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Project Delivery Methods

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SELECTING THE APPROPRIATE CONSTRUCTION PROJECT DELIVERY METHOD

There are a number of factors that should be considered by the Owner and the Owner's internal or external program manager when selecting the most appropriate project delivery method for a particular project. None is more important, though, than an understanding of the Owner's posture for purchasing construction. In making this analysis, the key point is whether or not the Owner can prudently rely upon relationships in procuring construction.

In any construction program it is unwise for the Owner or the Owner's representatives to have anything other than cordial, cooperative and businesslike relationships with all the parties involved. However, there is a significant difference between having cordial and good businesslike relationships and the Owner finding itself in a position in which it is forced to rely upon relationships to obtain reasonable prices and performance commitments or for the administration of the various contracts for the project.

Owner organizations which can consider relying upon relationships in buying construction would usually include successful and stable real estate developers and other private sector businesses which are regularly in the market for new construction such as major retail chains, manufacturers, processors, distributors or refiners. These Owner organizations would be seen by the industry as having a clear procurement decision process based primarily on past performance and have relatively few people involved in the decision. Also, some private sector non-profit institutions which are regularly in the market for new construction can rely upon relationships for procuring construction if they have a relatively simple contractor selection process.

Those Owner organizations which would be at significant risk in obtaining fair prices and good performance if they relied upon relationships in the procurement of, or administration of, major construction contracts include virtually all governmental and public sector owners. Also included in this group would be many businesses, both large and small companies, as well as private sector non-profit institutions who are not perceived as being regularly in the market for new construction, or any Owner organization which has complex selection procedures.

For an Owner to analyze whether or not it can prudently rely upon relationships in procuring construction, the Owner should ask itself the following questions. If the Owner's organization finds the answer to any one of these questions is "No", then the Owner's organization probably should not consider relationship buying:

1. Does the Owner have the need and resources for a constant stream of future construction contracts?
2. Does the industry perceive the Owner organization as a reliable source of repeat construction business in the future?
3. Does the Owner organization have a relatively simple process for awarding construction contracts, that involves relatively few people in the Owner's organization (no more than 2 or 3 people)?
4. Do the Owner's procurement procedures allow for single source selection of contracting parties for major construction contracts, and does the industry clearly perceive that situation?
5. Is it well understood in the industry that in the selection of contractors, the Owner organization gives major and primary consideration to high quality past performance and little consideration to other factors such as political influence or public policy?

George T. Heery FAIA RIBA FCMMA

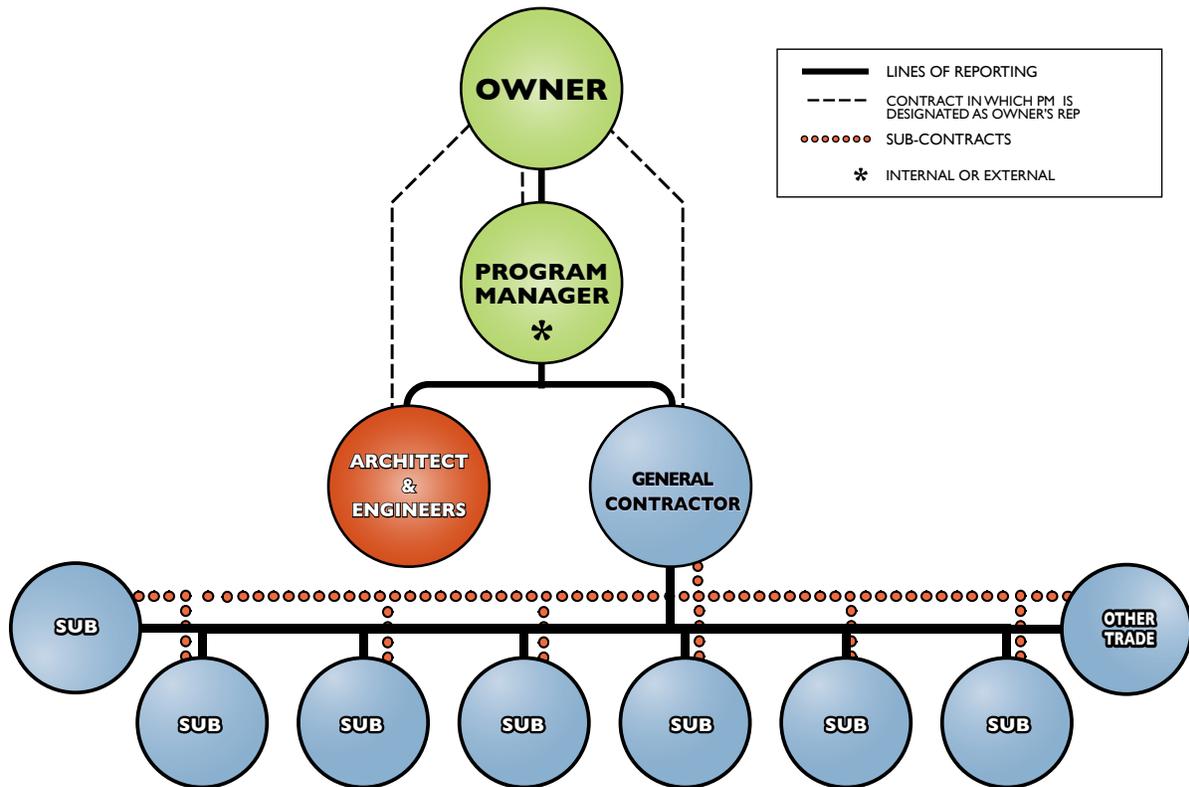
Design-Bid-Build

The Design-Bid-Build project delivery method is generally referred to as the traditional method.

Although various alternatives to this traditional method have come into greater use in recent years, it is still preferred by many owners. Many Owner organizations in the public sector continue to be primarily oriented to this method.

The traditional method has a number of fundamentally sound aspects. It is a logical and orderly method that is well understood throughout the United States and in many other parts of the world. It easily meets all procurement procedure requirements, being free of conflicts of interest. It provides a clear and transparent method for obtaining direct "apples-for-apples" competition for a fully described and illustrated end product before construction starts. It also provides for the highly desirable direct professional relationship between the owner/user and the architect-engineers for the project.

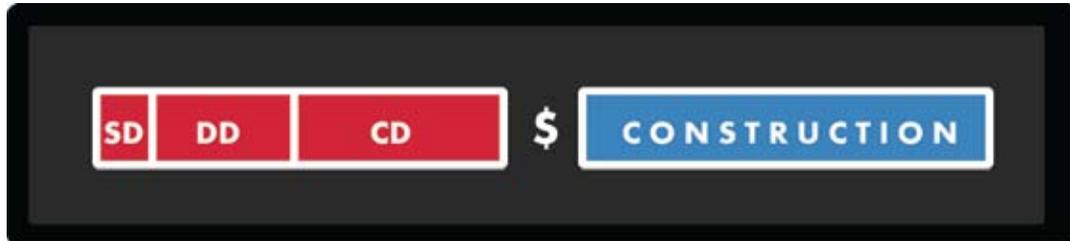
The below diagram illustrates the basic organization of a typical Design-Bid-Build project.



A more detailed description and discussion of Design-Bid-Build follows on the next page.

Design-Bid-Build (continued)

Main Phases of the traditional Design-Bid-Build Method



The Architect and the Architect's Consulting Engineers (the "Architect") first carry out Schematic Design ("SD"). With the Owner's review(s) and approval, the Architect then more fully develops the drawings and preliminary specifications in the Design Development ("DD") phase of services. Then, with the Owner's further approval, the Architect prepares the final "working drawings" and detailed specifications and contractual requirements referred to as the Contract Documents ("CD"). At that point the Owner, with the assistance of its professional advisors, and with the Contract Documents completed, may obtain competitive bids from general contractors or may negotiate a price with a general contractor who might have been selected at that point or earlier. During the construction phase the Architect typically works with the Owner's Program Manager (internal or external) to observe the work in progress, review shop drawings, approve progress and final payments, process any change orders and generally act as an advisor to the Program Manager and the Owner.

This set of services is in accordance with a standard form of Agreement between Owner and Architect as published by the American Institute of Architects as well as similar forms of agreement used by many public and private sector owner organizations.

Issues with the traditional process which have caused some owners to change to alternative methods include the fact that the pre-construction phase is fairly lengthy with the Owner having a good bit in project funds at risk before obtaining a firm price on construction. (That is actually also the case, though some would disagree, with all other project delivery methods except Bridging and Bridging/CM-at-Risk, Forms 1 and 2).

The traditional method also leaves the Owner vulnerable to Contractor initiated changes orders and claims as well as to delays and additional costs for the Owner in correcting post construction problems discovered after occupancy. Also, some of the best sources of knowledge on construction technology and practical construction methods (specialty sub-contractors and building product manufacturers) are not easily involved in the design process in this method.

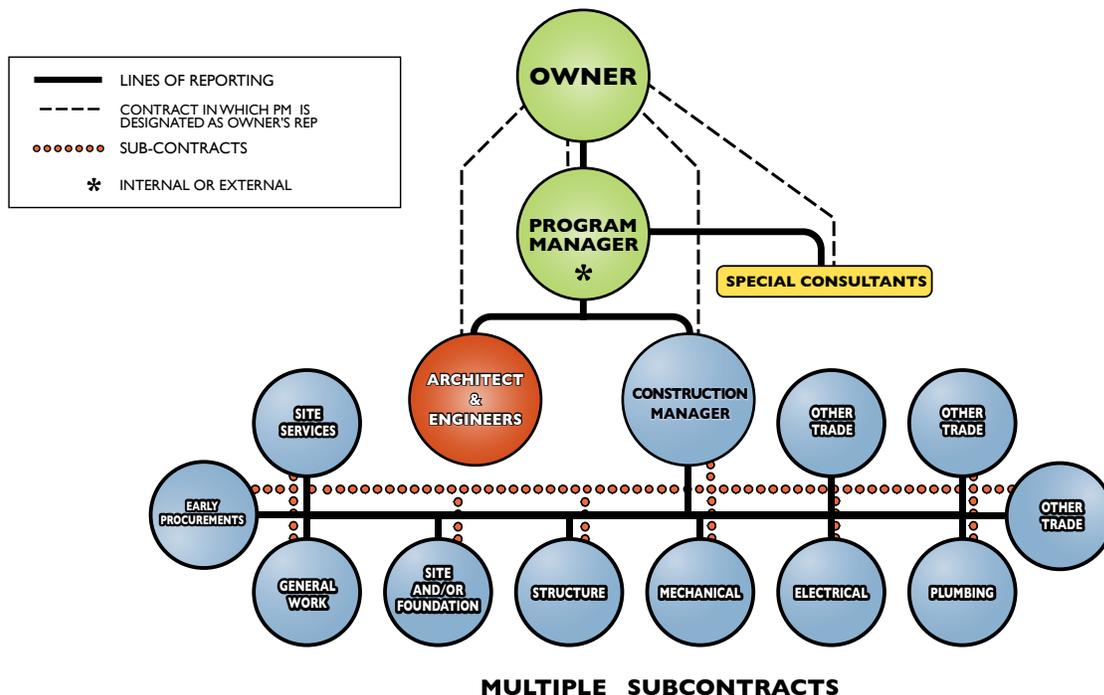
CM-at-Risk

The Construction Manager at Risk project delivery method can be a very comforting and effective way to manage the design and construction of a project as long as the Owner's organization is one that is in a position to rely upon relationships in the procurement of construction.

In CM-at-Risk, the Owner will either select the Architect and consulting Engineers (Architect) first so they can be involved in the selection of the CM, or the CM and the Architect will be selected at the same time. In some cases the CM may be selected before the Architect and may be involved in that selection. If an external Program Manager ("PM") is to be engaged by the Owner, the PM, acting as the Owner's representative should be selected first to assist the Owner in the preparation of the contracts for the CM and the Architect/Engineers as well as assisting the Owner in those selection processes.

The CM would typically assist the Owner and the Architect with input on costs, cost effective construction, materials, constructability, scheduling and sequencing issues throughout the pre-construction design phases. Continuous consultation, estimating, and providing input into the design and construction process would be the norm. In many cases, at design milestones, the CM would provide the Owner, Architect and PM with the most reliable possible estimate of the final total cost. Sometimes, these cost statements would be issued in the form of a Guaranteed Maximum Price ("GMP"). The Owner should be aware, however, that a GMP issued before the working drawings and detailed specifications are 100% is not readily enforceable by the Owner.

The CM is usually a general construction contractor with technical and financial capabilities appropriate to the project at hand or a professional CM organization with sufficient financial capabilities to accept the responsibilities under the contract with the Owner for the CM-at-Risk method.



The CM's fee is often a set amount, and the CM obtains competitive proposals from sub-contractors. The issuance of a GMP by the CM, however, in many ways causes an adversarial relationship with the Owner if the owner is not able to rely upon relationships in the procurement of construction.

A form of CM-at-Risk can also be very effective for projects for other types of Owners. (See Bridging/CM-at-Risk)

Design-Build

The Design-Build method of construction project delivery can be employed on a wide range of building types. It is best used by an owner organization that is in a position to rely upon relationships in the procurement of construction. However, it can also be useful for projects for other types of owners as long as procedures for leverage retention are provided in the Owner-Contractor agreement and an appropriate plan of management is developed and followed.

Design-Build has been used for years by many owners with good results. The method was first used fairly widely in the United States for industrial projects in which the cost of the building envelope was less than the manufacturing or process equipment that went into or alongside the building itself. Use of Design-Build has grown steadily through the years for a wide range of building types and sizes, though it is still generally favored by many owners and consultants for simpler building types.

In Design-Build the Architect and Consulting Engineers are subcontractors to the (general) Contractor or are members of the Contractor's organization. In some cases, the Contractor may be a subcontractor to the Architect or Engineers.

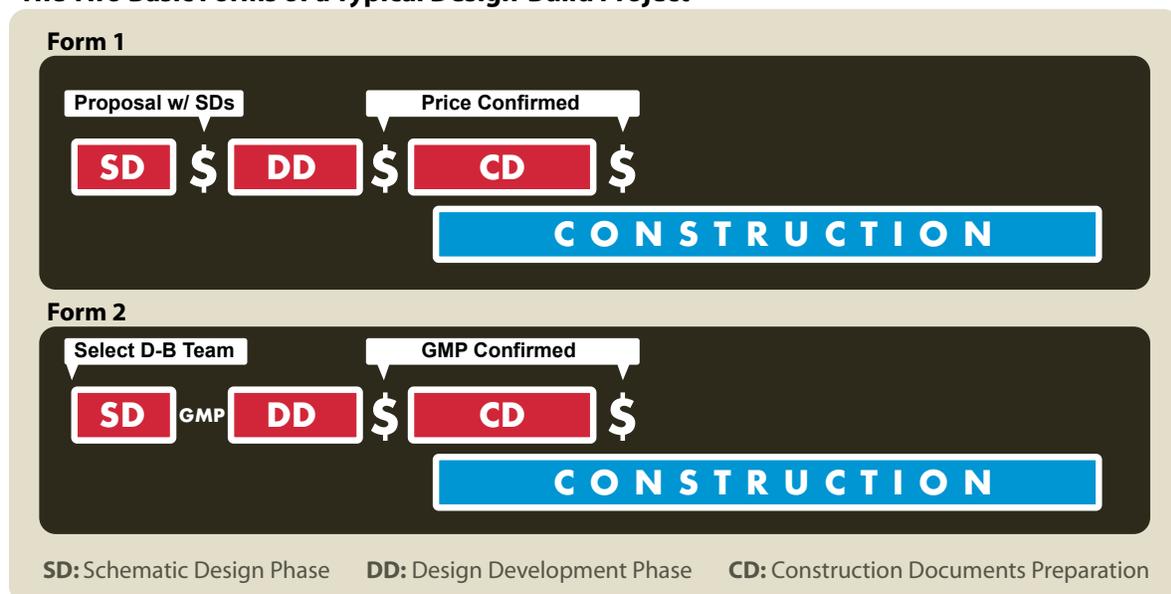
The chart below illustrates the two basic forms of Design-Build, though there are many variations on both forms illustrated. (The term Design-Build should not be interpreted as referring to the Bridging method. Bridging, a different project delivery method, is a hybrid of the traditional Design-Bid-Build method and Design-Build method.)

In Form 1 in the below charts, the selection of the Contractor (often referred to as the "Design-Build Team" or the "Design-Builder") occurs after one or more prospective contractors submit a preliminary design along with a price proposal. If an external Program Manager (PM) is engaged by the Owner, the PM, acting as the Owner's representative should be selected first to assist the Owner in preparing the Request for Proposal ("RFP") as well as assisting the Owner in identifying and vetting prospective proposers. The RFP will be an extensive document. It will typically include information about the site, the Owner's requirements and usually some design and specification criteria.

In Form 2 in the below charts, the selection of the Design-Build Contractor will come before design work starts. Selection in this case is usually based primarily on the qualifications, experience and references for the Design-Build team.

If the Owner has retained an external Program Manager, the PM would come on board before the selection process starts for either approach, to assist the Owner in the preparation of an RFP which would typically include site information and other material and criteria as may be appropriate.

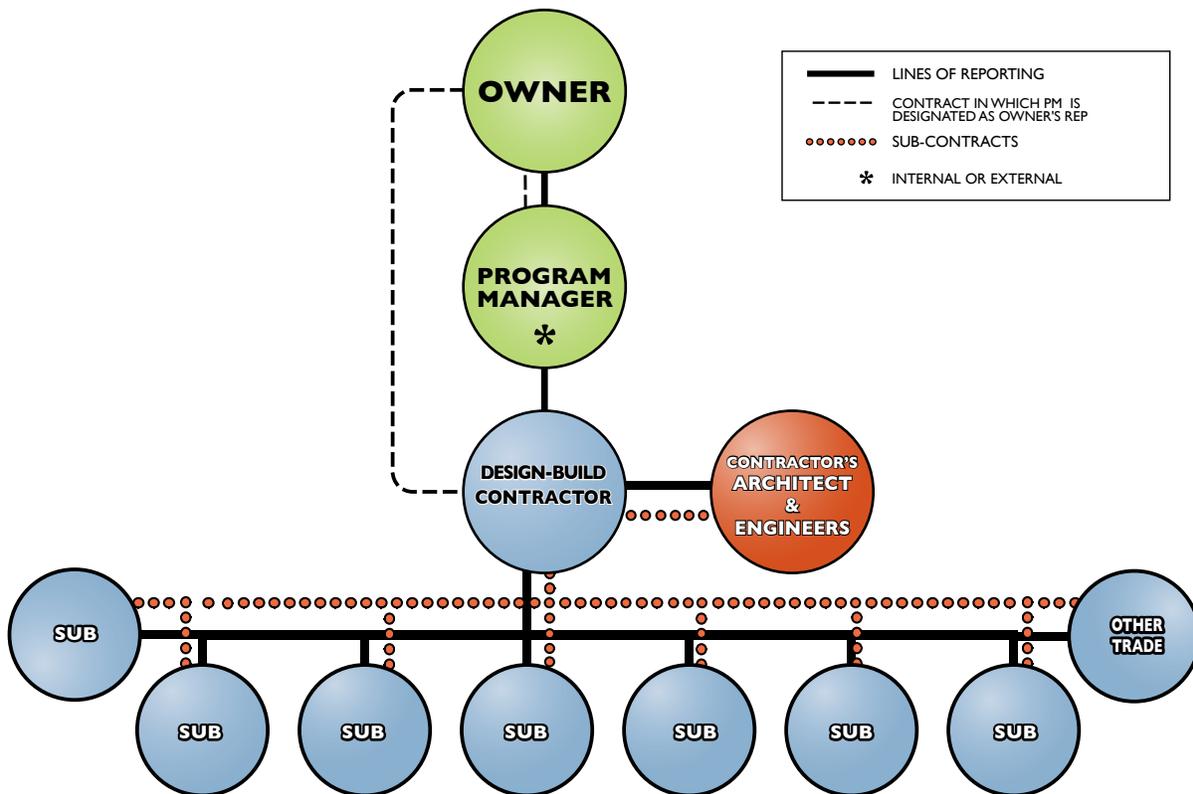
The Two Basic Forms of a Typical Design-Build Project



Design-Build (continued)

There are a number of advantages to the Owner in using Design-Build. Two particularly valuable ones are that the Design-Build method (a) offers the opportunity to integrate into the design process more advanced construction technology and practical knowledge of construction costs and methods and (b) provides a clear single responsibility for correction of any design or construction problems that are discovered before or after occupancy.

Major issues of concern with Design-Build method are the conflict of interest between the Owner and the design Architect/Engineers, the difficulty for the Owner in obtaining apples-for-apples competition on the total price of the construction, and the Owner's loss of control over the design details. While the conflict of interest and lack of apples-for-apples competition are inherent in Design-Build, there are procedures that can be employed in a Design-Build project that can help the Owner mitigate these areas of concern to some degree.

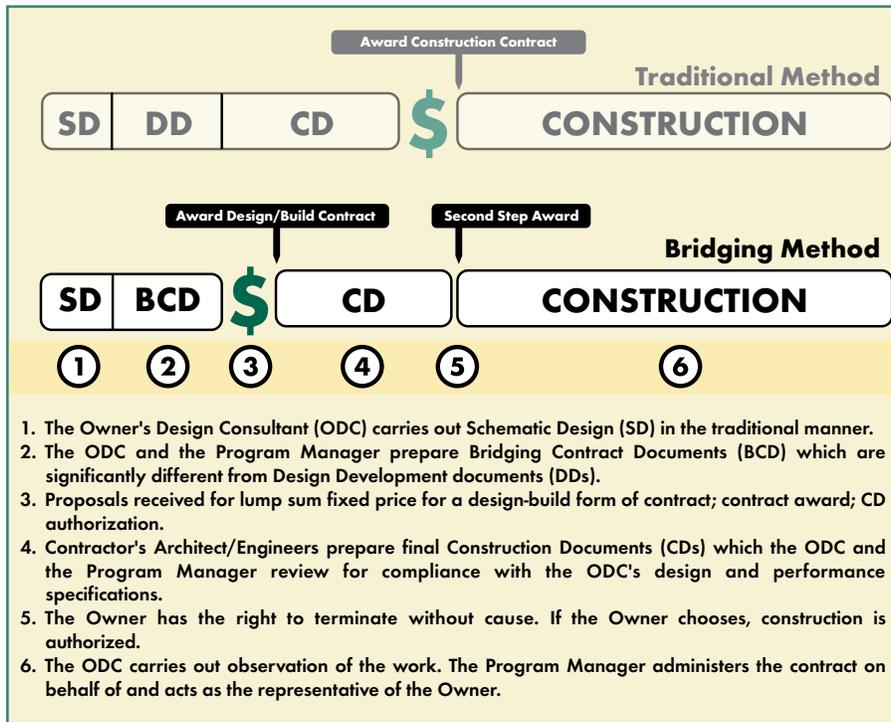


Typical Design-Build project organization

Bridging

The Bridging method of construction project delivery is a hybrid of the traditional Design-Bid-Build and the Design-Build methods. It retains the better features of each of those project delivery methods and eliminates aspects of both that can sometimes cause problems for the Owner. It is particularly useful to those Owners who should not rely upon relationships or cannot make single source procurements for construction contracts. It is applicable to all types and sizes of projects. Some in the industry would suggest that Bridging is more appropriate for simple projects, but experience has shown that this method is more valuable and applicable to a complex project.

Below is a diagram comparing the Bridging method with the traditional Design-Bid-Build method.



The major benefits of Bridging to the Owner:

Bridging allows the Owner to obtain a highly enforceable fixed price for construction in about half the time and half the at-risk cost compared to the traditional Design-Bid-Build method. The price obtained by this method and at this earlier point, is more enforceable than a price obtained by Design-Bid-Build, CM-at-Risk or Design-Build.

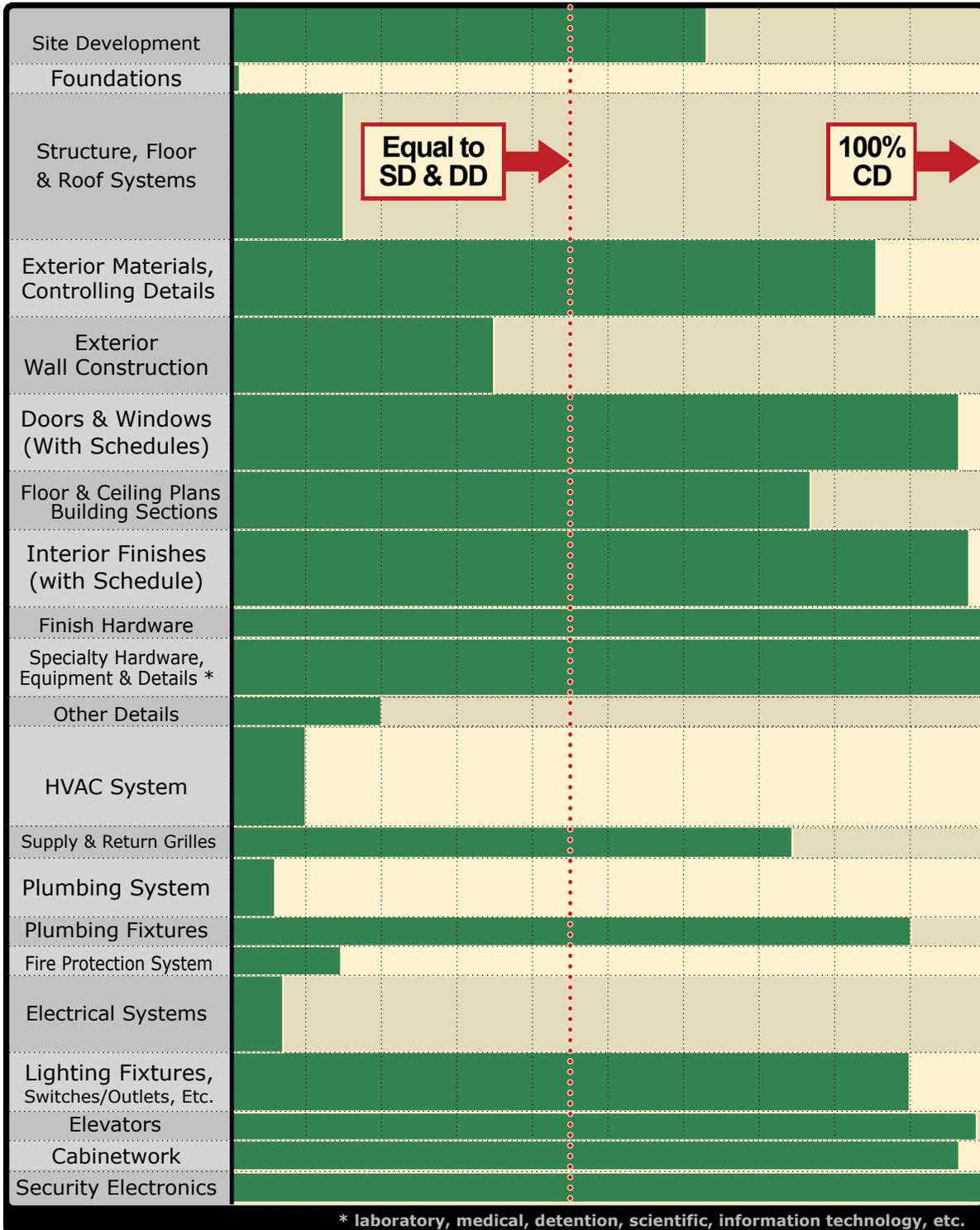
- Bridging greatly reduces the Owner's exposure to construction risks including contractor initiated change orders, claims, as well as delays/disputes in resolving blame for flaws in the design or construction discovered after occupancy.
- On most projects, it will shorten the construction time due to the Contractor's more intensive planning and input during the preparation of the final drawings and specifications.
- On most projects, it will reduce overall final costs for a fully equivalent end product.
- The Owner and the ODC can exert whatever degree of design and construction quality control they wish.

A weakness in the Bridging method may exist during times of very overheated construction markets. Under those circumstances an Owner may consider Bridging/CM-at-Risk. Another area of concern is that some architects and engineers have the misconception that the Bridging Contract Documents are equivalent to traditional Design Development Documents. This can lead to very poor results and little protection of the Owner. See the diagram illustrating Bridging Contract Documents on the next page.

For more information on Bridging visit www.BridgingMethod.com

Bridging (continued)

Below is a graphic illustration of the difference between Design Development documents prepared by the AE in a traditional Design-Bid-Build project and the drawings and specifications prepared by the Owner's Design Consultant which are part of the Bridging Contract ("Bid") Documents ("BCDs" or "Bridging RFP documents").



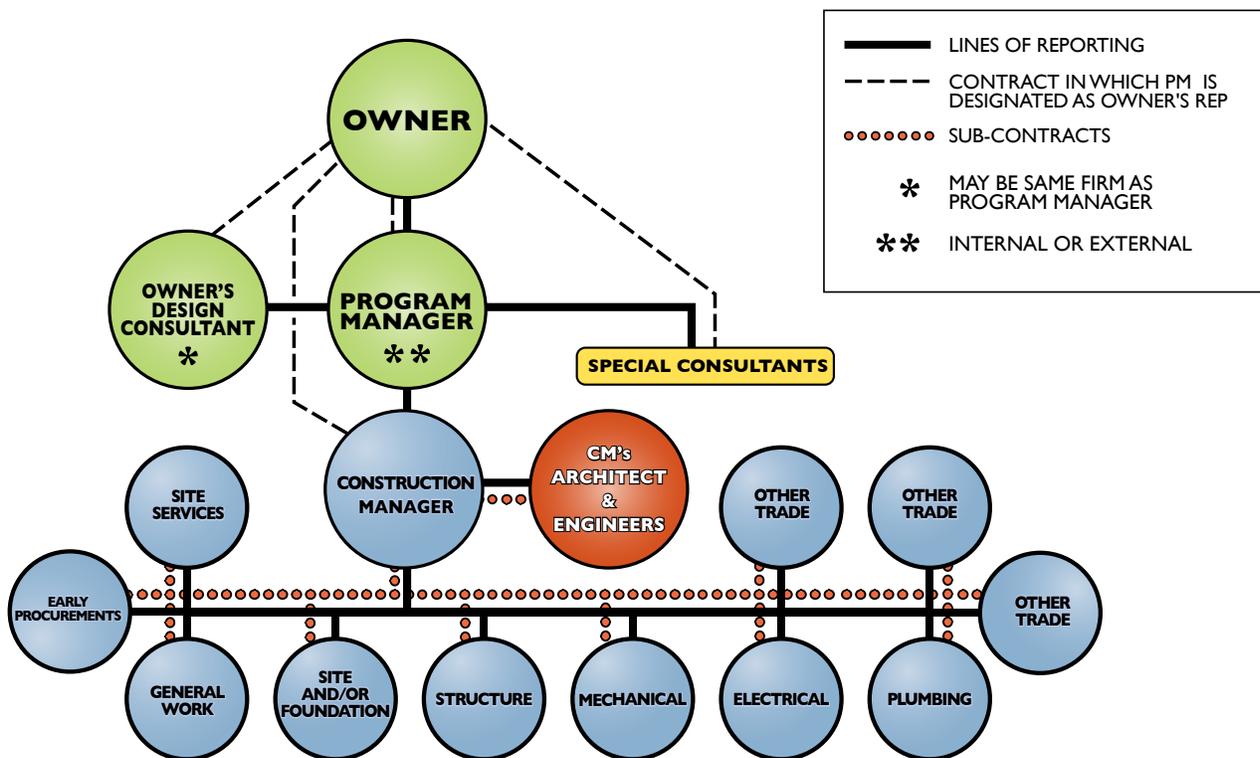
Bridging/CM-at-Risk

The typical CM-at-Risk delivery method has become more widely used in recent times due to its popularity with contractors and construction managers who vigorously market it. At the same time there has been an increased number of Owners who have been concerned with the lack of enforceability of a Guaranteed Maximum Price ("GMP") which is issued before final traditional drawings and specifications are fully complete. Bridging/CM-at-Risk ("Bridging/CMR") can be an effective way for an Owner and the Owner's Program Manager to deal with that issue.

Bridging/CMR also provides the Owner with a good alternative to basic Bridging in the following situations:

1. It is to the Owner's advantage to have an early selection of the Contractor with the Contractor's AE.
2. In overheated construction markets.

Diagram of Project Organization



Bridging/CM-at-Risk (continued)

In Bridging/CMR the team that develops the design criteria often includes architects and engineers working directly with and for the Owner and is referred to as the Owner's Design Consultant, providing the same services the Owner's Design Consultant provides in the Bridging method.

In Bridging/CMR, as illustrated on the preceding page, the Architect and Engineers "of record" (Contractor's AE), who prepare the Construction Documents in compliance with the Bridging Contract Documents, are separate from the Owner's Design Consultant and are subcontractors to the CM.

Under Bridging/CMR, all of the aspects of CM-at-Risk are retained for the Owner and additional advantages of Bridging are realized by the Owner.

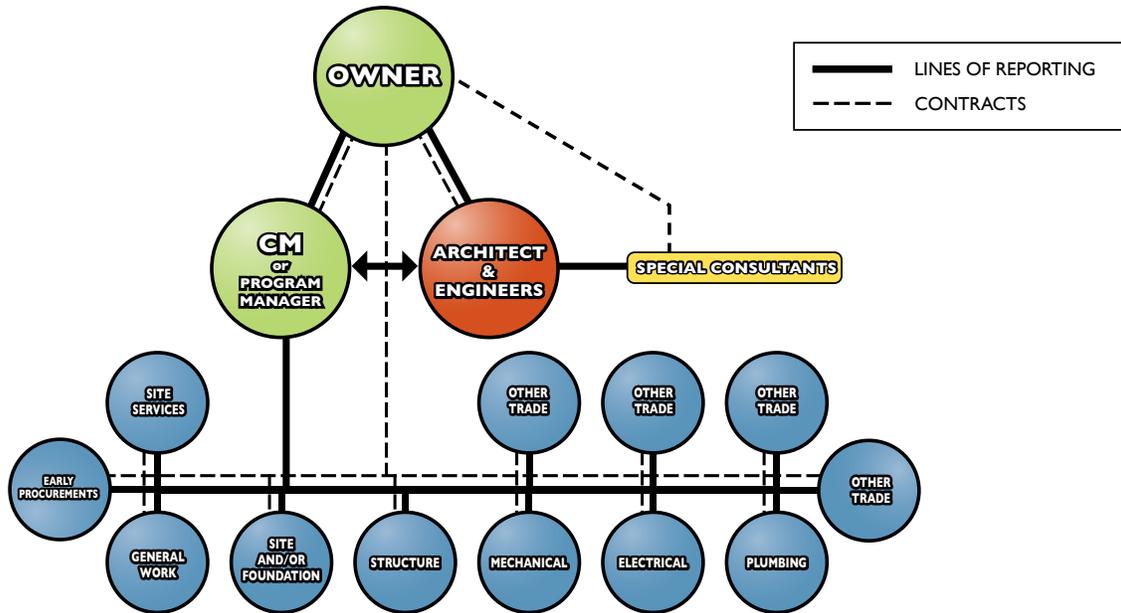
A major improvement for the Owner of Bridging/CMR over CM-at-Risk is that the price obtained part way through the three design phases is highly enforceable and meaningful for the Owner compared to a GMP based on less than 100% complete construction documents.

Bridging is a method being used more frequently today to reduce construction costs to the Owner for a fully equivalent end result as well as improved results in terms of obtaining a highly enforceable fixed price for the construction much earlier than in Design-Bid-Build. This price is more enforceable than a GMP in the typical CM-at-Risk method. Bridging also significantly reduces the Owner's exposure to contractor initiated change orders, claims and post construction frustrations as well as unexpected and unbudgeted correction costs.

As in the case of CM-at-Risk, because of the price guarantees issued by the CM in any form of Bridging/CMR, there is a conflict of interest between the CM and the Owner. Because of this, Program Management services should be delivered by the Owner's staff, a separate professional Program Manager, or combined with the ODC services.

CM Agency

The Construction Management Agency project delivery method was the basic CM idea that emerged in the 1960s as major construction programs, particularly public agency programs, began to be undertaken after World War II. During that period this early alternative delivery method was referred to simply as "Construction Management" or "CM".



This chart illustrates the typical basic structure of a project undertaken through the CM Agency project delivery method.

As can be seen in the chart, the CM often acts as the Owner's representative in managing the whole design and construction program, indicating that a CM firm, which has good capabilities in managing pre-design planning and design might well be engaged to manage the whole "program" for the Owner. Likewise, the Construction Program Management firm ("Program Manager") which has the capabilities to manage the construction in the field and otherwise, might well be engaged as the CM for the CM Agency project delivery method.

Under CM Agency, companies who are typically referred to as "sub-contractors" are referred to as trade contractors. In some cases there may be as few as from five to eight such contracts, one of which might be a General Work contract, a catch-all for everything that is not included in the four to seven specialty trade contracts. However, more frequently today, there are many more than eight separate trade contracts used in CM Agency.

Site services, such as clean-up, site fencing, security, and miscellaneous labor might be included in the contract responsibilities of the CM. In other cases, all or part of these functions are contracted out to one or more specialty trade contractors.

As there are multiple trade contracts, sometimes the term "CM Agency Multiple Primes" is used referring to CM Agency as described herein.

The CM would typically assist the Owner and the Architect/Engineers with input on costs, cost effective construction methods, constructability, scheduling and sequencing issues throughout the pre-construction design phases. Continuous consultation, estimating and providing input into the design and construction schedule would be the norm. At design milestones, the CM would provide the Owner, Architect/Engineers and the PM with the most reliable possible estimate of the final total cost. Basically, the CM would fulfill the functions of a general contractor except for providing a performance bond or a fixed price for the project.

CM Agency (continued)

Today, with the Owner having a wider range of alternative project delivery methods from which to choose, and with experience many have had with CM Agency, it would appear that the most appropriate uses for CM Agency would be the following:

- a. Projects that are so complex and/or have so many unknown conditions that it would not be feasible for the Owner to obtain an enforceable fixed price even after completion of final working drawings and specifications.
- b. Projects for which time of completion is more important than adherence to the cost budget.
- c. Interior fit-up or "churn" projects, particularly for Owners who have a continuing demand for many such small projects.
- d. Complex historic restoration projects.

For the first ten or so years after World War II, most construction in the United States consisted of projects that might be categorized as "catch-up" projects. There was almost no construction during the war that was not part of the war effort. In the late 1950s and early 1960s, some very large public construction programs for both building and infrastructure projects were begun. Also, during this period, the Country began to experience much higher costs of money and inflation. Consequently, "busted budgets" in large amounts almost became the norm for those programs. Since general contractors were often the messengers of the bad news, they were the ones who took the brunt of the blame (though some admittedly profited from the large change orders). Also, during this period, a number of projects needed to be greatly accelerated, particularly in the industrial and military areas. In the accelerated projects, the construction and/or off-site fabrications as well as long lead materials and products orders often needed to be authorized before design was complete, sometimes before much design at all had been completed. Another factor at the time was that after World War II, a larger percentage of the construction project was carried out by subcontractors who, in turn, became larger, more specialized and of greater influence in the industry.

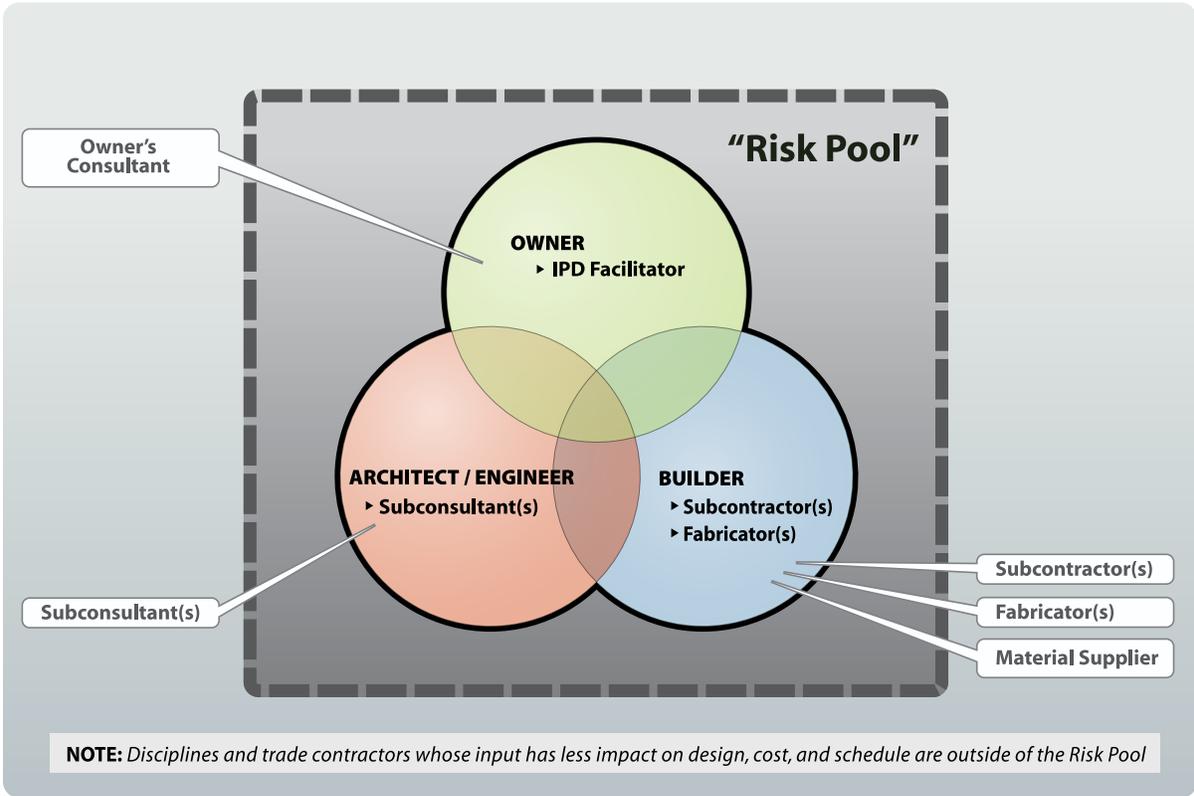
As a result of all of these factors, the idea emerged of a professional manager of construction, compensated on a fee basis to reduce the adversarial relationship between the Owner and the builder. In time it came to be realized, though, that the Contractor was not the only party contributing to the problem, though some Owners began to use "CM" fairly regularly. (At the end of this pamphlet, see other definitions of "CM" and "Program Management" that are in use today.)

Integrated Project Delivery

Integrated Project Delivery is a relatively new project delivery method that seeks to eliminate costly waste and miscommunication in design and construction and provide the owner with early and reliable cost and schedule certainty. It does so by bringing all the key participants to the table early in the design process and making them jointly responsible for a collaboratively validated design, budget and schedule. "Key participants" is defined as the owner, the design team, and the builder, plus disciplines and trade contractors whose input has the most impact on design, cost, and schedule. Early participation is valuable to the owner because architects and engineers are not sufficiently well informed about the most practical construction methods nor do they have the market insights available to specialty contractors. This is more the case now than ever, as building systems become more specialized and complex. Depending on the specifics of the project these early participants might include mechanical, electrical, and plumbing subcontractors, curtain wall fabricators and installers, structural steel fabricators, and wall and ceiling framing and finish, together accounting for more than half of the work by value. Smaller, less critical subcontracts such as floor coverings, painting, etc are bid out in the traditional way.

The key participants are selected on the basis of fee and qualifications rather than price. They then become part of the design team, contributing their specialized expertise and market knowledge and consequently are held fully accountable for the accuracy and completeness of the contract documents. Participants typically work at cost, with open books, putting their projected profits at risk depending on project outcomes. These at-risk profits are combined with contingencies to form an incentive pool out of which profits are distributed at the end of the project if pre-defined goals are met or exceeded. These goals always include budget and schedule but can also include such objectives as design quality, user satisfaction, sustainability, and operational efficiency. If goals are not met, profits are forfeited. In this way an alignment of commercial objectives among the participants is achieved such that all players are invested in the success of the project.

Six recent case studies of new, occupied projects that employed a relatively pure form of IPD for design and construction demonstrated considerable success. The six projects, which ranged from \$12 million to \$150 million in construction cost, did not have a single change order not initiated by the owner. Schedules, including a few that were extremely compressed, were also met, except when extended by the owner for programmatic or operational reasons.



Integrated Project Delivery (continued)

A number of institutional building owners, including several large health service providers, have adopted IPD as their preferred project delivery method." Agile, integrated design-and-build teams have demonstrated the ability to respond effectively to late changes initiated by the owner, something that is especially critical in health care projects. IPD is particularly well suited to active and well-capitalized owners who deal with complex buildings and rapidly changing facility requirements.

In its purest form, IPD uses a multi-party contract for design and construction or a two-way agreement between the owner and a single-purpose-entity. However, much experimentation is currently underway in both public and private sectors in hybrid approaches that apply principles and techniques of IPD to a variety of procurement methods. Some elements of IPD can be used in any project delivery method except Design-Bid-Build. It is highly compatible with variants of Bridging, CM-at-Risk, and Design/Build with best value selection.

Key Elements of Integrated Project Delivery

Essential Elements:

1. Early involvement of key participants
2. Collaborative decision making and project governance
3. Jointly developed and validated project goals, e.g. cost, schedule, sustainability, design quality, operational cost, user satisfaction, etc.

Strongly Desirable Elements:

4. Shared risk and reward, i.e. "skin in the game" for key participants
5. Multi-party contract
6. Transparent Financials, i.e. open books
7. Shared building information modeling (BIM)
8. Liability limitation between parties

Desirable Elements:

9. Co-location and/or "Big Room"
10. Liability waivers between parties

IPD requires a strong, active and sophisticated owner who is willing and able to take on greater risk and responsibility, especially during the early phases of project design. With this increased risk comes the potential for reward in the forms of lower cost and increased certainty of meeting (or exceeding) project goals in the realms of schedule, budget, quality and other parameters.

Owners contemplating the use of IPD should carefully consider the following issues:

IPD is still an evolving process, even though success has been achieved by first-time users. It does require a degree of improvisation. Contracts need to be customized to the project and team.

It requires a sophisticated and fully engaged owner who is empowered to make and stick to decisions.

There will be more upfront cost for design. This could be a problem if a project is not fully entitled and financed. The upfront cost will be more than offset by savings later on but if the project is canceled there could be a bigger expenditure. This risk is partially offset because designers and builders typically work at cost during design.

IPD shifts some risk from the builder to the owner in exchange for lowered contingencies and greater transparency.

An independent IPD facilitator brought in at the early stages of a project can help owners set up an effective process, by helping to create selection criteria for design and build partners, setting up a legal framework, aligning technology and information exchange, and establishing and evaluating project goals.

Note on Multiple Meanings of the terms “Construction Management” and “CM”

The terms Construction Management and CM have multiple meanings and have been used in a number of different ways through the years since the late 1960s when Construction Management first emerged as a separate service.

While the service described in the CM Agency section of this pamphlet was the original idea of CM, another fairly common definition of CM today is that of the service provided by an individual or firm as the Owner’s representative. In this context the CM administers one or more construction contracts on behalf of the Owner. Services provided usually include both contract administration (“CA”) services as well as on-site services during construction. These services are often preceded by consulting services to the Owner and the Owner’s architects and engineers during design. These consulting services are usually related to costing, scheduling, reporting, constructability and other such issues. Often in an accelerated project there may be more than one contract: one to five or more separate contracts for the construction itself, possibly with other separate contracts for the installation of equipment, interior, fit-up, furnishings, or commissioning.

It was also in the 1960s that the idea emerged that to fully deal with the time and cost problems, one had to deal with more than just construction. The pre-design planning and programming and the design phases of a project as well as the procurements of non construction items such as furnishings, moveable equipment, security and telecom systems, etc. needed to more effectively managed. Thus it became obvious to some that the Owner’s interests could only be fully addressed if the management of the full construction “program” was dealt with, not just the construction itself.

Thus, “CM” services are usually referred to as Program Management services (or by its original name, “Construction Program Management”) when they are expanded into pre-design planning, budgeting and scheduling, assisting the Owner in selecting and placing the design architects, engineers or Owner’s Design Consultants under contract, and/or the management of project related communications within the Owner organization, or in the management of multiple projects.

With respect to college degrees in Construction Management, the curriculum offered by colleges and universities in most cases prepares a student for a career in construction contracting rather than preparing the student for a career in professional services.

The Construction Management Association of America is an important and respected professional organization that represents all aspects of the professional management of construction and construction programs.

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