materials. The remaining fifteen (15%) percent of said payment shall be paid to Vendor within ten (10) days after Purchaser receives payment from the Owner of all retained percentages under the terms of the Principal Contract. Before any partial of final payment, Vendor shall furnish written proof satisfactory to Purchaser that all labor and all suppliers of material, equipment and/or services in connection with the materials hereunder have been paid in full and that there are no claims outstanding against it in connection with the materials hereunder.

6. Vendor shall be entitled to no price increases or escalators of any kind in connection with the furnishing of the materials hereunder nor shall Vendor be entitled to reimbursement for boxing or packing costs or cartage charges or taxes of any type (including any Federal, State or local taxes and including but not limited to Sales or Use Taxes), all of such costs and expenses and all other costs and/or expenses which might be incurred by Vendor in connection with the furnishing of the materials hereunder being included in the consideration set forth on the reverse side hereof, payment of which consideration shall constitute payment in full for the furnishing of the materials hereunder. Vendor represents that the price charged for the items or services covered by this Purchase Order, is the lowest price charged by Vendor to buyers of a class similar to Purchaser under conditions to those specified in this Purchase Order and that prices comply with applicable Government regulations in effect at time of quotation, sale or delivery. Vendor agrees that any price reduction made in merchandise covered by this order subsequent to the placement of this Purchase Order will be applicable to the Purchase Order.

7. The number of this Purchase Order must appear on all invoices and if more than one purchase order has been issued by Purchaser to Vendor, there must be separate invoices for each order. Written evidence (such as delivery receipts) of delivery of the materials hereunder to Purchaser must be attached to all invoices.

8. Unless a specific delivery date or period of delivery is expressly specified herein, Vendor shall within five (5) days after being notified so to do by Purchaser, deliver the subject material or any portion thereof in such amounts and at such times as Purchaser may direct. It is understood that such time of delivery is of the essence and shall be determined by the requirements of the Principal Contract and that Purchaser shall be the sole judge thereof. Delivery shall be made FOB job site. Vendor shall unload, uncrate and stock pile in the places and manner requested by Purchaser.

9. Purchaser is under no obligation to accept any delivery exceeding the quantity specified in this Purchase Order and reserves the right to return, at Vendor's expense, part or all of any amount so delivered. Unless the entire order can be filled, Purchaser is under no obligation to accept delivery of any part thereof, unless previously consented to in writing and Purchaser reserves the right to return, at Vendor's expense, part or all of any such delivery. Material must be delivered as per instructions and if not so delivered, any extra handling costs incurred by Purchaser will be billed back to Vendor.

10. Vendor shall prepare and submit all samples and drawings and any other back-up data when and as required by the Principal Contract and/or when and as otherwise required by Purchaser or Owner and Vendor shall perform any and all other matters necessary in order to have the materials hereunder approved by the Owner. All of the preparation, submissions and other work, materials and/or services under or in connection with this paragraph shall be at the sole expense of Vendor. Unless otherwise agreed in writing, all special dies, molds, patterns, jigs, fixtures, and any other property furnished to the Vendor by the Purchaser, or specifically paid for by the Purchaser for use in the performance of this Purchase Order, shall be and remain the property of Purchaser, shall be subject to removal upon Purchaser's instructions; shall be used only in filling orders from Purchaser; shall be held at Vendor's risk, and shall be kept insured by Vendor at the Vendor's expense while in its custody or control in an amount equal to the replacement cost thereof, with loss payable to Purchaser. Copies of policies or certificates of such insurance will be furnished to Purchaser on demand.

11. Vendor agrees to employ workmen and to use materials and work practices and delivery methods which shall not in any manner cause or contribute to strikes or other labor disturbances by workmen employed by Purchaser and/or by subcontractors of Purchaser or by any other contractors involved in the subject project. Union labels shall be affixed to the materials hereunder if Purchaser so requires. Vendor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. Vendor will take affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin.

12. If the Owner makes or causes to be made changes or issues or causes to be issued orders or directions, any of which effect the materials to be furnished hereunder, this Purchase Order shall be deemed to be modified accordingly. If such modification causes an increase or a decrease in the cost of furnishing the materials hereunder, then in lieu of all claims and demands which vendor might otherwise have or make, Vendor shall accept in full satisfaction and discharge of all such claims and demands, the amounts, if any, as may be allowed by the Owner to the Purchaser on account of Vendor's claims and demands. If such modification causes a decrease in the cost of furnishing the materials hereunder, Vendor shall accept and be bound by the Owner's determination as to the amount of money to be deducted on account thereof. Vendor agrees to accept the Owner's determination, as aforesaid, in full and complete discharge and release of Purchaser's liability to Vendor by reason of such modification and agrees to be bound and concluded thereby and agrees never to look to Purchaser on account thereof, except for such monies, if any, as the Owner may pay to Purchaser in satisfaction of Vendor's claims and demands. Vendor agrees to immediately comply with all orders and directions of Purchaser in any way bearing upon the material to be furnished hereunder, including but not limited to, orders or directions modifying the materials hereunder, irrespective of whether Vendor shall dispute same in any particular (including but not limited to Vendor claiming additional reimbursement therefor), it being understood that the furnishing of the materials hereunder is not to be held up pending the resolution of such dispute.

13. In addition and without prejudice to all other warranties expressed or implied by Law, Vendor warrants that all materials covered by this Purchase Order will strictly conform to the requirements set forth in the Principal Contract and will be of the best quality and workmanship and free from defects and fit for the intended purposes. All warranties, both expressed and implied, aslo constitute conditions and shall survive inspection, acceptance and payment and shall inure to Purchaser and the Owner. Without limitation of any rights by reason of any breach of warranty or otherwise, material or articles which are not as warranted may at any time be returned to Vendor at Vendor's expense for credit, correction or replacement, as Purchaser may direct. This warranty shall remain in effect for one (1) year from the date of acceptance of all work under the Principal Contract unless a longer period of warranty is contained in the Principal Contract, in which event such longer period shall govern.

14. Vendor shall observe and comply with all Federal, State, Municipal and Local Laws, orders, rules, ordinances and regulations and those of all pertient bureaus, agencies and departments, which in any way relate to the furnishing of the materials hereunder.

15. Vendor undertakes and agrees to defend at Vendor's own expense and to indemnify and hold Purchaser, its bonding company and the Owner harmless from and in connection with all claims, suits, actions, and proceedings in which Purchaser, and/or Purchaser's bonding company and/or the Owner are made defendants for actual or alleged infringement of any U.S. or foreign letters patent or copyright or trade secret or unfair competition resulting from the use or sale of the materials purchased hereunder and Vendor further agrees to pay and discharge any and all judgments or decrees which may be rendered in any such suit, action or proceedings against such defendants. The provisions of this paragraph shall apply whether or not Purchaser furnishes any specification to Vendor.

16. Vendor shall promptly pay for all labor, materials, equipment, services and all other charges it incurs in connection with the furnishing of the materials hereunder. All payments received by Vendor hereunder shall be held by Vendor as trust funds for the payment of such labor, materials, equipment, services and all other charges incurred by Vendor in connection with the furnishing of the materials hereunder and shall not be applied to any other purposes until all of Vendor's obligations in connection with the materials hereunder are satisfied. Vendor agrees that it shall file no lien in connection herewith and that it shall file no notice or claims with the Owner or with Purchaser's bonding company. Vendor further agrees that if a lien is filed by any third person or entity for whom Vendor obtains labor, materials, equipment or services in connection with the materials to be furnished hereunder, then Vendor shall at its own expense and immediately after being notified by Purchaser of the existence of such lien, take all steps necessary to discharge or vacate such lien including but not limited to, furnishing a lien bond if necessary to discharge such lien. If such lien is filed by a third party and is not discharged or vacated within five (5) days after Vendor is notified as to its existence, Purchaser may take the steps necessary to discharge or vacate such lien and charge to Vendor all costs in connection therewith, including attorney's fees. Further to the above, Vendor agrees to assume the entire responsibility and liability for and defense of and to indemnify and hold Purchaser and Purchaser's bonding company harmless from any and all demands, claims, liens and/or charges which may be filed, made or asserted against Purchaser and/or its bonding company and/or the Owner, for or in connection with the materials hereunder, which demands, claims, liens and/or charges may be filed and/or asserted by any third person or entity, including but not limited to demands, claims, liens and/or charges for payment for labor, equipment, materials or services as well as those for personal injury (including death) and/or property damage in any way related to the materials hereunder. If at any time there should be any such lien, demand, claim or charge, Purchaser shall have, in addition to all other rights, the right to retain out of any payment then due or which thereafter might become due to Vendor, an amount sufficient in Purchaser's opinion to fully indemnify it against any loss in connection therewith. If Purchaser so elects, it may make payment directly to such third persons or entities in order to resolve such third party claim and such payment shall be for the account of Vendor.

17. Vendor agrees that it shall not delegate or sublet or assign this Purchase Order, or any of its obligations or rights hereunder or any portion of such right or obligations, without prior written permission of Purchaser. Any such delegation, subletting or assignment without prior written permission of Purchaser shall vest no rights against Purchaser and any third party.

18. In the event that any provisions of the Bankruptcy Act of the United States of America shall be invoked by or against Vendor, or in the event Vendor shall become insolvent, or make an assignment for the benefit of creditors, or a Turstee or Receiver shall be appointed of his property, or any judgment is taken against Vendor and execution issued thereon, or any writ of attachment or the like is served upon Purchaser because of any pending litigation of Vendor, or if the Vendor shall in the opinion of Purchaser violate any of the terms of this Purchase Order, then upon the happening of any of the foregoing, Purchaser shall have the right to terminate the employment of Vendor under this Purchase Order, and in such event, may either employ its won forces or those of others to complete the work remaining to be performed under this Purchase Order either in whole or in part, and shall be entitled to have and use without cost to it, either through its own forces or through any other persons so employed by it, any plant, equipment or materials, whether on the premises or otherwise provided by Vendor in the performance of the work called for herein and the completion thereof (the right to possession of which plant, equipment and materials Vendor hereby assings and transfers to Purchaser), and Vendor shall receive no further payment until the work under the Purchase Order shall be finished, completed, accepted, and final payment made by the Owner. Then, if the unpaid balance that would be due under this Purchase Order shall exceed the cost to Purchaser of completing same, including Purchaser's overhead plus any damages or loss which the Purchaser may sustain by reason of Vendor's fault such excess shall be paid to Vendor, but if such cost plus all such damages shall exceed such unpaid balance, Vendor shall pay the difference to Purchaser. In addition to having the right to terminate this Purchase Order for cause, as aforesaid, Purchaser may at any time, terminate this Purchase Order in whole or in part, for Purchaser's own convenience. Upon such termination for convenience, the principals contained in Section 8-706 of the Armed Service Procurement Regulations relating to termination of subcontracts (as such is in effect as of the date of execution by Purchaser hereof) shall determine the rights of Vendor and Vendor shall have no other claims or rights against Purchaser.

19. None of the rights and remedies conferred upon or reserved by Purchaser under this Purchase Order or the liabilities or obligations hereby imposed or assumed by Vendor, shall be deemed exclusive, or impose any limitation upon or be in derogation of any right or remedy of Purchaser now existing or which hereafter may exist, at Law, in equity or by statute. Each and every right and remedy of Purchaser under this Purchase Order shall be cumulative and in addition to all of the rights and remedies of the Purchaser under this Purchase Order now existing, or hereafter to exist, at Law, in equity or statute. In the event that Vendor fails to perform any of its obligations hereunder, then in addition to all other obligations and/or liabilities imposed upon Vendor hereunder and/or under the Law otherwise, Vendor shall hold Purchaser harmless from and indemnify Purchaser for any and all losses, costs, damages and expenses (including, but not limited to, all incidental and consequential damages due to delay or otherwise) incurred by Purchaser as a result of any of such failures, it being understood by Vendor that any failure on its part may effect Purchaser to an extent in excess of the dollar amount of this Purchase Order.

20. Failure on the part of Vendor to perform any of the obligations called for hereunder shall be deemed to be a substantial breach of the within Purchase Order. It is understood that this Purchase Order constitutes an entire and indivisible agreement. No waiver by Purchaser of any breach of this Purchase Order shall be deemed to be a waiver of any other or any subsequent breach. Acquiescense by Purchaser in a course of performance by Vendor contrary to the terms of this Purchase Order shall not be construed as a waiver or modification of any term hereof. A waiver or modification of any term hereof may be accomplished only be a writing signed by Purchaser in which Purchaser so states its intent.

21. It is understood and agreed that each and every provision of this Purchase Order, including any alleged breach thereof, shall be interpreted in accordance with the Law of the State of New York.

22. This Purchase Order constitutes the entire agreement between Purchaser and Vendor and shall supersede and merge all prior understandings, whether oral or in form of correspondence heretofore had between said parties in connection with any and all matters pertaining to this purchase order and the performance thereof, and it is specifically agreed that the within Purchase Order shall be subject to modification only by a writing signed by an officer of Purchaser. Nothing contained in this Purchase Order is intended to inure to the benefit of any third party.

23. Purchase Order valid only if signed by an authorized officer of the Purchaser.

FIGURE 17.12*b* Back side of purchase order.

17.12 SCHEDULING AND EXPEDITING

Two common methods of scheduling construction projects are by means of the Gantt (bar) chart (Fig. 17.14) and by means of the critical path method (Fig. 17.15).

Bar Chart. The bar chart is preferred by many contractors because of its simplicity, ease in reading, and ease of revision. The bar chart can show a great deal of information besides expected field progress. It can also show actual field pro-

PURCHASING LOG

KREISLER BORG FLORMAN CONSTRUCTION CO.
97 Montgomery Street, Scarsdale, N Y
FOR: 170 Street, Jamaica, N.Y. — TURNKEY PROJECT

SPEC	ITEM	NAME	DATE	AMOUNT
4.00	Excavation and Grading	Dedona Contracting	4/27/	$25,000.-
5.00	Concrete Foundations	AD&M General Cont.	4/26/	28,000.-
30.00	Heating & Ventilation	John A. Jones	6/11/	150,000.-
29.18, 19 &22	Asphalt Paving & Steel Curb	Strada Contracting	6/26/	4,500.-
22.0	Lath & Plaster	A. Palmese & Son	7/20/	1,600.-
12.00	Resilient Flooring	Staples Floorcraft	7/20/	20,000.-

FIGURE 17.13 Purchasing log lists every subcontract and purchase order after its submission to a subcontractor or vendor.

gress; dates for required delivery; fabrications and approvals; percent of completion, both planned and actual; and time relationships of the various trades. Copies of bar charts may be distributed to subcontractors, trade supervisors, and in many cases laypeople, with the expectation that it will be easily understood.

Steps in preparation of a bar chart should include the following:

1. On a rough freehand sketch, layout linearly and to scale horizontally the amount of time contemplated for the total construction of the job, based on either the contract or past experience.

2. List in the first column all the major trades and items of work to be performed by the contractor for the job.

3. Based on past experience or on previous bar charts that give actual times of completion for portions of past jobs, block in the amount of time that will be needed for each of the major trades and items of work, and indicate their approximate starting and completion date in relationship to the other trades on the job.

4. On completion of Step 3, reexamine the chart in its entirety to ascertain whether the total amount of time being allocated for completion is realistic.

5. After adjusting various trades and times of completion and starting and completion dates on the chart, work backward on dates for those trades requiring fabrication of material off the site and for those trades that require approval and submission of shop drawings, samples, or schedules.

6. Block in the length of time necessary for fabrication and approval of items requiring those steps.

7. Using the contractor's trade-payment breakdown or schedule of payments for each trade and month-by-month analysis of which trades will be on the job, sketch in the percent-completion graph across the face of the chart.

8. After the chart has been completely checked and reviewed for errors, draw the chart in final form.

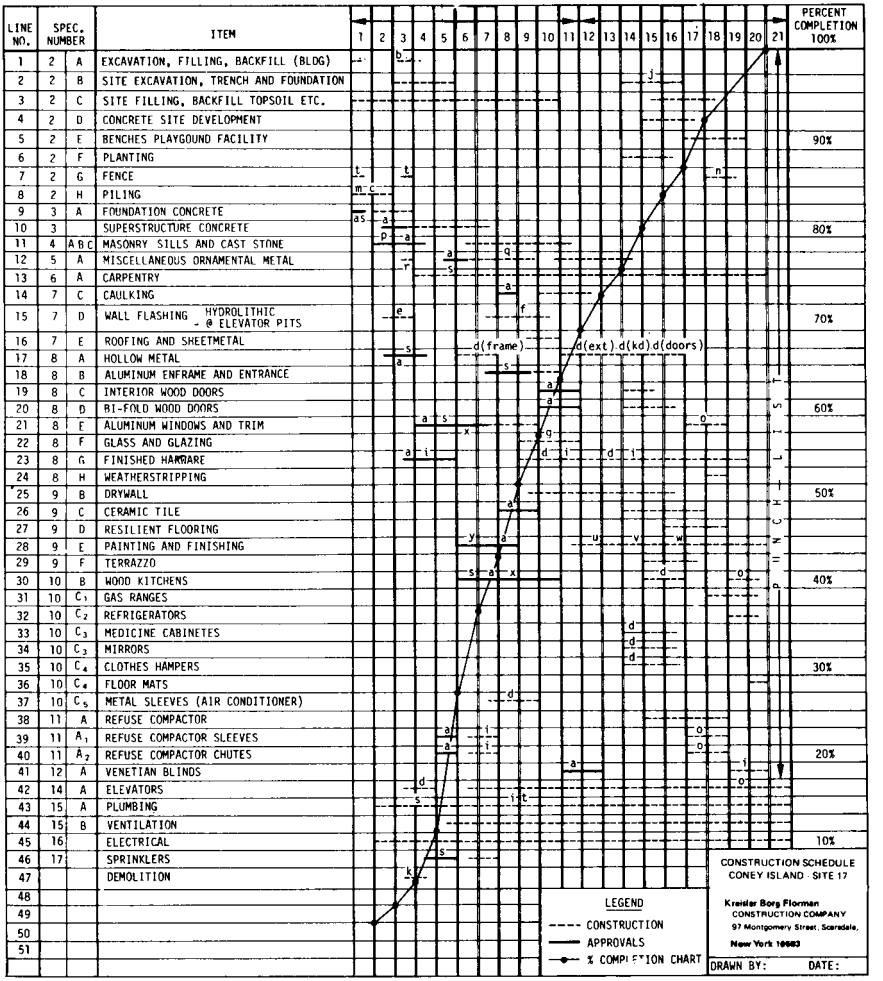

FIGURE 17.14 Bar chart for construction scheduling. Letters associated with bars indicate *a*, approvals; *b*, backfill; *c*, contract piles; *d*, delivery; *e*, elevator pits, hydrolithic; *f*, spandrel waterproofing; *g*, glazing; *h*, handrails, *i*, installation; *j*, site work; *k*, taxpayers; *l*, hardware schedule; *m*, load tests; *n*, permanent; *o*, adjustments; *p*, brick panels; *q*, lintel; *r*, saddles, wedge inserts; *s*, shop drawing; *t*, temporary; *u*, tape; *v*, prime, ceiling spray; *w*, finish; *x*, fabrication; *y*, finish schedule.

***Critical Path Method* (*CPM*).** This is favored by some owners and government agencies because it provides information on the mutually dependent parts of a construction project. CPM also reveals the effect that each component has on the overall completion of the project and scheduling of other components. It permits a more realistic analysis of the daily problems that tend to delay work than does the customary bar chart. Strict adherence to the principles of CPM will materially aid builders to reduce costs substantially and to enhance their competitive position in the industry. Execution of the method can be expedited with the aid of a computer and CPM program.

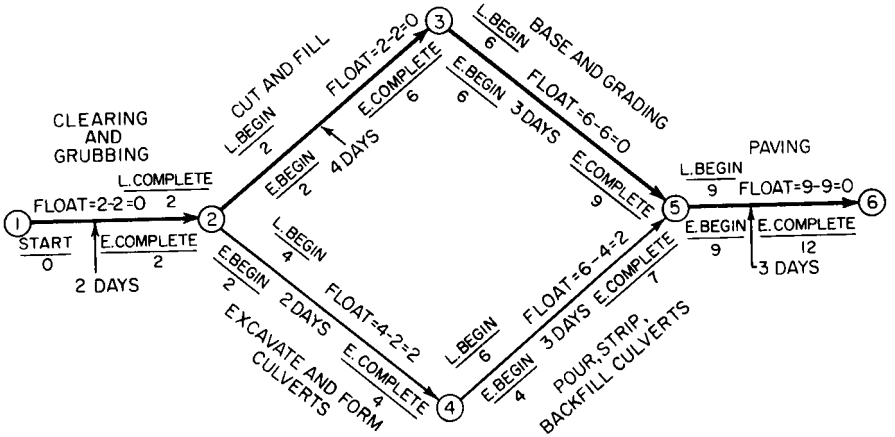

FIGURE 17.15 Network for critical-path method of scheduling comprises arrows representing steps, or tasks, and numbered nodes representing start or completion of those tasks. Heavy line marks critical path, the sequence of steps taking longest to complete.

Briefly, CPM involves detailing, in normal sequence, the various steps to be taken by each trade, from commencement to conclusion. The procedure calls for the coordination of these steps with those of other trades with contiguous activities or allied or supplementary operations. The objective is to ensure completion of the tasks as scheduled, so as not to delay other work. And CPM searches out those trades that control the schedule. This knowledge enables the contractor to put pressure where it will do the most good to speed a project and to expedite the work at minimum cost.

An important, but not essential, element of CPM is a chart consisting of a network of arrows and nodes. Each arrow represents a step or task for a particular trade. Each node, assigned a unique number, represents the completion of the steps or tasks indicated by the arrows leading to it and signifies the status of the project at that point. The great value of this type of chart lies in its ability to indicate what tasks can be done concurrently and what tasks follow in sequence. This information facilitates expediting, and produces a warning signal for future activities.

The actual critical path in the network is determined by the sequence of operations requiring the most time or that would be considered the most important parts of the contract on which other trades would depend. This path determines the total length of time for construction of the project. Usually, it is emphasized by heavier or colored lines, to remind the operating staff that these tasks take precedence (see Fig. 17.15). Also, it is extremely important that the contractor be guided by the knowledge that a task leaving a node cannot be started until all tasks entering that node have been completed.

Another benefit of CPM scheduling is the immediate recognition of float time. Associated with noncritical activities, float time is the difference between time required and time available to execute a specific item of work. This information often enables a supervisor to revise planning and scheduling to advantage.

Float is determined in two steps, a forward and a backward pass over the network. The forward pass starts with the earliest begin time for the first activity. Addition of the duration of this task to the begin time yields the earliest complete time. This also is the earliest begin time for the next task or tasks. The forward

pass continues with the computation of earliest complete times for all subsequent tasks. At nodes where several arrows meet, the earliest begin time is the largest of the earliest complete times of those tasks. The backward pass starts with the earliest complete time of the final task. Subtraction of the duration of that activity yields the latest allowable begin time for it. The backward pass continues with the computation of the latest allowable begin times for all preceding tasks. At nodes from which several arrows take off, the latest allowable complete time is the smallest of the latest allowable begin times, and the latest allowable begin times of preceding tasks are found by subtracting their duration from it. Float is the difference between earliest and latest begin (or complete) times for each task.

The computations can be done manually or with a computer. The latter is desirable for projects involving a large number of tasks, or for which frequent updating of the network is required.

As an alternative, the time-scale arrow diagram with the activities shown to scale may be used. Compared with bar charts, such arrow diagrams are almost as easy to read and understand. (S. S. Pinnell, "Critical Path Scheduling: An Overview and Practical Alternative," *Civil Engineering,* July 1980, pp. 66 to 69.) See also Art. 17.10.2.

Expediting. The task of keeping a job on schedule should be assigned to an expediter. The expediter must be alert to and keep on schedule the following major items: letting of subcontracts; securing of materials; and expediting of shop drawings, sample approvals, fabrication and delivery of materials, and building department and government agency submissions and approvals.

Records must be kept by the expediter of all these functions, so that the work can be properly administered. One method of record keeping for the expediting of shop drawings, change orders, samples, and other miscellaneous approvals is illustrated in Fig. 17.16. Information entered includes name of subcontractor, description of work being done, and dates of submissions and approvals received. Space is provided for shop-drawing and sample submissions, approvals and distributions, and other miscellaneous information, as well as contract and change orders. A page similar to the one shown in Fig. 17.16 should be used for every subcontractor and every supplier on the job.

Expediting requires detail work, follow-up work, and awareness of what is happening and what will be needed on the job. Its rewards are a completed job on or ahead of schedule.

17.13 FAST TRACKING

When time of completion is the most essential element in a construction job, superseding even the requirements for total coordination of the plans and specifications during design, and when competitive bids from general contractors are not essential, then a method of design and construction known as fast tracking may be utilized.

On a job that is fast tracked, design and construction begin almost simultaneously with groundbreaking and take place even while the designers are working on the foundations of the structure. Thereafter, work proceeds in the field directly after applicable portions of the design leave the drafting boards. This means that the normal time for design of the project and later bidding is telescoped by a procedure

Hsg. Dev. Fund Co.Inc. EXPEDITION Today's Date 18JUN9
KREISLER BORG FLORMAN
ST-24 Submittal Status by Vendor Page 1

PACKAGE	SUBMITTAL	TITLE	DRAWING	VENDOR	REQD STRT	REQD FIN	DAYS HELD	BALL-IN-COURT	DATE	STATUS
			SUBMITTALS							
ACME STEEL DOOR										
	08111-001	Pg.1--15 Hollow Mtl	PG.1--15	ACME	08JAN9	18JAN9	125	At-ACME	14FEB9	ANR
ATLANTIC HARDWARE & SUPPLY CORP.										
	08700-001	Hardware Schedule	BKLET	ATLANT	25FEB9	12MAR9	1	At-DATNER	17JUN9	RES
AVANCD										
	07110-001	30 Mil.Spandrel Flash.	CUTS/SAMPLE	AVANCD	15JUN9	20JUN9	0	At-AVANCD	18JUN9	AAN
	07110-002	Tremco Sealants (Caulk)	CHART/DATA	AVANCD	15JUN9	22JUN9	3	At-DATNER	15JUN9	NEW
BRUNO APPLIANCE CORPORATION										
	11450-001	Roper Top Mount Refrig.	RT14DKIX	BRUNO	16APR9	27APR9	0	At-BRUNO	06MAY9	APP
	11450-002	Roper Vert.Freezer	RV15KFRW	BRUNO	16APR9	27APR9	0	At-BRUNO	06MAY9	APP
	11450-003	Roper Strd.Clean Range	FGP215V/210V	BRUNO	16APR9	27APR9	0	At-BRUNO	06MAY9	APP
	11450-004	Roper Side by Side Refrig.	RS22ARXX	BRUNO	16APR9	27APR9	0	At-BRUNO	06MAY9	APP
	11450-005	Underctr.Dishwasher (Roper)	WU3000X	BRUNO	16APR9	27APR9	63	At-DATNER	16APR9	NEW
CARDOZA-WINER CORP.										
	15500-001	El Paso Bathtub	CUTS	CARDOZ	22JAN9	04FEB9	0	At-CARDOZ	02FEB9	APP
	15500-002	Pipe & Fitting Sched.	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	05FEB9	APP
	15500-003	Roof Tank	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	20MAR9	APP
	15500-004	Domestic&F.S.P.Wtr.Valve	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	05FEB9	APP
	15500-005	Backflow Preventer	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	05FEB9	APP
	15500-006	Domestic Water Heater	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	05FEB9	APP
	15500-007	Drains	CUTS	CARDOZ	27JAN9	10FEB9	0	At-CARDOZ	05FEB9	APP
	15500-008	SL-1 Gr.Fl.Slv.	SL-1	CARDOZ	05FEB9	10FEB9	0	At-CARDOZ	28FEB9	APP
	15500-009	SL-2 2nd Fl.Slv.	SL-2	CARDOZ	05FEB9	10FEB9	0	At-CARDOZ	28FEB9	APP
	15500-010	SL-3 3rd-7thFl.Slv.	SL-3	CARDOZ	05FEB9	10FEB9	0	At-CARDOZ	28FEB9	APP
	15500-011	SL-4 8--10thFl.Slv.	SL-4	CARDOZ	05FEB9		0	At-CARDOZ	28FEB9	APP
	15500-012	Detail Bklet	BKLET	CARDOZ	05FEB9	10FEB9	0	At-CARDOZ	28FEB9	APP
	15500-013	Plumb.Fixtures	BKLET	CARDOZ	10FEB9	17FEB9	0	At-CARDOZ	06MAR9	AAN
	15500-014	P-G Part.Grnd/2Fl.Clg.Pip.	P-G	CARDOZ	10FEB9	17FEB9	0	At-CARDOZ	28FEB9	APP
	15500-015	SL-5 Roof/Bulkhd Slv./Piping	SL-5	CARDOZ	10FEB9	17FEB9	0	At-CARDOZ	28FEB9	APP
	15500-016	Croker Standpipe	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	APP
	15500-017	Duplex Sump Pumps	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	AAN
	15500-018	Duplex Booster Pump	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	APP
	15500-019	Hot Water Circul.	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	APP
	15500-020	Duplex Sewage Ejectors	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	AAN
	15500-021	Duplex House Pumps	BKLET	CARDOZ	24FEB9	10MAR9	0	At-CARDOZ	04MAR9	AAN
	15500-022	Insulation	CUTS	CARDOZ	03MAR9	15MAR9	0	At-CARDOZ	06MAR9	APP
	15500-023	Roof Tk.Float Valve	CUTS	CARDOZ	03MAR9	15MAR9	0	At-CARDOZ	06MAR9	APP
	15500-024	P-U Undergrd Pipe.	P-U	CARDOZ	24MAR9	07APR9	66	At-CARDOZ	13APR9	ANR
	15500-025	P-C Cellar Clg.Pipe.	P-C	CARDOZ	24MAR9	07APR9	66	At-CARDOZ	13APR9	ANR
	15500-026	Hand Held Shower	BKLT	CARDOZ	29APR9	10MAY9	0	At-CARDOZ	05MAY9	APP
	15500-027	Holby Mixing Valve	CUTS	CARDOZ	20MAY9	30MAY9	0	At-CARDOZ	01JUN9	APP

FIGURE 17.16 Record for expediting approvals of shop drawings, change orders, samples, and miscellaneous items.

that, in effect, sets design and construction on separate tracks parallel to each other, rather than in consecutive sequence.

The advantage of fast tracking is that a considerable amount of time is saved if construction can indeed proceed simultaneously with, and in conjunction with, the design. Presumably, job completion will take place shortly after completion of the design or, certainly, much earlier than it otherwise would have.

The disadvantages of fast tracking are that in coordination of the work, the necessary input from various consultants will be largely lacking or after the fact.

This may necessitate redoing certain work, or at best, repairing deficiencies that are discovered only after portions of the construction are in place.

Another disadvantage of fast tracking is that much less control exists over costs than in a job where designs are complete when prices are solicited. This disadvantage can be partly overcome, however, if the work is given to reputable, carefully prequalified subcontractors and suppliers. Certain rules of thumb from past jobs certainly will give an indication of what the final cost will be. But because of the expected loss of efficiency and redoing of certain parts of the work, costs can be expected to be higher. Nevertheless, such cost increases could be offset by resultant savings in interest on construction loans, revenues accruing from earlier use of the building, and avoidance of the effects of monetary inflation on the cost of the job if it had been begun at a considerably later date.

Fast tracking lends itself particularly to professional construction management as a form of contract, although the cost-plus-fixed-fee or cost-plus-percentage-fee contract is applicable as well. (See also Art. 2.18.)

17.14 CHANGES, CLAIMS, AND DISPUTE RESOLUTION

After a construction contract has been awarded to a contractor, and usually after construction has begun, it may become necessary to make changes in the work that are not covered by the contract documents. To avoid writing a new contract whenever a work change is made, construction contracts usually include provisions for change orders. These are legal documents that provide a means by which an owner can order changes in the work or require extra work. Change orders may be issued for the following reasons:

1. *Change in scope.* Specifications for building construction include a ''Scope of the Project,'' which includes a general verbal description of the project. The details are given in the technical sections of the specifications, each of which provides a ''Scope of the Work.'' This is a statement of the work to be done under that section. If any change is to be made in the project, a scope becomes involved. Usually, the specifications give the owner the right to make changes in scope, with specified compensation to the contractor.

2. *Change in material or installed equipment.* For any of a variety of reasons, such as unavailability of a specified item or cost or time savings resulting from a substitution, the owner or the contractor may request a change in building materials or installed equipment.

3. *Change in expected conditions.* After the start of a project, a contractor may encounter conditions not anticipated by the building designers and not covered by the contract documents. For example, during excavation for the building foundations, subsurface conditions may be encountered that are different from those described in the plans and specifications. Or abnormal weather may interfere with progress of the work or may damage work already completed. Or labor strikes may occur. Change orders may be required to accommodate these unexpected conditions.

4. *Change to correct omissions.* During construction, the owner or the contractor may discover that certain necessary work or extra work desired by the owner is not covered by the contract documents. The owner will have to issue a change order for performance of that work.

17.14.1 Methods of Payment for Change Orders

Either an owner or a contractor may request a change order. Changes or extras may be priced in any of the following ways:

Unit Prices. At the time of either the bid or the signing of the contract, unit prices are listed by the contractor for various classes of work that may be subject to change. Usually, unit prices are easily administered for such trades as excavation, concrete, masonry, and plastering. The task of the purchaser is to obtain unit prices from subcontractors for various classes of work for the same trades that are in the contract. Although usually the same unit price is agreed for both added and deducted work, occasionally the unit prices for deducted work will be agreed to be 10% less than those for added work.

Cost of Labor and Materials, plus Markup. Another method of computing the value of changes or extra work is by use of actual certified costs, as derived from record keeping as the project proceeds. Rates for wages and fringe benefits must be verified, and the amount of percentage markup must be agreed to either in the contract or before the work is started. Usually, the general contractor is allowed a markup over and above subcontractors' costs and markup, but the general contractor's markup is less than the subcontractor's allowance in such cases.

Kreisler Borg Florman
CONSTRUCTION COMPANY

97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600

DESCRIPTION OF WORK relocation site drainage line NO. 3 PAGE 1 OF 1
LOCATION Apartment House, 170th Street, Jamaica, New York (JOB NAME) JOB NO.
PERFORMED BY General Contractor (INSERT GENERAL CONTRACTOR OR NAME OF SUBCONTRACTOR) DATE January 23,

LABOR

NAME OF EMPLOYEE	OCCUPATION	HOURS WORKED	RATE OF PAY	AMOUNT
George M	Laborer	7	$7.50	

MATERIALS, SUPPLIES AND/OR EQUIPMENT

QUANTITY	DESCRIPTION
60 LF	4" Clay Drainage Pipe

COMPLETE DESCRIPTION OF WORK DONE THIS DATE

Relocated site drainage to catch basin B as shown on revised sketch A-301 dated January 10.

THE INFORMATION CONTAINED ABOVE IS CORRECT. ALL WORK SUBJECT TO TERMS OF SUBCONTRACT AND PRIME CONTRACT.

Kreisler Borg Florman CONSTRUCTION COMPANY
BY
TITLE Superintendent

SUBCONTRACTOR (NAME)
BY
TITLE

OWNER'S OR REPRESENTATIVE CONSTRUCTION FOR PROGRESS, INC. (COMPANY)
BY
TITLE Engineer

FIGURE 17.17 Daily work-report certification by a general contractor for changes made or extra work performed.

When work is done on a cost-plus-markup basis, the contractor must maintain an accurate daily tabulation of all field costs. This document should be agreed to and signed by all parties responsible for the record keeping for the change. It will form an agreed-on certification that the work has been performed and of the quantities of labor and material used. A daily work-report certification is shown in Fig. 17.17.

Negotiation by Lump Sum. If the owner desires to have changes or extra work performed and does not want it done on a cost-plus or unit-price basis, owner and contractor may negotiate a lump-sum payment. In this situation, a cost estimate is prepared by the contractor or subcontractor involved, and a breakdown of costs is submitted, together with the estimate total. If the owner accepts the lump sum, the owner or the architect writes a change order, and the work is performed. Such a change order is shown in Fig. 17.18 as issued to a subcontractor.

17.14.2 Claims

Sometimes a dispute may arise as to whether or not the work is part of the contract documents and hence the obligation of the contractor. Such a dispute may result in

CHANGE ORDER

Kreisler Borg Florman
CONSTRUCTION COMPANY
97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600

DATE: March 2,

TO: National Tile & Marble Corporation
300 West 102nd Street
New York, New York 10025

RE: 13-Story Apartment Building
170th Street, Jamaica, New York

WE ARE INCREASING ~~(DECREASING)~~ YOUR SUBCONTRACT AMOUNT BY THE SUM OF $1100.00 FOR

Change tile in lobby and vestibule in accordance with letter from Clarence Lilien and Associates dated January 26,

Reference your proposal dated February 15,

ALL WORK MUST COMPLY WITH THE PLANS, SPECIFICATIONS AND ALL OTHER CONDITIONS AND REQUIREMENTS OF THE GENERAL CONTRACT. ALL TERMS AND CONDITIONS OF THE ORIGINAL SUBCONTRACT BETWEEN US SHALL APPLY AND REMAIN IN FULL FORCE.

KINDLY SIGN AND RETURN ONE COPY OF THIS ORDER.

ACCEPTED:
NATIONAL TILE & MARBLE CORPORATION

BY _____ DATE _____

OWNER'S CHANGE ORDER NO. 4

BASED ON CHANGE ORDER PROPOSAL NO. _____

Kreisler Borg Florman
CONSTRUCTION COMPANY

BY _____

TITLE Vice-President

FIGURE 17.18 Order issued by a general contractor to a subcontractor to proceed with a change in work not covered by the contract documents.

CHANGE ORDER PROPOSAL NO.

Kreisler Borg Florman
CONSTRUCTION COMPANY
97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600

TO Bond-Ryder Associates, Inc.
101 Central Park North
New York, New York 10026

DATE: January 15,

RE: Lionel Hampton Houses
UDC #29
New York, New York

WE SUBMIT OUR ESTIMATE IN THE AMOUNT OF $ 325.40 + Mark up FOR PERFORMING THE FOLLOWING extra WORK:

Furnishing and installing labor and material to remove and or eliminate receptacles that are directly over kitchen sinks and install blank cover plates in Buildings "A", "B", and "C".

Attached find back-up information from Meyerbank Electric Co., Inc., dated 12/13/ and letter of authorization to proceed from Mr. R. Germano, Project Manager, Urban Development Corporation dated December 11,

This proposal is our request for a Change Order to reimburse us for Change Order No. 56 issued to Meyerbank Electric Co., Inc., a copy of which we enclose.

This work is not part of the completed plans dated September 1, 19 , nor is it part of the Addenda, as agreed to by contractor. We are proceeding with this work so as not to delay the job.

~~BEFORE STARTING ANY WORK ON THIS CHANGE WE ARE AWAITING YOUR DECISION. IF YOU WISH US TO PROCEED WITH THIS WORK~~ PLEASE SIGN ONE COPY OF THIS PROPOSAL INDICATING YOUR APPROVAL. ALL OTHER CONDITIONS OF THE CONTRACT BETWEEN US SHALL REMAIN IN FULL FORCE AND EFFECT. ~~IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE CONTRACT WE REQUEST AN EXTENSION OF OUR CONTRACT COMPLETION DATE BECAUSE OF THIS CHANGE. A PROMPT DECISION IS REQUESTED.~~

APPROVED AS CHANGE ORDER NO._____ TO THE CONTRACT

BY _____ DATE:_____

DISAPPROVED; PROCEED IN ACCORDANCE WITH CONTRACT PLANS & SPECIFICATIONS.

BY _____ DATE:_____

CC: Urban Development Corporation

Kreisler Borg Florman
CONSTRUCTION COMPANY

BY _____

TITLE Project Manager

FIGURE 17.19 Change-order proposal submitted by a contractor to an owner to request issuance of a change order.

a claim on the part of the contractor. In making a claim, the contractor may request that a change order be issued prior to proceeding with the work. Or the contractor may nevertheless proceed with the work so as not to delay the job, but request that a change order be issued. Such a request is made in the form of a change-order proposal (Fig. 17.19). Depending on the size of the claim and the attitude of the owner or architect, the contractor may decide whether to continue with the extra

work or to press for a decision on the claim, through either arbitration (Art 17.14.4), or some other remedy available either under the contract or at law.

Dispute Resolution. The American Institute of Architects Forms, which are widely used in the construction industry, now provide for an additional means of settlement of claims between contractors and owners. AIA Form A-20 1, 1997 Edition, ''General Conditions of the Contract for Construction,'' for the first time features a mediation clause requiring parties to resort to mediation prior to instituting litigation or arbitration. This expanded approach to dispute resolution will empower the parties to work out any problems in an informal and expedient way. (See Art. 17.14.4.)

The new edition of A-201 continues the practice of making the architect the first arbitor of construction claims, except for those involving aesthetic effect. However, a new section, 4.5, adds mediation as the next step in the dispute resolution process. The new A-201 retains the Arbitration Clause which provides that claims not resolved by mediation shall be decided by arbitration. These methods of claim resolution are available in any construction contract that includes, as part of its terms, the AIA General Conditions A-201.

17.14.3 Who Pays for the Unexpected?

A well-drafted construction contract between contractor and owner should always contain a changed-conditions clause in its general conditions. (See ''General Conditions of the Contract for Construction,'' AIA A201, Art. 4.3.4, Claims for Concealed and Unknown Condition, American Institute of Architects, 1735 New York Ave., NW, Washington, DC 20006.) This clause should answer the question:

If a contractor encounters subsurface conditions different from what might normally be expected or from what is described in plans, specifications, or other job information provided by the owner or owner's agents, resulting in increased cost, should the contractor absorb the increased cost or should the owner pay it?

A properly drafted change-conditions clause should contain the following elements:

A requirement that the owner pay for the unexpected.

Arrangements so that the owner will not be the arbiter of whether the unexpected has occurred.

Recognition that the contract documents have been based on an assumed, described set of facts.

Indication that a changed condition can exist because of unanticipated difficulty of performance.

A requirement that the owner be made aware of a changed condition when it occurs.

Indication that changed conditions can include obstructions.

A requirement that the contractor stop work in the area of a changed condition until ordered to proceed.

Indication that either party can claim changed conditions.

Recognition that the method of procedure for handling changed conditions is provided for in the contract.

An arbitration clause or effective means of appeal other than to the courts.

A contractor would be well advised not to enter into agreement for construction without a changed-conditions clause.

17.14.4 Alternative Dispute Resolution

Alternative dispute resolution is the term applied to methods of resolving disputes other than litigation. The American Arbitration Association. a nonprofit organization and pioneer in alternative dispute resolution, has established and is a financial supporter of the National Construction Industry Disputes Resolution Committee. This group comprises representatives of all the major organizations concerned with construction.

Assistance in Negotiation. When a dispute between owner and contractor arises on a construction project, the foremost method of resolving it is by immediate negotiation. One optional procedure for facilitating negotiation is to appoint before the start of a project a Dispute Resolution Board (DRB). It usually consists of three qualified persons whose role is to assist the parties in negotiating a settlement of a controversy or claim. If there cannot be a resolution of the dispute by such negotiation, then the DRB will issue nonbinding recommendations based on available information.

Besides negotiation, other methods used for dispute resolution include conciliation, facilitation fact-finding, minitrials, and most importantly, arbitration and mediation.

Arbitration. Parties to a contract, either at the time of entering into the contract or when a dispute arises, agree to submit the facts of the dispute to impartial third parties who will hear a presentation of the claims by both parties and render a decision.

If the parties have agreed to submit a matter to arbitration, the decision of the arbitrators is binding on both parties. The decision can be enforced in any court of law having jurisdiction over the party against whom a claim is made.

Because of the large number of construction arbitration cases filed, the American Arbitration Association has, in conjunction with representatives from the construction industry, drafted special construction-industry arbitration rules (''Construction Industry Dispute Resolution Procedures.'' American Arbitration Association, 335 Madison Ave. (10th Floor), New York, NY 10017-4605). These rules provide information for proceeding with construction arbitration.

Parties may agree beforehand to submit disputes to arbitration by inclusion of the standard arbitration clause in their agreement:

> Any controversy or claim arising out of or relating to this contract, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any Court having jurisdiction thereof.

To the standard arbitration clause, it is sometimes best to add the words ''in the city of _____'' immediately after ''shall be settled by arbitration,'' to specify where the arbitration hearings should be held.

Mediation. In addition to arbitration, there is available through the services offered by the American Arbitration Association a system of mediation of disputes. Mediation differs from arbitration in that not only is it entered into voluntarily by the parties, but the results are nonbinding, as opposed to arbitration where the results are binding on both parties. When a dispute is submitted to mediation, a trained mediator, or several mediators, will assist the parties in reaching a settlement of the controversy.

The mediator participates impartially in the negotiations and advises and consults the various parties involved. The result of the mediation should be an agreement that the parties find acceptable. The mediator cannot impose a settlement and can only seek to guide the parties to a settlement.

The American Arbitration Association administers the mediation process by providing panels of trained and acceptable mediators. In addition, it will provide a place to hold the mediation hearings and will maintain records of cases and issues involved, the names and types of mediators appointed, and the results of the mediation efforts.

When drawing up a contract, the parties to the contract may, by mutual agreement, wish to insert into the contract the following mediation clause:

> If a dispute arises out of or relating to this contract, or the breach thereof, and if said dispute cannot be settled through direct discussions, the parties may agree to endeavor first to settle the dispute in an amicable manner by mediation under the Voluntary Construction Mediation Rules of the American Arbitration Association, before having recourse to arbitration or a judicial forum.

17.15 INSURANCE

Insurance policies are contracts under which an insurance company agrees to pay the insured, or a third party on behalf of the insured, should certain contingencies arise.

No business is immune to loss resulting from ever-present risks. It is imperative, therefore, that a sound insurance program be designed and that it be kept up to date.

Because few businesses can afford the services of a full-time insurance executive, it is important that a competent agent or broker be selected to: (1) prepare a program that will provide complete coverage against the hazards peculiar to the construction business, as well as against the more common perils; (2) secure insurance contracts from qualified insurance companies; (3) advise about limits of protection; and (4) maintain records necessary to make continuity of protection certain. While an executive of the business should oversee insurance coverage, much of the detail can be eliminated by utilizing the services of a competent agent or broker.

It is necessary, of course, that the responsibility for providing protection be placed on an insurance company whose financial strength is beyond doubt.

Another important point for the buyer of insurance is the service that the company selected may be in a position to render. Frequently, construction operations are conducted at a considerable distance from city facilities. It is necessary that the company charged with the responsibility of protecting the construction operations be in a position to render ''on-the-job'' service from both a claim and an engineering standpoint.

The interests of contractors, subcontractors, and building owners are very closely allied. Particular attention should be given to the definition of these respective interests in all insurance policies. Where the insurable interest lies may depend upon the terms of the contract. Competent advice is frequently needed in order that all policies protect all interests as required.

While the forms of protection purchased and the adequacy of limits are of great importance to a prime or general contractor, it is also of great importance that the insurance carried by subcontractors be written at adequate limits and be broad enough to protect against conditions that might arise as a result of their acts. Also, the policies should include the interests of the prime or general contractor insofar as much interests should be protected.

This section merely outlines those forms of insurance that may be considered fundamental (Table 17.1). It includes brief, but not complete, descriptions of coverages without which a contractor should not operate. It is not intended to take the place of the advice of experienced insurance personnel.

17.15.1 Fire Insurance

Fire insurance policies are well standardized. They insure buildings, contents, and materials on job sites against direct loss or damage by fire or lightning. They also include destruction that may be ordered by civil authorities to prevent advance of fire from neighboring property. Under such a policy, the fire insurance company agrees to pay for the direct loss or damage caused by fire or lightning and also to pay for removal of property from premises that may be damaged by fire.

Attention should be given to the computation of the amount of insurance to be applied to property exposed to loss. In addition, the cost of debris removal should be taken into consideration if the property could be subject to total loss. Under no circumstances will the amount paid ever exceed the amount stated in the policy. If the fire insurance policy has a coinsurance clause, the problem of valuation and adequate amount of insurance becomes even more important.

The form of fire insurance particularly applicable in the construction industry is known as **Builders Risk Insurance.** The purpose of this form is to insure an owner or contractor, as their interests may appear, against loss by fire while buildings are under construction. Such buildings may be insured under the Builders Risk form by the following methods:

1. The reporting form, under which values are reported monthly or as more buildings are started. Reports must be made regularly and accurately. If so, the form automatically covers increases in value.

2. The completed-value form under which insurance is written for the actual value of the building when it is completed. This is written at a reduced rate because it is recognized that the full amount of insurance is not at risk during the entire term of the policy. No reports are necessary in connection with this form.

3. Automatic Builders Risk Insurance, which insures the contractor's interest automatically in new construction, pending issuance of separate policies for a period not exceeding 30 days. This form generally is used for contractors who are engaged in construction at a number of different locations.

There are certain hazards which, though not quite so common as fire and lightning, are nevertheless real. The contractor should insist that these be included in the insurance, by endorsement. A few of the available endorsements are:

TABLE 17.1 Typical Insurance Needs of Parties to Construction

Type	Purpose	Suggested limits for small-to-medium-size company	Basis for premium
Builders Risk Fire Insurance with extended coverage, vandalism, and malicious mischief	Protect building, fire and lightning, explosion, windstorm, etc. All risk coverage is the broadest and most expensive	Amount of contract less demolition, construction below lowest basement slab and landscaping	Dollars per hundred
Commercial General Liability			
1*a*. Premises, operations of contractor	Third-party bodily injury and property damage	$3,000,000 B.I.* $1,000,000 P.D.†	Payroll classification
1*b*. Independent contractors contingent public liability and property damage	Protector contractor against subcontractor's negligence	Same as above	Amount of subcontract
1*c*. Completed operations insurance	Claims by third parties on projects already completed	Same as above	Amount of coverage
1*d*. (Hold-harmless) Contractual liability	Contractually assumed liability	Same as above or as per contract	Amount of coverage
2. Owner's protective liability insurance	Third-party liability	As per contract	Amount of contract
3. Umbrella liability	Third-party liability	$3,000,000	Various
Owned and nonowned motor-vehicle insurance	Third-party liability and physical damage insurance	B.I., P.D., collision, fire and theft (no fault)*†	Number of cars and experience
Contractor's equipment insurance	Protects equipment, tools, etc.	$200,000	Coverage amount
Material floater	Losses to materials before installation in job (may be included in Builders Risk)	$200,000	Coverage amount
Workers' compensation and employers liability	Employee protection	Set by state	Payroll
Employers liability insurance	Employee suits outside of workers compensation	Unlimited in some states or $100,000	Payroll
Disability benefits insurance	(Where required by the state)	Set by the state	Payroll

TABLE 17.1 Typical Insurance Needs of Parties to Construction (*Continued*)

Type	Purpose	Suggested limits for small-to-medium-size company	Basis for premium
Fidelity insurance	Embezzlement of funds	$500,000	Number of employees
Valuable papers	Loss of valuable papers	$50,000	Amount of coverage
Key officer insurance	Life insurance policy to cover corporate officer in case of death or disability	$500,000 or amount to be determined	Amount of coverage
Group hospitalization	Employees' protection (Blue Cross or HMO‡)	120-day extended coverage	Number of employees and coverage
Major medical	Employees' protection	Limits beyond Blue Cross or HMO‡	Same as above
Group life insurance	All eligible employees	6 mo. to year salary	Age and number of employees
	Technically not insurance		
Pension and/or profit sharing plan	Employee retirement	25% salary when combined with Social Security	Salary of employees
Unemployment insurance	(Where required by the state)	Set by state and federal government	Payroll
Social Security	Employees' welfare	Set by federal government	Payroll
	Architects and engineers insurance		
Architects and engineers liability insurance	Damage to persons and property	$3,000,000 B.I.* $1,000,000 P.D.†	Amount of coverage
Errors and omissions insurance	Errors or omissions from the plans	Highest available	Amount of coverage
	Owner insurances		
Owner's protective liability insurance	Public liability and property damage as a result of construction operations	$1,000,000 $5,000,000	
Property fire insurance	When construction is being done on an existing building, fire, etc., general contractor and subcontractors	Full insurance value	

TABLE 17.1 Typical Insurance Needs of Parties to Construction (*Continued*)

Type	Purpose	Suggested limits for small-to-medium-size company	Basis for premium
		Owner insurances	
Loss of use insurance	Losses in property as result of fire or other loss	Approx. Loss of income	
Steam boiler	Explosion, etc.	$500,000	
Nuclear incident	Nuclear reactor loss (if required)	High	

*B.I. = bodily injury
†P.D. = property damage
‡HMO = Health Maintenance Organization

1. Extended coverage endorsement, which insures the property for the same amount as the basic fire policy against loss or damage caused by windstorm, hail, explosion, riot, civil commotion, aircraft, vehicles, and smoke.

2. Vandalism and malicious mischief endorsement, which extends the protection of the policy to include loss caused by vandalism or malicious mischief. There is a special extended coverage form that provides coverage on an all-risk basis and includes the peril of collapse.

Completed-value and reporting forms treat foundations of a building in the course of construction as a part of the Builders Risk Value for insurance purposes. But all work below the lowest basement slab, site work, and demolition are not covered by Builders Risk Insurance. The value of these items should be deducted from the amount of the policy. This will result in a saving of insurance premium. Builders' machinery and equipment should be specifically insured as a separate item if coverage is desired under the policy.

Under the terms of the AIA General Conditions, the owner is to provide the Builders Risk Insurance and pay for it. Under those circumstances, the contractor should request that the following clause appear as an endorsement to the policy:

> Additional insureds under this policy: The Contractor and its Subcontractors, as their interests may lie.

This endorsement will assure the contractor and its subcontractors of a share in the insurance proceeds in case of claim. It further protects the contractor and subcontractors from suit by the insurance company under its subrogation clause, should either of these parties have caused or contributed to the loss.

17.15.2 Insurance for Contractor's Equipment

The so-called Inland Marine insurance market is the place to look for many coverages needed by contractors. From the insurance point of view, each contractor's

problem is considered separately. The type of operation, the nature of equipment, the area in which the contractor works, and other pertinent factors are all points considered by an Inland Marine underwriter in arriving at a final form and rate.

Obvious contractors' equipment—mechanical shovels, hoists, bulldozers, ditchers, and all other mobile equipment not designed for highway use—is the primary subject of the **Contractors Equipment Floater.** Such protection is necessary because of the size of the investment in such equipment and of the multiplicity of perils to which the equipment is exposed.

Some companies will write the Contractors Equipment Floater Policy only on a named-perils basis, which ordinarily includes fire, collision, or overturning of a transporting conveyance, and sometimes theft of an entire piece of equipment. Other companies will write certain kinds of contractors' equipment on the so-called all-risk basis. Certain perils, such as collision during use, are subject to a deductible fixed amount. The rate for this broader insurance generally is higher than that for the named perils form. In the all-risk form, the customary exclusions, such as wear and tear, the electrical exemption clause, strikes, riots, and other similar exclusions, are present. Because of increased exposure to nuclear hazards, all Inland Marine policies that insure against fire must carry a nuclear exclusion clause that provides that the company shall not be liable for loss by nuclear reaction or radiation or radioactive contamination, whether controlled or uncontrolled and whether such loss is direct or indirect, approximate or remote.

In addition to the equipment, there is a need to provide protection for the materials and supplies en route to or from the site. If these materials and supplies are transported at the risk of a contractor and are in the custody of a common carrier, a **Transportation Floater** should be obtained. If, on the other hand, these materials and supplies are moved on the contractor's own trucks, a **Motor Truck Cargo-Owners Form** should be obtained. The premium for the transportation form is usually based on the value of shipments coming under the protection of the policy. The coverage is usually on an all-risk basis. The Motor Truck Cargo-Owners Form is generally on a named-perils basis at a flat rate applied against the limit of liability required by the insured's needs.

Occasionally, a contractor may be responsible for machinery, tanks, and other property of that nature until such times as they are completely installed, tested, and accepted. Exposures of this kind are usually covered under an **Installation Floater,** which would provide insurance to the site as well.

The Installation Floater Form is generally on a named-perils basis, including perils of loading and unloading, at a rate for the exposure deemed adequate by the underwriter. Large contractors should have such insurance written on a monthly reporting form to reflect increasing values as installation progresses. Small contractors generally can provide for the coverage under a stated amount on an annual basis subject to coinsurance.

There is also a form of policy known as a **Riggers Floater** that is designed for contractors doing that type of work. This policy is usually a named-perils form at rates based on the nature of the rigging operation.

Neither the forms nor rates in any of these classes are standard among the companies writing them, although in general they are all similar.

Some contractors building bridges might be required to take a **Bridge Builders Risk Form.** This is an exception to most of the insurance provided to contractors, in that it is required to be rated in accordance with forms and rates filed in most of the states and administered by a licensed rating bureau.

17.15.3 Motor-Vehicle Insurance

Loss and damage caused by or to motor vehicles should be separately insured under specific policies designed to cover hazards resulting from the existence and operation of such vehicles. Bodily injury or property damage sustained by the public as a result of the operation of contractor's motor vehicles or other self-propelled equipment is insured under a standard policy of insurance. To secure complete protection, a Comprehensive Automobile policy should be obtained to provide protection, in addition to the preceding, for hired cars, employers nonownership, and any newly acquired motor vehicles or self-propelled equipment during the term of the policy. Damage to owned vehicles can be added to the same policy on an automatic basis to provide Comprehensive Coverage and Collision Insurance.

All vehicles should be covered, for high limits.

Protection furnished by automobile liability and property damage insurance serves in two ways: (1) the insurance company agrees to pay any sum for bodily injury and property damage for which the insured is legally liable, (2) the policy agrees to defend the insured. It is important, therefore, that the limits be adequate to guarantee that the insured obtain full advantage of the service available. For example, suppose only $25,000 and $50,000 limits are carried, and action is brought against the contractor in the amount of $500,000. It may be necessary to employ an attorney to safeguard the insured's interests for the amount of the action that exceeds the limits of the policy.

A contractor should not operate any type of motor vehicle without insurance. Automatic coverage should be provided to include all motor vehicles owned or acquired. The cost for highest available limits is reasonable.

Damage to owned motor vehicles may be insured under a fire, theft, and collision policy. Comprehensive motor-vehicle protection covers physical damage sustained by motor vehicles because of fires, theft, and other perils, including glass breakage. Collision insurance insures against loss from collision or upset. While the latter is available on a full-coverage basis, it is generally written on a deductible basis (loss less a fixed sum).

To cover a contractor for liability arising from the use by employees of their own automobiles while on the contractor's business, nonownership or contingent liability coverage is necessary. This may be included in the policy by endorsement.

Frequently, contractors have occasion to hire trucks or other vehicles. Liability and property damage insurance to cover the contractor's liability when using hired vehicles should be included at the time automobile insurance is arranged.

17.15.4 Boiler and Machinery Insurance

Boilers and other pressure vessels and machinery require the protection provided by boiler and machinery insurance. These policies cover loss resulting from accidents to boilers or machinery, and in addition, cover contractor's liability for damage to the property of others. Policies may also include liability arising from bodily injuries sustained by persons other than employees. This is needed because of the exposure that many contractors have as a result of the interest of the public in construction work.

The service rendered by boiler and machinery companies is of great help. Nearly all insurance companies that write this form have staffs of competent and experienced inspectors whose job it is to see that boilers, pressure vessels, and other machinery are adequately maintained.

17.15.5 Liability Policies Covering Contractor's Operations

Anyone who suffers bodily injuries or whose property is damaged as a result of the negligence of another person can recover from that person, if the latter is legally liable. Every business should protect itself against claims and suits that may be brought against it because of bodily injuries or property damage suffered by third parties.

Maintenance of an office or yard, as well as the conduct of a construction job, presents exposures to the public. There may be no negligence, and consequently no legal liability on the part of the contractor, but should claim be brought or suit instituted for an injury, the contractor without insurance coverage will require trained personnel to investigate the claim and negotiate a settlement or defend a lawsuit if the claim goes to court.

17.15.6 Commercial General-Liability Insurance

This is expressly designed to serve contractors by providing insurance that will pay for bodily injuries and property damage suffered by third parties if the contractor is legally liable, but the policy will also serve by defending the interests of the contractor in court. Sometimes the litigation involves amount of damage; but frequently, the contractor being sued is not legally liable for the injuries or damage. It is fundamental, therefore, that a policy be obtained at substantial limits for both bodily injuries and property damage, that the policy cover all existing exposures and also provide for protection against exposures that may not exist or be contemplated on the inception date of the policy. The scope of operations conducted by most contractors is such that it is frequently difficult to visualize all the hazards that may exist or come about simply by being in the construction business.

The commercial general-liability policy that covers all liability of the insured, except that resulting from the use of automobiles, is a standard form available in all states at rates regulated by law. This policy protects the contractor under one insuring clause and with one limit against claims. Blanket coverage is provided at a premium based on actual exposures disclosed by an audit at the end of the policy term. As required by this policy, every contractor must maintain accurate records of payrolls, value of sublet work, dollar amount of sales, and other factors that will be important at the time an audit is made.

Under the bodily injury liability clause of this policy the insurance company agrees to pay on behalf of the insured "all sums that the insured shall become legally obligated to pay as damages because of bodily injury, sickness or disease, including death at any time resulting therefrom, sustained by any person and caused by an occurrence." This is a very broad insuring clause. It obviously includes the entire business operations of the insured.

Property-damage liability is also covered. Additionally, the policy provides Independent Contractors Contingent Public Liability and Property Damage protection, which insures the general contractor against subcontractors' negligence.

There are certain exclusions in the policy that should be noted. The policy does not include:

1. Ownership, maintenance, or use (including loading or unloading) of water craft away from premises owned, rented, or controlled by the insured; automobiles while away from the premises or the ways immediately adjoining; and aircraft under any condition. However, this exclusion does not apply to operations performed by

independent contractors or to liability assumed by any contract covered by the policy.

2. Bodily injury sustained by employees while engaged in the employment of the insured.

3. Liability for damage to property occupied, owned, or rented to the insured or in the insured's care, custody, or control.

Contractors should be familiar with the provision of the commercial general-liability policy pertaining to contractual liability. The policy automatically provides coverage for the following written contracts: lease of premises; easement agreement, except in connection with construction or demolition operations on or adjacent to a railroad; undertaking to indemnify a municipality; side-track agreement; or elevator maintenance agreement. A premium is charged for such agreements as may be disclosed by audit.

There is no protection for the liability assumed in some very common types of agreements that include service, delivery, and work contracts. Many of these contracts are signed without full realization of the liability assumed. Each such agreement should be submitted to the insurance company at the time the policy is written in order that a premium charge may be computed and the agreement covered under the policy.

The most important contractual liability that may be assumed by the contractor is the so-called **hold-harmless clause.** A common type of hold-harmless clause as written by a general contractor to a subcontractor is illustrated in the subcontract rider in Fig. 17.7, Paragraph 32*a*. A similar clause written by the owner for inclusion in the general contract would be slightly modified and would substitute in appropriate places the word "Contractor" for "subcontractor" and the word "Owner" for "Contractor."

Hold-harmless clauses can be automatically included in a general contractor's commercial general-liability policy. However, the general contractor should include the previously mentioned subcontractor hold-harmless clause in each subcontract. Subcontractors will probably be required by their insurance companies to pay an additional premium for this coverage.

The commercial general-liability policy includes complete and automatic products-liability insurance, including completed-operations protection. The one exception to this complete coverage is that the policy does not include liability for damage to the work or to the goods themselves, such as the obligation of the contractor to repair or replace if there are defects. While the policy provides coverage, it is in fact an optional protection, which may be deleted. However, every contractor should take advantage of this coverage.

Most building contractors use elevators or hoists during construction. The policy automatically covers elevators, hoists, and other such hazards. Escalators may be covered for an additional premium.

The breadth of public-liability protection available, the numerous hazards to which a contractor may be exposed, both known and unknown, and the necessity for having complete coverage at all times indicate the need for the advice of trained insurance representatives.

17.15.7 Workers' Compensation Insurance

Every state requires an employer to secure a policy of workers' compensation to provide for an injured employee the benefits of the workers' compensation law of

that state. An insurance company that has had extensive experience in the workers' compensation field is best suited to meet the requirements of most contractors. It is in the employer's, as well as the employee's, best interests to see that the company entrusted to provide workers' compensation insurance is equipped to provide loss-prevention service and prompt first aid and to settle compensation claims fairly and speedily.

Some states impose on contractors liability for injury to subcontractors and their employees unless insurance is specifically provided for subcontractors and their employees. Check the law of the state in which construction is to be performed.

Subcontractors' insurance should be carefully examined and deficiencies found should be corrected. Certificates of insurance should be required, including coverage for contractual liability (hold-harmless). Because many complex situations arise, it is important that the advice of a qualified agent or broker be obtained.

An injured employee may believe that it is advantageous to waive workers' benefits and sue the employer for negligence or failure to maintain a safe place to work. Since benefits under workers' compensation are limited by statute, the employee may believe that recovery in a lawsuit may be substantially higher. Insurance coverage for such suits is provided by Employers Liability Insurance.

17.15.8 Money and Securities Protection

Every contractor has cash, securities, a checking account, and payrolls that are vulnerable to attack by dishonest people, both on and off the payroll. The same hazards present in every business are present also in the construction business. And no contractor is immune to dishonesty, robbery of payroll, burglary of materials, or forgery of signature on check.

Employee dishonesty may be covered on a blanket basis, either under a Primary Commercial or Blanket Position Form of Bond. The fact that contractors generally entrust the maintence of payroll records and the payment of employees to subordinates demonstrates the necessity for blanket dishonesty protection.

While many contractors maintain an organization on a year-round basis, some may not. For those contractors who do have a permanent staff, the bond may be written on a 3-year basis at a saving. It is important that adequate limits be purchased. A blanket bond in an amount equal to 5% of the gross sales is desirable.

General funds, securities, and payroll funds should be covered on the broadest basis available that protects against burglary, robbery, mysterious disappearance, and destruction, on and away from any premises. The general funds may be covered in an amount sufficient to protect against the maximum single exposure. Payroll funds may be insured specifically and in a different amount.

Contractors who maintain inventories of materials should insure them against burglary and theft. It should be noted, however, that insurance companies are not willing to insure against loss by burglary or theft unless materials are under adequate protection. Insurance is not available to cover property on open sites or in yards, but only while within buildings that are completely secured when not open for business.

Every business that maintains a checking account, however small the balance may be, should insure against loss caused by the forgery of the maker's name or by the forgery of an endorsement of checks issued.

The policy to cover all these hazards is the Comprehensive Dishonesty, Disappearance, and Destruction Policy. Its several insuring agreements include employee-dishonesty coverage, broad-form money and securities protection, on and off the premises, and forgery. Other coverages to provide burglary and theft protection for

merchandise and materials may be added by endorsement. Optional coverages available are numerous, and the contract may be designed specifically for all of a contractor's exposures.

17.15.9 Employee Group Benefits

There are many forms of group insurance for providing benefits for employees. Included in the following is a brief description of those forms of "group insurance benefits" that are of greatest current interest.

Group Life insurance. A form of term life insurance written to cover in a specified amount a group of employees of a single employer. Frequently, the amount of insurance is related to an employee's earnings and increases as the earnings increase. However, the amount of insurance may be a flat sum. Usually, a specified number of employees must participate.

Group Disability Insurance. If an employee is away from work as a result of a nonoccupational disability, this insurance provides a continuing income during the period of absence. The amount of benefit is usually a percentage of earnings. Many states have adopted compulsory disability laws.

Group Hospitalization and Surgical Benefits. These forms of group protection are designed to protect an employee from the results of high hospital expense or the expense of a surgical operation. The protection may be written to cover an employee solely or it may be written to cover an employee and dependents.

Group Coverage for Major Medical Expenses. Rates vary greatly, as do forms of policy. The coverage is usually provided on a deductible basis (medical expense less a fixed sum). Frequently a coinsurance feature is included so that the individual protected by such insurance bears part of the cost.

17.15.10 Amounts of Insurance

For a construction manager, the limits of insurance that should be carried by the contractor and the limits that should be carried by the subcontractors are of fundamental importance.

Usually, the contractor's limits are set forth in the agreement with the owner. When the owner's insurance limits are not high enough to afford the contractor full protection for the exposure the contractor anticipates, it is often worth the additional cost of increasing these limits. For example, insurance with limits of $500,000 to $1,000,000 for public liability and $500,000 for property damage often may be less expensive in the long run than lower limits that may be the maximum required by the owner. Furthermore, if the general contractor requires subcontractors to carry insurance with the same limits, it may be provident for the general contractor to pay the additional cost to the subcontractor for the increase of limits above what the subcontractor normally carries. When insurance limits are raised from $100,000 to $500,000, or from $50,000 to $500,000, the increase in cost is not proportional to the increase in limits.

17.16 CONSTRUCTION CONTRACT BONDS

Agencies at all levels of government generally obtain competitive bids for construction. Awards are made to the lowest responsible bidder, who is required to furnish

performance and payment bonds provided by a qualified corporate surety. In addition, all construction projects financed or insured by the Federal government, such as FHA-insured projects, require such bonds. Also, many private owners require bonds of contractors.

Generally, bidders are required to post a certified check or furnish a bid bond. A bid bond assures that, if a contract is awarded, the contractor will, within a specified time, sign the contract and furnish bond for its performance. If the contractor fails to furnish the performance bond, the measure of damage is the smaller of the following: the penalty of the bid bond or the amount by which the bid of the lowest bidder found to be responsible and to whom the contract is awarded exceeds the initial low bid.

Most surety companies follow the practice of authorizing a bid bond only after the performance bond on a particular contract has been underwritten and approved. For this reason, contractors are well advised against depositing a certified check with a bid unless there are assurances that the performance bond on that particular contract has been underwritten and approved.

There is no standard form of construction contract bond. The Federal government and each state, county, or municipal government has its own form. Private owners generally use the bond form recommended and copyrighted by the American Institute of Architects. Surety companies have developed a very broad form of bond, which is available to owners of private construction. Whatever form is used, the surety generally has a twofold obligation:

1. To indemnify the owner against loss resulting from the failure of the contractor to complete the work in accordance with the contract.
2. To guarantee payment of all bills incurred by the contractor for labor and materials.

Usually, two bonds are furnished, one for the protection of the owner, and another to protect exclusively those who perform labor or furnish materials. If one bond is furnished, the owner has prior rights.

Sureties underwrite construction contract bonds carefully. They are interested in determining whether a contractor has the capital to meet all financial obligations, the equipment to handle the physical aspects of the particular undertaking, and the construction experience to fulfill the terms of the contract.

A Performance and Payment Bond is not an insurance policy that will pool the premiums from those contractors who receive bonds and will pay the losses out of that pool, as is done with insurance. Rather, the bond essentially is a credit guarantee by the bonding company, and, as for any credit guarantee given in business, the bonding company expects to be reimbursed if this guarantee is enforced. Therefore, before providing a bond to a contractor, the surety requires the contractor to sign an Application for Surety Bond. This application, among other things, includes an agreement by the contractor to reimburse the surety for any losses that the surety may sustain as a result of having written the bond. The contractor, in order to receive the bond, therefore is indemnifying the surety. Cost of the bond is added by the contractor to the construction contract price.

Contractors should be aware of all the information that a surety will require and that is necessary to the underwriting of a contract bond. It is also important that a contractor take advantage of the services of a competent agent or broker who has close affiliations with a surety company that has the capacity to meet all the contractor's needs. Outlined below are several items of information that will be required by the surety:

1. A complete balanced financial statement with schedules of the principal items. This is a condition precedent to the approval of any contract bond. Sureties have forms on which a contractor may furnish financial information. They should be completed by the individual responsible for the financial operations of the company and the data taken directly from the company's books. It is preferable to have the financial statement prepared and certified by a public accountant.
2. A report on the contractor's organization. The surety is interested in knowing the length of time the contractor has been in business, whether the firm operates as an individual, a partnership, or a corporation, and certain specific details, depending upon the form of organization.
3. A report on the technical qualifications and experience of the individuals who will be in charge of work to be performed.
4. A report on the type of work undertaken in the past, together with information regarding jobs successfully completed.
5. An inventory of equipment, noting value and age of each piece and any existing encumbrance. An inventory of materials will also be helpful.

From the construction management point of view, the most important question involving bonding is: What avenues of business are open to the contractor who lacks sufficient bonding capacity to do bonded work?

In Art. 17.4 various sources of business are described, and in Art. 17.1 various types of construction companies are discussed. Many of these types of business and construction companies do not require bonds for their work. For example, it is very rare that a bond is required in a construction management contract. When a contractor lacks capacity for bonding, it is well to pursue the lines of work described in those articles for which a bond will not be required.

The second question confronting a construction manager is whether or not to require a bond of subcontractors. In general, if the financial capability or experience of a subcontractor is sufficiently doubtful as to require bonding, the job should not be awarded to that company. Exceptions to this can be made to assist young companies in starting and gaining experience.

There are alternatives to subcontract bonds. These alternatives include the following:

Personal guarantees by the principals of the subcontracting company

Personal guarantees of other individuals of substantial worth unconnected with the subcontracting company

Posting of a sum of money or of a security, such as a letter of credit, until performance of the subcontractor's work has been completed by the subcontractor.

17.17 TRADE PAYMENT BREAKDOWNS AND PAYMENTS

The Contractor's Trade Payment Breakdown (Fig. 17.20) is usually prepared by the contractor long in advance of purchase of materials or subcontracts. Therefore, the amounts shown may vary from the actual costs of the various items. In addition to this, the contractor usually has start-up costs for such expenses as mobilization,

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL HOUSING ADMINISTRATION

CONTRACTOR'S and/or MORTGAGOR'S

COST BREAKDOWN
(SCHEDULES OF VALUES)

Date: August 23
Sponsor: 80-86 Houses
Project No.: 012-38024-LP
Building Identification
Name of Project: 80-86 Houses.
Location: 80-86 Green Ave Brooklyn N.Y.

LINE	DIV	TRADE ITEM	COST	TRADE DESCRIPTION
1	3	Concrete	530,000	Foundations, superstructure plank, slab-on-grade
2	1	Masonry	410,000	Brick and block masonry and caulking
3	5	Metals	70,000	Lintels, stairs, railings
1	6	Rough carpentry	10,000	Block and rough framing
5	6	Finish carpentry	60,000	Millwork, material, and labor
38	2	Site improvements	5,000	Benches, etc.
39	2	Lawns & planting	10,000	Topsoil, seeding, plants
10	2	Unusual site conditions		
11		Total land imprvts.	130,000	
12		Tot. struct. & land imprvts.	2,860,000	
13	1	General requirements	240,000	
14		Subtotal (lines 41 and 42)	3,100,000	
15		Builder's overhead	62,000	
16		Builder's profit		
17		Subtotal (lines 44 thru 46)	3,162,000	
18				
19		Other fees		
50		Bond premium		
51		Total for all improvements		
52		Builder's profit paid by means other than cash		
53		Total for all improvements less line 52		

NONRESIDENTIAL AND SPECIAL EXTERIOR LAND IMPROVEMENT
(costs included in item breakdown)

DESCRIPTION	EST. COST
TOTAL $	

OTHER FEES

TOTAL $	

OFFICE COSTS
(costs not included in item breakdown)

DESCRIPTION	EST. COST
TOTAL $	

DEMOLITION
(costs not included in trade item breakdown)

DESCRIPTION	EST. COST
TOTAL $	

Mortgagor: Kreigler Borg Florman — By: _____ Date: _____
Contractor: Construction Company (Inc.) — By: S. Florman, Samuel C. Florman, VP — Date: August 23,
FHA _____ Processing Analyst) (Date) _____ (Chief, Cost Branch or Cost Analyst) _____ (Date)
FHA _____ (Chief Underwriter) Date _____

FIGURE 17.20 Contractor's Trade Payment Breakdown.

temporary structures, temporary utilities, and layout, which may not be reflected completely in the breakdown. To offset both of these conditions, the breakdowns may be unbalanced by giving greater value than true costs to the work of some of the trades done early than to the work of the trades done later. This unbalancing will enable the contractor to receive funds for these early start-up costs and thus to be compensated for having to pay various subcontractors and suppliers greater amounts than anticipated at the time the breakdown was prepared. The unbalancing will also make funds available for paying certain subcontractors and suppliers their retained percentages prior to payment of the general contractor's retained percentage. The reason why such payments are made earlier is that direct labor costs and many purchase commitments made by contractors, such as lumber, hardware, millwork, doors, and frames, are not subject to retained percentage. These materials, which are merely delivered and not contracted for to be both delivered and installed, must be paid for in full. Since there is a retained percentage being held on all of the work of the general contractor, funds must be available for the part of the

retainage that is paid out by the contractor. The unbalancing of the Trade Payment Breakdown will serve this purpose.

Payments to subcontractors and suppliers are made on the basis of payments received by the general contractor on monthly requisitions. The general contractor should pay to these subcontractors and suppliers only the same percentage as approved on the contractor's requisition to the owner. In addition, the contractor should pay only extras for which corresponding payments have been received from the owner. In case of disputed extras, the contractor may have to pay a portion of the disputed amount to the subcontractor to keep the job running smoothly, despite the fact that the owner has not paid anything on these disputed claims.

Subcontractors should be paid only when the contractor gets paid for the subcontractors' portions of the work. Furthermore, subcontractors should be paid only after their subcontracts are signed and insurance certificates have been received. All subcontractors should be required to use the same requisition form. A typical Application for Payment on Account of Contract is illustrated in Fig. 17.21. Both the front and back must be filled out by the subcontractor and signed. Payments to a subcontractor should be shown cumulatively on the subcontractor's financial folder, which should be separately set up for each subcontractor.

After the first payment is made to a subcontractor, the contractor should verify that the subcontractor is paying suppliers. If suppliers are not being paid, the general contractor should insist on joint checks to suppliers and the subcontractor and require that the subcontractor endorse the check so that the supplier can receive the funds.

In making final payments to subcontractors and suppliers, the contractor may be able to get a reduction in their claims and extras. In addition to this, the records of backcharges and other charges for use of hoists, etc. should be shown to them. A close check should be kept on credits due. If a subcontractor omits portions of the work and if this is known, it is essential that a credit be requested of the subcontractor before final payment. All omitted work and shortcuts, especially in alteration work, should be recorded. Before final payment to a subcontractor, the general contractor should ensure that final waivers of liens have been signed and that all guarantees warranties, operating manuals, as-builts, and application for final payment have been received. After final settlement between contractor and subcontractor of all claims, and while final payment is being awaited from the owner, the subcontractor may often be willing to discount the final payment for immediate receipt of the money, rather than wait.

17.18 COST RECORDS

Segregation of costs for each job is essential for proper construction project management. Only with such records can profits or losses for each job be calculated and predictions made for future work costs. After award of subcontracts, in order for records to be up to date as to any extras or credits that are being claimed by or awarded to the subcontractors for changes (Art. 17.14), a monthly update of all anticipated costs for each subcontract is essential. This can be done by means of an Application for Payment Form (Fig. 17.21) from each subcontractor.

On this form, the approved extras are shown on the second line on the front of the sheet under Amount (Fig. 17.21*a*). Also, all extras claimed by the subcontractor

Kreisler Borg Florman
CONSTRUCTION COMPANY (INC.)
97 Montgomery Street, Scarsdale, New York 10583
Telephone (914) SC 5-4600

APPLICATION FOR PAYMENT ON ACCOUNT OF CONTRACT

ALL REQUISITIONS MUST BE MAILED AND IN THIS OFFICE ON OR BEFORE THE LAST DAY OF THE MONTH.
BOTH SIDES OF THIS REQUISITION MUST BE COMPLETED AND SIGNED.

SUBCONTRACTOR Modern Pollution Control, Inc. PERIOD FROM Start TO September 30,

FOR 170th St @92rd Ave, Jamaica, New York WORK REQ. No. 1

PROJECT Apartment Building

ITEM	AMOUNT	DO NOT WRITE IN THIS SPACE
AMOUNT OF ORIGINAL CONTRACT	9,825	
APPROVED EXTRAS TO DATE (LIST ON REVERSE SIDE)	250*	
TOTAL CONTRACT AND EXTRAS	10,075	
CREDITS TO DATE (LIST ON REVERSE SIDE)	nil	
NET CONTRACT TO DATE	10,075	
VALUE OF WORK PERFORMED TO DATE	TOTAL	
LESS RESERVE OF ____% AS PER CONTRACT	1,475	
BALANCE	8,600	
LESS PREVIOUS PAYMENTS	nil	
AMOUNT OF THIS REQUISITION		

DO NOT WRITE IN THIS SPACE

JOB _____ DISTRIBUTION _____
CHECKED: QTY. _____ PRICE _____ EXT. _____
AMOUNT PAID _____ DATE _____
CHECK NO. _____ FOLIO NO. _____
ENTER _____ PAY _____

(OVER)

FIGURE 17.2l*a* Front side of application for payment submitted by a subcontractor.

must be listed on the back (Fig. 17.21*b*), as shown on the portion of the form Extras to Date.

Payrolls. From the daily reports received from the field (Art. 17.10.3), weekly payrolls can be prepared for each job. Labor for each job must be segregated and tabulated in a payroll report (Fig. 17.22). This report also provides statistics on tax

THE FOLLOWING IS A FULL AND COMPLETE LIST OF ANY AND ALL PERSONS, FIRMS OR ENTITIES OF EVERY NATURE OR KIND AND DESCRIPTION WHO FURNISHED WORK, LABOR (OTHER THAN ON DIRECT PAYROLL OF APPLICANT), SERVICE AND/OR MATERIAL (INCLUDING BUT NOT LIMITED TO INSURANCE PREMIUMS, WATER, GAS, POWER, LIGHT, HEAT, OIL, GASOLINE, TELEPHONE SERVICE OR RENTAL OF EQUIPMENT AS WELL AS UNION WELFARE, PENSION AND OTHER FRINGE BENEFIT PAYMENTS AND FEDERAL, STATE & LOCAL TAXES) IN EXCESS OF $100.00 ARISING OUT OF OR IN CONNECTION WITH THE JOB FOR WHICH THIS PAYMENT IS REQUESTED TOGETHER WITH ANY AND ALL AMOUNTS NOW DUE AND OWING TO THEM AS WELL AS THE DATE THAT THEY LAST PERFORMED ANY WORK, LABOR, SERVICE OR DELIVERED ANY MATERIAL:

NAME	ADDRESS	DATE	AMOUNT DUE
NONE DUE AND OWING			

ALL CLAIMS FOR EXTRAS NOT HEREIN LISTED ARE WAIVED BY THE SUBCONTRACTOR

EXTRAS TO DATE				CREDITS TO DATE			
Order No.	Description	Date	Amount	Order No.	Description	Date	Amount
	Damages on electrical control box		$250.00				

THE FOREGOING REPRESENTATIONS ARE MADE IN ORDER TO INDUCE YOU TO MAKE AN INTERIM OR FINAL PAYMENT TO US, WELL KNOWING THAT YOU ARE RELYING ON THE TRUTH THEREOF

MODERN POLLUTION CONTROL INC	
APPLICANT'S NAME	SIGNATURE
36-50 38th St, L.I.C., New York	President
ADDRESS	TITLE

FIGURE 17.21*b* Back side of the application for payment.

withholding to the government, as well as other payroll information. In addition, the report gives the gross wages week by week.

Monthly Cost Report. This report summarizes subcontracts and extras, material purchases, and labor costs encountered to date and expected to be encountered until completion. A monthly report prepared in a manner similar to Fig. 17.23 (computer spreadsheet) will yield information to the contractor, long before the job has been completed, for calculating anticipated profit for the job. It also will offer a method of monitoring job progress and costs to ascertain whether the anticipated profit is being maintained.

PAYROLL

Kreisler Borg Florman

CONSTRUCTION COMPANY (INC.)
97 MONTGOMERY STREET, SCARSDALE, N. Y., 10583, SC 5-4600

SHEET NO. 1 OF 1

PROJECT TWIN PARKS NORTHWEST

PERIOD - FROM 1/17/ TO 1/23/

		BARGE NUMBER	NAME OF EMPLOYEE	POSITION	HOURS WORKED DAILY — WED.	THU.	FRI.	SAT.	SUN.	MON.	TUE.	TOTAL HOURS	RATE	AMOUNT EARNED — STRAIGHT	PREMIUM	GROSS WAGES	W.T. EXEMP.	DEDUCTIONS — O.A.B.	W.T.	N.Y.S. W.T.	N.Y.C. W.T.	OTHER	NET PAYMENT
	1		J.R.		S.T.																		
					O.T.											200 00		11 70	26 30	6 90	2 30		152 80
	2		V.L.	Lab.	S.T.																		
					O.T.											262 50		15 36	46 40	12 60	4 00		184 14
	3		P.F.	Lab.	S.T.																		
					O.T.											262 50		15 36	30 50	8 70	3 05		204 89
	4				S.T.																		
					O.T.																		
	5				S.T.																		
					O.T.																		
	6				S.T.																		
					O.T.																		
	7				S.T.																		
					O.T.																		
	8				S.T.																		
					O.T.																		
	9				S.T.																		
					O.T.																		
	10				S.T.																		
					O.T.																		
	11				S.T.																		
					O.T.																		
	12				S.T.																		
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	13				S.T.																		
					O.T.																		
	14				S.T.																		
					O.T.																		
	15				S.T.																		
					O.T.																		
	16				S.T.																		
					O.T.																		
	17				S.T.																		
					O.T.																		
	18				S.T.																		
					O.T.																		
				TOTAL	N.T.																		
					O.T.											725 00		42 42	103 20	28 20	9 35		541 83

CODE:
A—ABSENT; NOT PAID FOR
B—ABSENT; PAID FOR
H—HOLIDAY
V—VACATION WITH PAY
P—VACATION WITHOUT PAY
S—SICK

DEPT. HEAD APPROVAL RB

AMOUNT OF PREVIOUS WEEK'S PAYROLL $755.00

SIGNATURE OF SUPERINTENDENT

17.59

FIGURE 17.22 Payroll report for a construction project.

Date - 08 JUL 199 Time - 06:32:57

Sample Company Number 99
J O B C O S T T O D A T E
REVISED ESTIMATE
Through Period 02 Year 9

JOB NUMBER - BAYS
Bayshore Medical Ctr
Bayshore Medical Center
North Beers Street, Holmdel, NJ
Remodeling, Renovation, Structural Changes

Job Supervisor: Bill Cook
Completion Date: 9/30/92
Trailer phone (908) 938-4533

PHASE	CODE	DESCRIPTION	ESTIMATE REVISED	ESTIMATE CHANGE ORDERS	COST TO DATE CURRENT	COST TO DATE MONTH	COST TO DATE YEAR	COST TO DATE JOB	VARIANCE
100-1000	-A	Job Overhead	12,450.00		12,450.00				12,450.00-
100-1300	-L	Job Supervis	13,500.00		13,500.00			2,284.59	11,215.41-
100-1400	-E	Bulldozer	2,500.00		2,500.00			1,791.30	708.70-
100-1810	-S	Grading - Ex	8,000.00	1,800.00	9,800.00			4,234.56	5,565.44-
100-1840	-L	Site Clearin	4,000.00		4,000.00			11,901.42	7,901.42
100-1843	-M	Footings	9,000.00		9,000.00			6,982.57	2,017.43-
100-1845	-M	Slabs	9,000.00		9,000.00			10,062.50	1,062.50
100-8230	-L	Seeding/Land	6,000.00		6,000.00			10,764.47	4,764.47
PHASE TOTALS			64,450.00	1,800.00	66,250.00			48,021.41	18,228.59-
200-2000	-M	Concrete Wal	10,000.00		10,000.00			16,365.36	6,365.36
200-2000	-S	Concrete Wal	10,000.00	7,500.00	17,500.00			7,500.00	10,000.00-
200-2200	-L	Framing	20,000.00	2,530.00	22,530.00			11,886.27	10,643.73-
200-2410	-S	Rough Electr	25,000.00	5,000.00-	20,000.00			22,000.00	2,000.00
200-2500	-S	Rough Plumbi	10,000.00	8,000.00	18,000.00			12,707.71	5,292.29-
200-2600	-M	Sheetrock	4,000.00		4,000.00			13,147.00	9,147.00
PHASE TOTALS			79,000.00	13,030.00	92,030.00			83,606.34	8,423.66-
300-3100	-L	Roofing	5,000.00		5,000.00			10,953.50	5,953.50
300-3100	-M	Roofing Slat	17,000.00		17,000.00			6,800.00	10,200.00-
300-3250	-M	Joists	6,985.00		6,985.00			4,000.00	2,985.00-
300-3300	-M	Flashing	3,275.00	4,000.00	7,275.00			859.83	6,415.17-
300-3350	-L	Install Flas	2,600.00		2,600.00			4,524.31	1,924.31
PHASE TOTALS			34,860.00	4,000.00	38,860.00			27,137.64	11,722.36-
400-4000	-L	Finishing Wo	16,850.00		16,850.00				16,850.00-
400-4100	-M	Carpeting	10,640.00	5,000.00	15,640.00				15,640.00-
400-4200	-M	Lighting Fix	6,950.00	7,000.00	13,950.00			6,030.00	7,920.00-
400-4300	-L	Finish Plumb	20,000.00		20,000.00			2,225.77	17,774.23-
400-4300	-M	Bathroom Fix	6,000.00		6,000.00			4,230.03	1,769.97-
PHASE TOTALS			60,440.00	12,000.00	72,440.00			12,485.80	59,954.20-
JOB TOTALS			238,750.00	30,830.00	269,580.00			171,251.19	98,328.81-

17.60

FIGURE 17.23 Monthly cost report as output by a computer spreadsheet program.

17.19 ACCOUNTING METHODS

The contractor together with an accountant should select a method of accounting best suited for the contractor's operations. The method selected will determine, to a great degree, the amount of taxes paid as well as the accuracy of the information that the contractor will be able to furnish to his bonding company.

One of two bases is generally used: the cash basis or accrual basis. The accrual basis is subdivided into (1) straight accrual basis; (2) completed-contract basis; (3) percentage-of-completion basis.

The **cash basis** is used mainly by small contracting companies. The gross income is reported on the basis of cash receipts. Contract costs are reported on the basis of actual expenses paid. This method has the advantages of simplicity, control of net income by the timing of requisitions and receipts, and payments of taxes *after* profits have been *earned* and *collected.*

The disadvantages of the cash basis are as follows: It is not an accurate reflection of the company's financial condition. It does not show monies earned and not collected, or debts incurred and not paid. It cannot be used for surety purposes.

The **straight-accrual method** can be used for both short-term and long-term contracts. In this method, the gross income is recorded when earned and expenses are recorded when incurred, regardless of when the cash is received or disbursed. It has the advantages that statements of income reflect actual operations during the period, all receivables and payables are recorded as incurred so that the balance sheet is more useful, and if there are more payables than receivables, less tax has to be paid.

The disadvantages are as follows: The gross income may not be accurate. It may not be the same as the gross profit because of advance billings (caused by unbalanced requisitioning, or front-loading) or job-site inventories. There is less flexibility in tax planning than in other methods. If there are more receivables than payables, the accrual method will result in a higher tax.

The **completed-contract basis** is used for long-term contracts. It is also very good for joint ventures. The income of each long-term contract is recognized only when that contract has been completed or substantially completed.

The advantages are as follows: Taxes are effectively deferred until completion of the project, thus augmenting the contractor's working capital. Contract profits are figured on the basis of actual results, rather than on estimates that could overlook unforeseen future costs or delays. All receivables and payables are recorded as they occur, making a more accurate balance sheet. Taxable income can be regulated between years by deliberately hastening or deferring contract completion. Profits as accrued can be invested and used to earn interest before taxes are paid. And payment of taxes has a better relationship to cash flow from accounts receivable and retained percentages.

The disadvantages of the completed-contract basis are that it does not reflect current performance when a contract spans more than one fiscal year and unincorporated contractors may be penalized, since net income may be irregular and taxed at higher rates one year and at lower rates in another year.

The **percentage-of-completion method** recognizes the gross income on each contract as work progresses. Annual income for each contract should be the same percentage of total income as contract costs to date are of the estimated total contract costs. In computation of contract costs, all or portions of costs may be temporarily excluded during the early stages—for example, start-up costs—if the exclusion would result in a more accurate allocation of income. The advantages of

this method are: It is the most realistic annual determination of income. Receivables and payables are recorded when earned or incurred. Liability for taxes arises in the fiscal year when it is actually incurred. And it provides consistent data with very little distortion.

The disadvantages are: It is dependent on estimates from management of percentage of completion and cost to complete. Retained percentages and accounts receivable not yet billed are taken as income although they may not be collected until a much later date. It does not permit the deferral of income taxes, a procedure that may be available with the cash or completed-contract method.

17.20 SAFETY

Responsibility for job safety rests initially with the superintendent. Various safety manuals are available giving recommended practice for all conceivable types of construction situations: for example, see ''Manual of Accident Prevention in Construction,'' Associated General Contractors of America, Inc., 1957 E St., NW, Washington, DC 20006.

Because of wide diversity in state safety laws, the Federal government in 1970 passed the Occupational Safety and Health Act (OSHA) (Title 29—Labor Code of Federal Regulations, Chapter XVII, Part 1926, U.S. Government Printing Office). Compared with state safety laws of the past. the Federal law had much stricter requirements. For example, in the past, a state agency had to take the contractor to court for illegal practices. In contrast, the Occupational Safety and Health Administration can impose fines on the spot for violations, despite the fact that inspectors ask the employers to correct their deficiencies. OSHA enforcement, however, may eventually be taken over by the states if they develop state regulations as strict as those of OSHA.

An essential aspect of job safety is fire prevention. In aiding this endeavor, superintendents and project managers often have the advice of insurance companies who perform inspection of the jobs, free of charge. Such inspections by insurance companies often result in reports with advice on fire-prevention procedures. Contractors will benefit from adoption of these recommendations.

To deal most effectively with safety in the contractor's organization, the contractor should assign responsibility for safety to one person, who should be familiar with all Federal and state regulations in the contractor's area. This person should instruct superintendents and supervisors in safety requirements and, on visits to job sites, be constantly alert for violations of safety measures. The safety engineer or manager should ascertain that the construction superintendent holds weekly ''toolbox'' safety meetings with all supervisors and that the superintendent is writing accident reports and submitting them to the contractor's insurance administrator. In addition, the safety supervisor should maintain a file containing all the necessary records relative to government regulations and keep handy a copy of Record-Keeping Requirements under the Occupational Safety and Health Act, Occupational Safety and Health Administration (U.S. Department of Labor, Washington, DC). Management should hold frequent conferences with this individual and with the insurance company to review the safety record of the firm and to obtain advice for improving this safety record.

17.21 COMMUNITY RELATIONS

Community concerns with the results of new construction or disturbances from construction operations materially affect the construction industry. Some communities merely help shape projects that are being planned for construction in their environs. This aid consists of recommendations from community advisory boards and localization of planning. Other communities have assumed a more vigorous role in regulating construction, including the power of veto or costly delay over many projects.

Some of the areas of community relations that must be dealt with in construction management are discussed in the following:

Employment of Local Labor. Because many construction projects are built in inner city, or core areas, where there is much unemployment, communities may insist on utilization of unemployed local labor. This may be done in accordance with local plans or in the form of an Equal Opportunity Program of nondiscrimination, or by recruitment of local labor for employment on the job site. Additional equal opportunity must be given by contractors to women and the handicapped in both office and field positions.

Utilization of Local Subcontractors. Various government agencies may require or give preference to employment for construction work of local subcontractors, with special consideration for minority- and women-owned firms. In many cases, general contractors may be required to enter into written understandings with a government agency specifying goals to be set for local subcontractor employment on a job. As a result of such actions, poorly capitalized subcontractors have been able to make initial employment gains in fields requiring small capital investment. Payrolls for such subcontractors, however, in a number of these trades do present difficulties. In many instances, it may be necessary for the general contractor to make special arrangements for interim payments to these subcontractors, prior to the regular payment date, for work performed.

Among the routes used to bring about employment of subcontractors short of capital on construction jobs are the following:

Awarding a subcontract and orders to such firms.

Subdividing work into manageable-size subcontracts.

Encouragement of subcontractors to enter into joint ventures with better-financed subcontractors.

Awarding subsubcontracts to subcontractors by better-financed subcontractors who hold a large subcontract.

Awarding a pilot contract for a small job to a subcontractor, for example, tiling of one or two bathrooms, just to create an opportunity to begin to function.

Recruitment of local community labor and local subcontractors for a project requires maintenance by the contractor of an active program for the purpose. When the job is started, if there is a community group strongly organized and vocal in the area, the leaders of this group should be approached. If a request is made by the community group for employment of a member of the group as a community liaison or organizer, this request should be given earnest consideration. With a

salaried liaison between the contractor's organization and the community, many pitfalls can be avoided.

Up-to-date lists of community subcontractors should be maintained by the contractor's office. These lists should be frequently updated, or they will rapidly become obsolete as these small subcontractors either expand or phase out. The contacts thus made with local firms are important, because an acquaintanceship with local conditions is essential in obtaining and executing contracts and dealing with communities.

Public Interest Groups. These also express their opinions and ask for a voice in planning and construction of proposed projects. They can promote projects they favor or seriously delay or cause to be canceled projects they oppose, by lobbying, court actions, presentation of arguments at public hearings, or influencing local officials in a position to regulate construction.

Environmental Impact Statements. An environmental impact statement is an analysis of the effect that proposed construction will have on the environment of the locality in which the project is to be built. The statement should take into consideration, among other things, the following factors: effect on traffic; potential noise, sound, and air pollution; effect on wild life and ecology; effect on population and community growth; racial characteristics; economic factors; and aesthetics and harmony with the appearance of the community.

For each project, contractors should ascertain whether an environmental impact statement is required. If such a statement is required, it should be begun early in the construction planning stage, if it is required to be drafted by the contractor. If the impact statement for a project is to be drafted by a government agency, the contractor should ascertain that the agency has drafted the statement and that it has been filed and approved.

17.22 RELATIONS WITH PUBLIC AGENCIES IN EXECUTING CONSTRUCTION OPERATIONS

A contractor must deal with numerous public agencies. In some localities, to obtain the necessary permits for start and approval of completed construction, a contractor, for example, may have business with the following agencies: building department, highway department, fire department, police department, city treasurer or controller, sewer and water department, and various government agencies providing the financing, such as Federal Housing Administration, State Division of Housing, or a public-interest corporation formed by the state or municipality for undertaking construction work.

The contractor must be familiar with the organization of the agency and the division of functions, that is, which portion of the agency does design, which does construction-cost approval, and which does inspection. The contractor should also determine whether financing is provided for completed construction, or merely by providing or guaranteeing a mortgage. In addition, the contractor should be knowledgeable on construction-code enforcement; source of payments, whether through a capital construction budget or merely a building mortgage; permits required, methods of obtaining them, and fees; record keeping; and methods of obtaining information from the agency's files.

The contractor should do the following to deal most effectively with public agencies. First, various members of the contractor's staff should concentrate their efforts and become experts on dealing with one or more agencies. For instance, the person in charge of field operations should be the one to deal with the building department and building inspectors. This person should become familiar with the organizational structure of the building department and know the inspectors. Others in the organization should be versed in dealing with city treasurers or comptrollers, and still others with state or Federal agencies.

Second, up-to-date files and information should be kept and segregated on agency regulations and procedures. For example, building department codes and regulations should be obtained, and revisions of these should be maintained in the contractor's offices.

Also, it is very important that a personal relationship be established between the contractor's personnel and the members of the agencies with which the personnel deal. Most agency personnel are willing to help when approached on a frank and open basis.

17.23 LABOR RELATIONS

Proper labor relations on a construction job involve many facets of a contractor's ability. Such relations often are affected by the type of labor organization involved.

Most craft labor on jobs in large cities and in the industrialized portions of the country is unionized. Most unionized employees on construction are members of American Federation of Labor building crafts unions. Open-shop contractors, however, often are able to perform work on a nonunion basis. In a few cases, local labor unions of an industrialized type perform construction work.

Strikes. Construction labor strikes after expiration of a labor contract can place a contractor in a difficult position. If the contractor is a member of a contractor's association, the association will handle the negotiations. If not an association member, the contractor has one or two alternatives: Sign up as an independent contractor on condition that the final terms of the agreement settled at the conclusion of the strike will apply to the contractor's agreement retroactively. Or the contractor can continue working around the affected trade and hope that the job will not be delayed or advanced too far from the normal job sequence.

Jurisdictional Disputes. Jurisdictional disputes between two crafts often make a contractor an innocent bystander. Appeals may be made to the national headquarters of the crafts involved, and machinery exists in such cases for resolution of such disputes in the National Joint Board for the Settlement of Jurisdictional Disputes and the National Appeals Board in Washington, DC. A simpler way is for the contractor to file a charge with the nearest office of the National Labor Relations Board.

Standby Pay. In many union contracts, a requirement is imposed on contractors for standby pay for workers who may not actually be engaged in installing materials or performing work because of a requirement that members of the union be assigned to stand by for certain purposes. Examples of standby pay are pay for temporary water (plumbers), for temporary electric standby to maintain temporary power and lighting (electricians), and for steamfitters or electricians to maintain temporary

heat. Standby pay is usually considered a normal part of the construction process, if in the union agreement, and must be allowed for by the contractor in cost estimates.

Prevailing Wages. Contracts for construction for governmental agencies often require that the labor on a job be paid prevailing wages. These are defined as the wages received by persons normally performing that trade in the locality where the job is being performed. Prevailing wages in localities where there is a strong union usually are the union wages paid to labor in that area. Also considered part of prevailing wages are all fringe benefits and allowances usually paid in addition to hourly wages. If a contractor enters into an agreement that provides for payment of prevailing wages, the contractor may also be responsible for a subcontractor who fails to pay prevailing wages.

Labor Recruitment. A contractor's labor recruitment takes many forms. Most importantly, the work force comes from a following of labor that has previously worked with the contractor. These workers are summoned by telephone or by word of mouth when they are needed on the job site. In instances in which the usual labor force must be vastly expanded, the contractor can resort to advertising in newspapers or recruitment by advising local labor-union officials that workers are needed.

Workers are assigned to tasks on the basis of their trade. In strong union jurisdictions, crossing-over by labor from one trade to another is prohibited when the union labor is organized along craft lines.

When there is strong competition for labor, the contractor may have to resort to overtime work to attract and hold capable people, with the expectation that overtime pay will prevent job hopping. In instances in which a great many jobs, or one tremendous job, will be under construction in a locality with a relatively small labor force, other problems may arise. Labor may have to be brought in from the outside, and to do this the contractor may find it necessary to pay travel time or living allowances for such labor.

Termination. When a project ends, generally all labor is discharged, except the contractor's key personnel, who may be moved to another job. Subcontractors, however, frequently, through judicious timing, are able to employ entire labor groups by moving them from one project to another.

Employment Policies and Practices. Employment policies and practices should include guidelines for all supervisors on employment termination that may be construed as discrimination because of sex, age, handicap, or various forms of sexual harrassment. Under prevailing court decisions, these areas must be dealt with in a clearly defined policy on the part of the company. Complaints from employees should be handled by an established machinery set up by the company so that they may be heard and fairly dealt with. Lawsuits based on violation of such practices may be quite costly both in the recovery awarded and in legal expenses. Employment termination under unusual circumstances should be discussed with an attorney prior to being executed.

Efficiency. Keeping production efficiency high is generally the chief task of the labor superintendent or supervisor. The means used may involve careful scheduling and planning of materials and equipment availability, weeding out of inefficient workers, training and instruction of those who may not be totally familiar with the work, and most importantly, skilled supervision.

17.24 SOCIAL AND ENVIRONMENTAL CONCERNS IN CONSTRUCTION

Construction project managers should seriously consider the social and environmental effects of their construction operations, job safety operations (Art 17.20), and for proper community relations, use of environmental impact statements and the opinions of public interest groups (Art. 17.22). Contractors should be familiar with operations that have resulted in criticism and restraints, so that they can avoid pitfalls and operate within desirable guidelines.

The Committee on Social and Environmental Concerns of the Construction Division of the American Society of Civil Engineers has defined the three main areas of concern for construction as follows:

Social. These areas cover:

Land usage, such as the visual aspect of the construction project, including housekeeping and security; avoidance of landscape defacement, such as needless removal of trees; prevention of earth cuts and borrow pits that would deface certain areas for a long time; protection of wildlife, vegetation, wetlands, and other ecological systems; and visual protection of surrounding residential areas through installation of proper fencing and plantings.

Historical and archaeological, including preservation of historical and archaeological items of an irreplaceable nature.

Crime. The construction process often creates temporary negative impacts on a community, resulting in a crime increase. This can include local crime as well as fraud and bribing of public officials.

Economics, including impact of a project on the economics of a region, such as a rapidly increased demand for labor far in excess of supply, with a negative effect on the wage structure in the area and economic harm to the area after construction has been completed.

Community involvement, including hiring practices and dealing with the leadership in the community, whether they be of different ethnic groups, income levels, or organizational affiliations (Art. 17.21); union hiring practices; and training programs and foreign language programs.

Safety (Art 17.20).

Physical Media. The effects of construction on land, air, water, and of release of pollutants and toxic substances are also a broad area of concern. Water is often altered in its purity and temperature, and wildlife often is destroyed on land and water by construction of such projects as dams, power plants, and river and harbor facilities.

Energy Conservation, Vibration, and Noise. Vibration has become of increasing concern through the increasingly frequent use in buildings of light construction materials. These are usually flexible and prone to vibrate. In addition, construction machinery has become larger and more powerful, with the result that vibration of this machinery requires strict control.

Identification of noise-producing construction operations and equipment, and control of building construction noise are a concern of contractors. Noise-abatement codes for construction exist in many municipalities. Unless the provisions of these codes are properly understood and enforced, they may result in prohibiting of two-

or three-shift construction work and delaying work that requires overtime. Also, some Federal agencies have promulgated regulations requiring noise readings on projects (Table 17.2). In accordance with such readings, local officials may place a construction project in one of the following categories:

Unacceptable: Noise levels exceed 80 dB for 1 h or more per 24 h, or 75 dB for 8 h per 24 h.

Normally unacceptable (discretionary): Noise exceeds 65 dB for 8 h per 24 h or loud repetitive noises on site.

Normally acceptable (discretionary): Noise does not exceed 65 dB for more than 30 min per 24 h.

Acceptable: Noise does not exceed 45 dB for more than 30 min per 24 h.

Energy conservation in construction projects is part of the overall problem of the conservation of energy resources of the nation as a whole. Contractors should be alert to and aware of any ways to bring this about. They can help by using

TABLE 17.2 Limits on Noise Levels of Construction Equipment

Equipment	Maximum noise level at 50 ft, dB(A)
Earthmoving	
Front loader	75
Backhoes	75
Dozers	75
Tractors	75
Scrapers	80
Graders	75
Trucks	75
Pavers	80
Materials handling	
Concrete mixers	75
Concrete pumps	75
Cranes	75
Derricks	75
Stationary	
Pumps	75
Generators	75
Compressors	75
Impact	
Pile drivers	95
Jackhammers	75
Rock drills	80
Pneumatic tools	80
Other	
Saws	75
Vibrators	75

recycled building materials, recycling materials used during demolition, and demonstrating sensitivity to depletion of endangered natural resources.

17.25 SYSTEMS BUILDING

The term systems building is used to define a method of construction in which use is made of integrated structural, mechanical, electrical, and architectural systems. The ultimate goal is integration of planning, designing, programming, manufacturing, site operation, scheduling, financing, and management into a disciplined method of mechanized production of buildings. Application of these systems should be controlled by an engineer-construction management firm rather than by use of prevailing contract building-management procedures.

Housing Production. The greatest concentration of effort has occurred in the realm of structural framing, leading to development of mass-production methods. These have, in general. been of the following types:

Panel type, consisting of floors and walls that are precast on site or at a factory and stacked in a house-of-cards fashion to form a building.

Volumetric type, consisting of boxes of precast concrete or preassembled steel, aluminum, plastic, or wood frames, or combinations of these, which are erected on the site after being produced in a factory.

Component type, consisting of individual members of precast-concrete beams and columns or prefabricated floor elements, which are brought to the site in volume, or mass produced.

These systems have displayed inherent disadvantages that came about through lack of opportunity to use the entire systems-building process, and because the systems often were not able to attain sufficient volume production to pay for the many fixed costs and start-up costs for the component factories that were built.

Experience has shown, however, that housing can be built efficiently and economically from standardized, modular designs. Some examples are as follows:

Mobile homes manufactured, complete with floor, roof, walls, electric wiring, plumbing, and cabinetry, by techniques similar to those used by automobile manufacturers. Built in factories, mobile homes are trucked to the sites and then installed and finished by on-site builders.

Packaged homes, also known as prefabricated or panelized. They are factory subassembled and, with an assortment of other building components, are delivered to the site for final assembly.

Modular homes, also known as sectional homes, manufactured in off-site factories, usually on an assembly line similar to that used by mobile-home manufacturers. Completely furnished, three-dimensional sections, including mechanical systems, of one or more rooms are factory assembled and then delivered to the sites by truck, railroad, or barge.

(A. D. Bernhardt. ''Building Tomorrow: The Mobile/Manufactured Housing Industry,'' The MIT Press, Cambridge, Mass.)

The lessons learned from past experiences offer the following guidelines for construction managers:

Early commitment must be made to use of a specific system in the design stage. The systems builder must control the design.

Shop drawings should be started early and refined during the design.

Preparations of schedules, cost estimate, and bids must involve all the members of the team, that is, the designers, owner, and contractor, because there will be many last-minute proposed changes and details that will have to be challenged and modified.

Construction must follow an industrialized-building sequence, rather than a conventional bar chart or CPM diagram. Unlike the procedure for conventional construction, the method of scheduling and monitoring for industrialized building requires that all trades closely follow the erection sequence and that every trade match the speed of erection. Thus, if the erection speed is eight apartments per day, every trade must automatically fall on the critical path. It is necessary that each of the subcontractors work at the rate of eight apartments per day, otherwise the scheduled date of occupancy will not be met.

Metal Building Systems. These systems, produced by several manufacturers, coordinate design and construction of buildings whose primary component is a structural steel frame of standard, modular size; whose secondary members are mass-produced, cold-formed steel shapes; whose roof is light-gage metal; and whose walls may be built of any material.

Metal building systems generally cost less than other construction systems because of in-plant automation, use of precut and prepunched components, and quick erection on the site. Furthermore, costs are predictable. Metal buildings usually are purchased under design-build contracts. In addition, these systems offer flexibility, in that expansion can be readily achieved by removal of end walls, erection of new modular framing, and addition of matching walls and roof.

(''Metal Building Systems,'' Building Systems Institute, 1230 Keith Building, Cleveland, OH 44115-2180.)

17.26 BASICS OF SUCCESSFUL MANAGEMENT

As outlined in this section, construction project management that will result in a profitable on-time job involves the organization and interplay of many talents. Engineers, accountants, field supervisors, construction labor. suppliers. and subcontractors, all aided by attorneys, insurance and bonding underwriters, the design professional, and the owner, must be organized and carefully coordinated.

Those who succeed in this complex and difficult business are the ones who familiarize themselves thoroughly with the daily operations of their jobs. They are constantly learning by reading the latest literature and professional journals and by attending seminars and industry functions. They are alert and open-minded about new ideas. They understand the needs of the clients and the design professional and are able to tailor their services to them.