

SCHOOL CONSTRUCTION MANAGEMENT CONTRACTS

Although there is a wide spectrum of opinion regarding what construction management is, most professionals and firms operating as professional construction managers are providing management service carried out during the predesign, design, and construction phases. These services provide control time and cost in the construction of a new facility or the modernization of an existing facility. The professional construction manager, then, is the individual or firm who binds himself to an District in a professional arrangement and applies the proper combination of management tools to a construction project necessary to achieve time and cost control.

When construction management is utilized to the fullest, one construction management firm is retained to coordinate all activities from concept design through acceptance of the facility. This one firm represents the District in all construction management activities

The construction manager (CM) in effect becomes the traffic cop or enforcer, controlling the flow of information among all parties active on the project. The CM ensures that the procedures for District award of all contracts associated with construction comply with the California Public Contract Code, Education Code, Government Code and any and all other government codes and/or ordinances. Once contractual relationships are established, the CM controls the prime contractors (contractors who have a direct contractual relationship with the District) and in a de facto sense the major subcontractors (contractors who have a direct contractual relationship with the prime contractors) as well as major vendors and off-site fabricators. In this control or management function, the CM firm utilizes the project schedule as a road map or flight plan to keep things moving forward in a timely and cost effective manner. The major functions carried out by the CM firm vary depending on whether the project is in the (1) predesign, (2) design, or (3) construction phase.

CM FUNCTIONS DURING PREDESIGN PHASE

During the predesign phase, the CM is occupied with what is referred to as programming. Programming consists of the development of the District's facility requirements. The requirements may be wide and varied, and so may the program. The program may be used for tracking state and local funding of projects, site selection, design, and so on. Programming may also include research and development of design criteria, sometimes referred to, as needs analysis.

In some cases, a District will get an idea of his needs from an in-house staff. However, if the District's construction requirements are only periodic, this leads to the maintenance of unneeded staff space and equipment. The CM works closely with the District in determining the actual needs. He supplements existing staff and becomes a part of the District team, thereby preempting the need to maintain permanent staff.

Along with listing facility requirements, the CM may provide a narrative describing the philosophy of the facility needs. If utilized the program will normally include any research that was performed and the results of any research shown in a design-oriented fashion.

The completed program fully lists all project requirements, defines the project philosophy, and attempts to give the District an overall picture of his needs an analysis showing trade-offs and reductions. This comprehensive program goes as far as is possible at this time toward giving the District cost control. This is accomplished through extensive study, research, and interviews with District personnel.

Once the programming is complete, the next step in the CM process is to determine a reasonable project budget based on eligibility for state funding and perhaps local sources, i.e. bonds and developer fees. Since most Districts are not experienced in budgeting and estimating facilities, they need the help of the CM. Projects can and should have their maximum realistic budget set before any design work begins. Most school projects are straight forward enough, or enough comparative data is available, so that the budget may be set.

Once the categories such as the award prices for the various contracts (if separate contracts are being used), budget for the design and engineering, budget for the construction management services, and budget for miscellaneous expenses and factors to allow the project budget to prepare for in-progress contingencies and cost index adjustments.

Once the total project budget is broken down, the District sees exactly what he is getting for his money. It may then be determined that his desired program is too large or too small for the budget. This is when the District turns to the CM for help. The CM may provide answers such as using lower-cost construction materials that bring the budget into line while still fulfilling the District's needs. Another answer he might find may be the use of trade-offs, the CM and the District reach a budget that fits the District's pocket and a program that fits his needs.

SELECTION OF ARCHITECT

The next step during the predesing phase of the project is the selection of the Architectural firm. The District may have already commissioned an Architect before the CM is selected. Some Districts find it more desirable to have the CM participate in this decision. If the CM is brought on board after the Architect has been commissioned, there is no guarantee that the two parties can work together with a minimum of conflict. However, if the CM has a say in who is commissioned to design the project, he will choose a firm with which he can work and that is reputable.

The first step in the selection of the Architectural firm is the preparation of lists of suitable firms to be targeted. The list of prospective Architect/engineers should start with firms that have expertise in a school construction and design. In some cases, the CM may already have a past positive professional association with a design firm. This is a very desirable situation, since the CM will have an excellent working base and is familiar with the firms' procedures, staff and consultants.

Once a list of suitable firms is worked up, the CM may advertise the request for proposals (requirement per the California Government Code) and can coordinate interviews between the District and representative(s) of the design firms. A briefing of the District before each interview may be desirable. The information presented can include the size of the firm, their professional reputation, and their experience in work of

this particular nature. It will be the job of the CM to take an active part in leading the interview, since the District may not be familiar with conducting meetings of this type.

At the end of all interviews, the CM prepares his recommendations to be presented to the District. He states which firm he recommends and prescribes the reasons for his recommendation. If none of the firms satisfy the CM and/or the District, he might recommend that all firms be rejected and another request for proposals be advertised.

When the District agrees to a firm, the CM may review and comment upon the contract. The contract will include, whenever possible, the agreed-on program, the project budget, and a project time schedule. These are needed to ensure the time and cost control of the project. If a schedule is not included, the Architect could delay the project considerably by producing tardy or poor designs and by continually running over the budget. This could lead to the District continually rejecting the drawings and could serve to delay the project. The only other hold the District has over the Architect is to withhold his pay requests. This action will serve to create ill feeling between the District and Architect and can be disastrous to the continuity of the project. Therefore, it is up to the CM to see that the project is continued with a mutual feeling of cooperation.

PREDESIGN PROJECT ANALYSIS

The last, and probably most important step of the predesign phase is predesign project analysis. It is during this period that the design concept (i.e., the general direction in which the design should proceed) is developed. This period is considered to be part of the predesign function, since it should normally be completed before any actual design or engineering work takes place. During predesign project analysis, a team approach is used. This team consists of the project Architect, construction manager, the Architectural designer(s), the structural, mechanical, electrical, and civil engineers, the landscape planner, the CM's estimator and the District or the District's representative.

Initially, the construction manager leads team discussions to make sure the sessions don't turn into committee meetings or simple briefings. This would destroy the team analysis approach. The construction manager attempts to organize the sessions into a type of "brainstorming" session with all members of the team injecting their opinions and points of view.

Once the sessions are on course and become productive, the CM will turn leadership of the sessions over to the project Architect. He will direct the discussion into areas such as budgeting, design concepts, systems utilizations, and scheduling. It may be initially difficult making these sessions truly productive, since 10 to 12 people are working with each other for the first time and they may be reluctant to present ideas subject to criticism by others. It is the job of the CM to tear down any personality barriers and create a harmonious working atmosphere, where ideas can be freely discussed, reviewed, and criticized.

The format of the sessions is unstructured, allowing for the development of new concepts as they relate to the subject under consideration. However, if discussion centers around certain specific considerations these will be included in the session. For example in the discussion of site use, site restrictions will also be discussed, since buildings, play areas, and common use areas may be based upon certain site

restrictions. Discussion of interfacing systems should not be delayed, since decisions on one system impact decision regarding others.

The period of time set aside for these sessions should be two or three days. If a week or longer is taken, the sessions tend to become unproductive. These sessions are not intended to yield a detail plan for the entire project, but instead to give all persons involved in the project the same planning base. The following areas should be developed during predesign project analysis:

1. Design concept development.
2. Elimination of design blind alleys.
3. Identification of constraints.
4. Systems utilization analysis.
5. Potential systems development analysis, i.e. the utilization of pre-manufactured classrooms and buildings.
6. District evaluation.
7. Construction management plan.
8. Critical date schedule.
9. Budget analysis.
10. Tentative selection of major engineering systems.

Depending on the size and scope of the project, there is a point of diminishing return in predesign project analysis. If the project is small, the analysis might progress as far as selecting the type of carpet, marker board and ADA upgrade construction required. If the project is very large (e.g., a new high school), the project analysis should not proceed past establishing the basic design direction.

When identifying constraints, care will be taken to ensure that identified constraints actually apply to the project being considered. Constraints that may be reviewed are:

- Structural Frame Fabrication, Delivery, and Erection.
- Site Availability
- Site Toxicity
- Utility, Street and Site Access Work
- Electric switch gear delivery and other major electric equipment
- Deferred Approval Items
- District Standards
- Special Equipment

The construction management plan is the flight plan that the construction manager sets for his use throughout the remainder of the project. The CM develops the plan most suitable for the District. His plan will include:

1. Bidding strategy. This consideration guides selection of the type of contract to be used for construction or in other words the number of prime contracts to be publicly bid. In addition, the timing of these bids will be evaluated. If possible, bids should be solicited when the bidding environment most beneficial to the District.
2. Plans for early bidding or negotiations. Depending on analysis of the project constraints, it might be in the District's best interest to bid portions of the work early. Staggering of the bid packages to get construction work going as early as possible may be desirable.

At the conclusion of the predesign project analysis, all operating parties will have a clear understanding of project goals that will enable them to proceed faster and more productively. The team should develop a feeling of mutual respect and cooperation. The most important accomplishment of the analysis is, however the formation and initiation of a team that is capable of realizing project goals and remaining within budget and schedule.

CM ACTIVITIES DURING THE DESIGN PHASE

From the time the Architect and the CM are satisfied with the predesign project analysis, the CM is continually feeding the designer with input. This will continue until the final design work and specifications are complete.

During this period, the Architect completes a series of phases as defined in his contract. Usually these phases are (1) the schematic design phase, (2) the design development phase, and (3) the contract document preparation phase. These are the standard phases for the design, which may vary in duration based on the specific project.

Design is of primary importance to the CM. He must be able to advise the Architect and make professional suggestions in areas of cost, methods of construction, systems, and scheduling. The design of the project is the "personification" of the project program set up during the predesign phase. Because of this, the design has a direct relationship between both time and cost. Therefore, design becomes the basic tool available for cost control.

The responsibility for design is designated to the Architect, where it properly belongs. The extent to which the CM should advise the Architect depends on what type of project the District wants, an aesthetic monument, or an economical functioning building. The CM's responsibility is based on the District's desire to control time and cost.

It is important for the CM to understand how early in the design certain fundamentals such as the structural system are established. He will be prepared to study trade-offs and advise the Architect and the District regarding the cost and scheduling impacts of selecting various systems. If the building is a one-story school building and the engineer has designed it using conventional structural steel, the construction manager should be well prepared to show the time, cost and functional differences using a framing system, a precast system, a cast-in-place system, or some combination.

Throughout the design phase, the CM, who also provides the estimate, must work closely with the Architect. Time spent with the Architect will range from full-time on very large projects to one or two days a week for smaller projects.

The estimate is only as good as the individual who makes it, and the CM who must know how to use this tool properly. The first task is to compile and examine the continuously changing cost data that apply to the project. The CM will know where to find this information, how to analyze it with respect to his project, and how to compile it in such a manner that its use will be extended to other projects, if the careful presentation of comparative data is extremely important to the initial project budget.

Once all comparative data and any other predesign information, such as the program for the project, are assembled, the CM makes a preliminary project budget without use of any designs. The budget would be broken down into components such as sitework, masonry, and HVAC. This is the initial project on which the predesign project analysis is based.

The CM's next major function occurs during the predesign project analysis. He presents a more detailed budget, breaking it down by components. He will also be available for advice on construction sequencing and be knowledgeable in areas such as labor wages, local unions, projected work stoppages, and wage increases. As soon as the design process is underway, the CM further breaks his components down until, at the end of the design, the budget is subdivided into unit prices and small components (e.g., footing steel and interior finishes, etc.). The first major breakdown comes during the schematic design. Here the sitework may be broken into earthmoving, drainage, and landscaping. As the design progresses other major areas are detailed. The final components are broken into unit prices. This method of development adds to the flexibility of cost control, since the impact of design changes can be reflected in the budget on a unit price basis.

Along with budget preparation, the CM provides the District and the Architect with three additional services:

1. He provides a list of areas of potential cost savings. These will include results of take-off studies and evaluations.
2. He develops a list of areas of potential cost problems. These might include items that are in short supply, such as interim housing and items with unstabilized prices, such as steel.
3. He established budget targets for major component systems of the building, such as electrical, mechanical and structural frame. These estimates are usually established on a square footage basis.

As each estimate is worked up and revised, it will be brought to the attention of the District for approval. The purpose of the approvals is not to let the District know how much the project will cost him now, but hopefully to reassure him that costs are being controlled.

The continual process of checking and adjusting the budget is not to change the final budget with each change in design, but instead to check the design, bringing it in line with the budget rather than the budget in line with the design.

Throughout the design phase, the CM must be continually aware of the progress of the design, present level of the budget, and current design philosophy. He updates the District regarding these facts on periodic basis (e.g., monthly reports). If a change is made, the CM will review the technical and economic aspects of the change and make his recommendation to the District. Conversely, he must take the wishes of the District and make recommendations to the Architects. It is also during the design phase that the project schedule should be finalized.

PREPARATION OF CONTACT DOCUMENTS

The contract for each individual project will be tailored to fit the needs of the project, this is done by having a set of general conditions that may be applicable to any project, and modifying them with a set of supplementary conditions that suit the needs of a particular project. If Multiple Prime Contracts are used a scope of work section will be included to define the limits and responsibilities of each Prime Contractor.

The time control contact provisions are generally of four types:

1. Completion dates.
2. Liquidated damages.
3. Grants of contract time extension.
4. Progress payments.

The master schedule establishes a project completion date. This schedule will include the bid date, notice to proceed date, access to site date (if required), milestone completion dates for each prime contract, any equipment delivery dates if purchased under separate contracts, and dates for substantial and final completion. The substantial completion date establishes the date at which the project may be fully occupied by the District except for any minor corrective work and any final cleanup. The contract should also specify provisions that may be taken if these dates are not met. One such provision normally requires that the contractor work overtime to complete the work within the parameters of the contract schedule.

When liquidated damages are written properly and the amounts are substantial, a competent contractor will do all he can to comply with the project completion dates in order to avoid being assessed liquidated damages. When a contractor submits a request for a time extension, the CM will:

1. Acknowledge the receipt of the request.
2. If it is immediately known that the request will be rejected, reject it immediately by written communication to the contractor.

3. If an immediate decision cannot be made, so inform the contractor and answer him as soon as a decision is reached. All time extension will be carefully reviewed and analyzed as to how they affect the critical path. District approval will be required on all time extensions.

Progress payments are the simplest and yet the most effective way of controlling time. Dates are stipulated in the contract as to when the contractor may be paid. The last date is usually within 30 days of final completion. If the contractor is running late, he must realize that no payments will be made past the last progress payment, until the project has reached final completion. Progress payments can be thought of as a complement to liquidated damages and other time-controlling contract provisions.

In addition, the CM insures that, as a condition precedent of payment, all conditional lien releases associated with work connected to the current progress payment and all unconditional lien releases for previous progress payments are secured.

CONSTRUCTION MANAGEMENT DURING THE BIDDING PROCESS

To ensure that competition is keen, the CM must have an up-to-date listing of all contractors who might be qualified to bid the job. These contractors should be of an appropriate size, be capable of efficiently mobilizing into the area of the job, and have experience on similar projects. It is helpful for the contractor to have qualifications such as a good industry-wide reputation, a good credit rating and a good record of consistency in bringing projects of this size and type in on time under budget. All of these qualities are helpful in obtaining a competitive bid and good craftsmanship. The pre-qualification process may be utilized under the Public Contract Code, Section 20111.5. Districts should be advised that Pre-qualification is the only limiting factor on public projects.

All public projects are required to be properly and legally advertised. As a part of solicitation, along with the legal advertisement, a list of suitable bidders will be compiled; each bidder will be contacted to engage their interest. They will be informed of the date of issuance of contract documents and the tentative bid date. As the time to issue documents draws near, bidders will again be contacted to confirm their interest.

About a week into the bid period, after the contractors have had the opportunity to review the bid documents, a prebid conference will be held. All contractors will be encouraged to attend along with the Architect, engineer, construction manager, scheduling consultant, and District's representative. There are four major purposes of the prebid conference. They are:

1. To evaluate the level of competitive interest. If a prebid conference draws only a few bidders, there is a need to create more interest.
2. To brief prospective bidders and other interested parties, such as subcontractors and suppliers, on the project schedule.
3. To bring out questions regarding the contract documents early in the bid phase, in order to avoid extensive last-minute changes in the form of addenda.

At the completion of the prebid conference, the people in attendance will be allowed a question-and-answer session to clear up any questions arising from the drawings and documents.

As the bid date approaches, final estimates will be made and compared to original estimates. The formality of simultaneous bid opening in a public place will be utilized and comparisons made immediately between each bid and final District's estimate. If all bids submitted are above the estimate, a decision may be made to accept the lowest, or to re-bid that portion of the Multiple Prime contract. Once the lowest responsive bid is determined, the CM will make a recommendation for approval to the School Board. The School Board will then award contracts and all bidders who have expressed interest and/or provided bids will be notified.

CM FUNCTIONS DURING THE CONSTRUCTION PHASE

One of the primary tasks carried out by the CM in the field is the maintenance of all necessary paperwork. Some of the more important types of documents that the field team must supervise or generate are discussed below.

Daily Field Log

This is a historical document filled out for each day the contractor performs work on the site. Data on the reports must include the date, weather conditions, amount of equipment in use for the day, number of people working, and major areas of work performed. A "remarks" section will also be included to specify any verbal instruction given by the Architect, any problems arising from the day's work, and anything else along these lines that should be documented. The purpose of the daily log is two-fold:

1. It keeps the District and all interested parties aware of the status of the project.
2. It documents events on a daily basis. If a contractor wants a time extension because he says he was rained out for two days, all that is needed is to check the daily logs for those two days.

Field Orders

A field order is a written authorization from the Architect to the contractor to change certain item(s) in either the specifications or the drawings, when the changes involved do not involve major design changes or any change in contract price. The field order is processed from the Architect to the contractor through the CM who reviews the change. If the change is one that would not require the authorization of the District, the CM logs the field order and then passes it on to the contractor who effects the change. A field order is usually a written authorization confirming verbal instructions.

Change Order

A change order is a written authorization from both the Architect and the District to the contractor that involves a change in design or contract price or both. In order to expedite the processing of a change order, the entire process will be handled through the construction manager. If any party (Architect, District, contractor, or CM) wishes to initiate a change order, the CM should be notified. He then proceeds to issue a proposal

to the contractor for the work involved. When a reply is received on the proposal, the CM review the proposal, make a recommendation to the District for action, and forwards both the proposal and recommendation to the District for review. If the District agrees with the proposal, he notifies the Architect to issue a change order that all parties sign. Once again careful documentation is needed on both the proposal and the change order. The CM must also watch the time to make sure the process does not endanger the project schedule.

Other documents that must be maintained include logs and copies of transmittals, shop drawings, change order, test reports, concrete pours, and equipment deliveries. The point to stress in making any kind of report and keeping any kind of log is to take note of all dates, decisions, verbal agreement, and anything else that may come back to haunt the District if it is not properly documented.

During the construction phase, in addition to the documentation function, the CM must coordinate all trades on the job. This also means coordinating the efforts of the Architect/engineer, as well as prime and sub-contractors into a working team. If a contractor has a question, the CM must develop the answer as quickly as possible. This enables the contractor to continue his work. If two contractors on the site have a coordination problem, the CM must become the arbitrator in resolving the problem.

The CM will avoid, if at all possible, becoming involved in interpreting the drawings. He must consult the Architect or engineer, depending on which would be applicable. The Architect/engineer, and not the CM, is solely responsible to the District for the correct application of the drawings.

Coordination of trades also involves keeping all superintendents on the job apprised of their progress as it pertains to the master schedule. This will take place about once a week through the vehicle of a weekly construction progress meeting. At these weekly project meetings, the progress of the project with reference to the schedule will be evaluated. If one trade is holding up another, this delay will be brought up and reconciled. If the entire project is behind, the reasons will be discussed. Careful criticism will be given where it is needed. However, the cooperation of every one is needed to make the project a success. These meetings also provide a good forum for discussing any questions from the superintendents that require action. The theme of these meetings should be communication. The need for full communication from all parties cannot be overemphasized.

The last major function of the CM during construction is monitoring the project cost analysis. This enables the CM to keep a careful eye on project cash flows and detect at an early date any budget overruns or underruns.

The job of the construction manager does not conclude with the final completion date of the project, but continues through tenant move-in and into the warranty period. If during the warranty period of the building the roof leaks, the District will contact the contractor, if the contractor fails to take immediate action the District will contract the CM who will contact the proper party to have it repaired or replaced.

CONSTRUCTION MANAGEMENT CONTRACTS

CM minimizes risk for everyone. The experience, wisdom, creativity and engineering skills of AE and CM firms are combined at the table with the client's understanding of requirements. This group has more complete control and unity. Together they command the classic tripod of functional requirements, design and construction. They are non-adversarial and collaborate to make decisions. The CM can review the AE's drawings and often catches errors, reducing the AE's and client's risk. The AE can review the CM's approach to the work, making helpful recommendations. The procedure is more methodical, manageable, predictable and less risky for all. The procurement of construction is also more business-like. Each trade contractor has a fair shot at being the low bidder without fear of bid shopping. Each must deliver the best bid to get the project, so the client winds up with the low sub-set of prices. Competition in the community is more equitable: all subcontractors have a fair shot at the work.

SUMMARY

The CM process has many characteristics attractive to clients, AEs and CMs:

1. The client makes selections based on qualifications, so the client hires better CMs. Because they are selected for their qualifications, CMs are inclined to maximize their service and their allegiance to the client in order to obtain repeat work and a good reference.
2. All parties collaborate. CMs provide advice on construction cost and technology during design to keep the project within budget and reduce design error; AEs are more involved in the construction process and make recommendations that are helpful to the project's success.
3. Costs and fees are out in the open, helping eliminate adversarial relationships between the contractors, clients, and architects.
4. Elimination of bid shopping also results in lower costs and better relationships in the community.
5. The CM can minimize risk to all by taking many or all trade bids prior to providing the GMP. Minimizing risk means minimizing cost to the client.