



## Understanding Project Delivery for the Design and Construction of Public Buildings

**T**he programming, design and construction of important public buildings require the coordinated efforts of a large number of professionals and organizations.

Critical to the successful delivery of a complex building project is effectively guiding these diverse parties into a productive and responsive force that represents the interests of public agencies, institutions and taxpayers. Five primary project delivery systems have evolved to organize the design and construction work:

- 1. Design-Bid-Build**
- 2. Construction Management-Agent**
- 3. Construction Management-Contractor or Construction Manager at Risk**
- 4. Design-Build**
- 5. Contractor Pre-Selection**

The first two delivery systems utilize an open, competitive bidding process and are therefore generally available for public sector projects under current law. Design-Build, Construction Manager-Contractor and Contractor Pre-Selection do not include competitive bidding and therefore require special legislation.

Each of these systems has a unique decision-making structure with distinct advantages and disadvantages.

Identifying the optimum delivery method for public projects depends on how public institutions value their own input; project cost and schedule; overall project quality; short-and long-term goals; and the accountability of the project participants.

### **Contractual Relationship Agent-Vendor**

When evaluating the opportunities and constraints of each delivery method, it's important to identify how a project benefits from an agent-contractual relationship or from a vendor-contractual relationship.

Agents, by definition, act in the owner's interest, providing professional services for compensation. They typically have special expertise and are expected to adhere to a professional standard of performance - that is, to exercise reasonable care in their services. In selecting an agent, the owner normally considers qualifications, experience and integrity as most important. Architects, engineers and construction managers put their professional expertise to work on behalf of their clients. As agents, they take responsibility for overseeing that the owner's needs and intentions are fully identified, defined and accommodated.

# Opportunities and Constraints of Project Delivery Methods

Vendors, by definition, supply a specified product for a fixed price. Vendors are expected to adhere to a standard of performance established in the construction documents. When selecting a vendor, the owner usually considers the cost of the product being supplied, its delivery, warranty and, only in cases of disqualification, the experience and reputation of the vendor. A contractor who is constructing a building for a specific price determined through an open bidding process is acting as a vendor. If specifications are met and drawings adhered to, the contract is satisfied.

## Design-Bid-Build

In this traditional method of project delivery, a design team of architects and engineers is hired to work with an owner to develop plans for a building to fit the goals, budget and aspirations of the owner. Based on completed construction plans, a contractor is selected through a bidding process to build the building for a set price. During the construction period, the architect works to see that the

contractor builds according to the plans and specifications, and that the owner meets financial and other obligations to the contractor.

Design-Bid-Build is an effective project-delivery system that, for many years, has helped public owners achieve quality in the design and construction of public projects. The architect is typically selected at the onset of the project based on qualifications and experience, and represents the owner's interests during both design and construction, delivering professional service as the owner's "agent". The building contractor that is successful in bidding will then contract with the owner as a "vendor" to construct the specified design for the lowest responsible price.

## Advantages of Design-Bid-Build

1. Contractors bid competitively, based on complete design documents to maximize the built product for the price.
2. The owner selects the architect on the basis of qualifications or ability. The architect's role is that of owner's advocate.
3. The architect is active in construction administration so design intentions are followed.

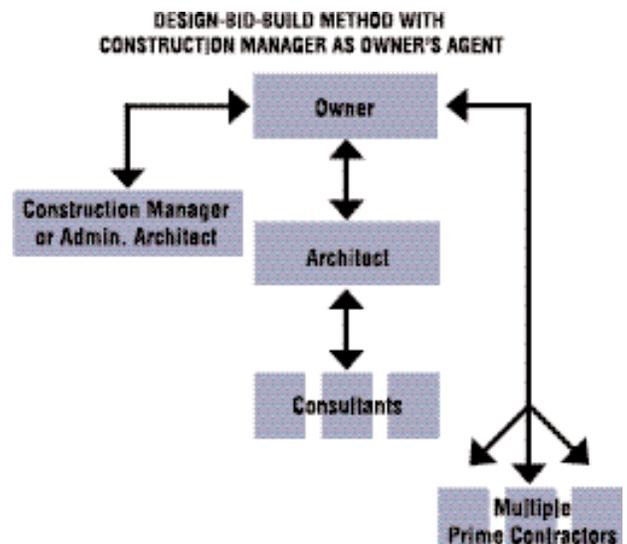
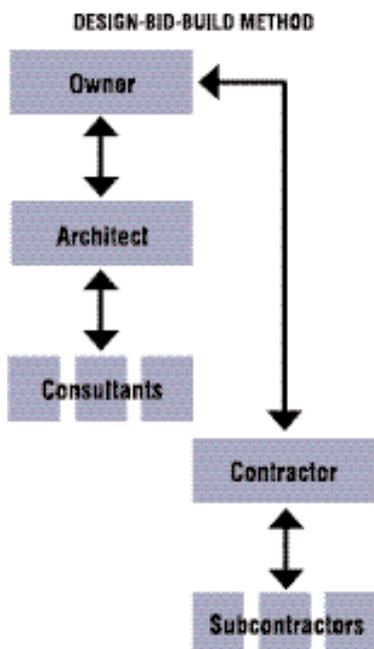
4. Design and construction roles are clearly defined, and responsibilities and liabilities clear.
5. Owner is an active participant in design process.

## Disadvantages of Design-Bid-Build

1. Design-Bid-Build construction phases are sequential and may require more time.
2. Owner is at risk for final construction cost. Actual construction costs are not known until design and bidding are complete.

## Construction Management

Some owners or public agencies planning construction of complex projects may not have resources in-house to manage planning, design and construction of a major building project. To support this need, Construction Management services can be provided in two different ways to an owner.



In one form of Construction Management, the owner contracts separately with an architect, a Construction Manager as Agent (CM-Agent) and—through a competitive bid process—one or more prime contractors. The CM-Agent provides early cost estimating, scheduling and assistance to the owner throughout the bidding and construction phases of the project. Additional cost control and condensed scheduling are the two main benefits of this method. The CM-Agent approach can be beneficial for large, complex projects where construction alternatives and solutions can positively impact the overall budget. The Construction Manager-Agent performs as an additional representative of the owner’s interests.

**Advantages of Construction Manager-Agent**

1. CM-Agent with construction expertise gives the owner an agent, in addition to the architect, to supervise the project, reducing the owner’s management burden in large or complicated projects.
2. CM-Agent’s project scheduling and capability to competitively fast track some items may speed process and save owner money.
3. CM-Agent’s cost estimating and construction expertise at design phase assists in monitoring construction costs.

**Disadvantages of Construction Manager-Agent**

1. CM-Agent is added cost. Owner is at risk for final construction cost; actual construction costs are not known until design is complete.
3. Multiple prime contracts increase paperwork and administrative time, and increase potential for construction disputes and claims.
4. CM-Agent typically has less clout to resolve design-construction issues than a general contractor and serves only as a mediator.

In the second form of Construction Management, the owner contracts separately with an architect and a Construction Manager at Risk or Construction Manager as Contractor (CM-Contractor). In this vendor form, the construction manager is “at risk” since he provides both contractor services and construction management services for the project. Construction Contractor services are provided to the owner based on a guaranteed maximum price, fixed price, cost plus or other means of defining a contract. This creates a major conflict of interest since the CM is no longer acting as an agent providing professional services to the owner, but now is a vendor delivering a contractually defined product to the owner for a price.

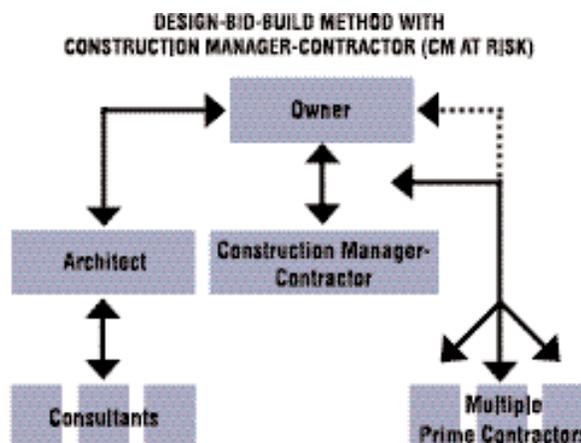
**Advantages of Construction Manager as Contractor (vendor)**

1. Architect still acts as agent protecting owner’s interest and architect’s early involvement with owner addresses building quality and function.

2. Early cost commitment gives owner project cost security.
3. At Risk entity is responsible for managing construction process and has more clout with subcontractors.
4. CM-Contractor can reduce owner’s burden in management of large or complicated projects.
5. CM-Contractor reviews project for constructability, cost and schedule, potentially reducing change orders and delays.
6. Fast-tracking and multiple prime contracts may speed construction.

**Disadvantages of Construction Manager as Contractor (vendor)**

1. Management role of CM-Contractor is added cost.
2. CM-Contractor may provide less building than a bid approach to protect margin of profit. Major conflict of interest with role as both construction manager and contractor.



# Opportunities and Constraints of Project Delivery Methods

## Design-Build

In the Design-Build delivery approach, the owner contracts with a single entity for both design and construction. The owner has one contract assigning single-point responsibility for the project. The Design-Build entity may be a single organization with both architectural and construction staffs, or a construction organization that hires or affiliates with an architect as part of a Design-Build team. The design-build entity usually proposes the design and construction price simultaneously, and the construction commitment is made. Design and construction may or may not be fast-tracked.

In a Design-Build delivery system, the architect is part of the Design-Build entity and not the agent of the owner. Thus, uniquely in the Design-Build system, there is no one in an agency relationship with the owner who is obligated to work in the owner's best interests. The design-build team is placed in a vendor relationship with the ultimate end user groups and public owner. When dealing with public sector building projects where much involvement, interaction and

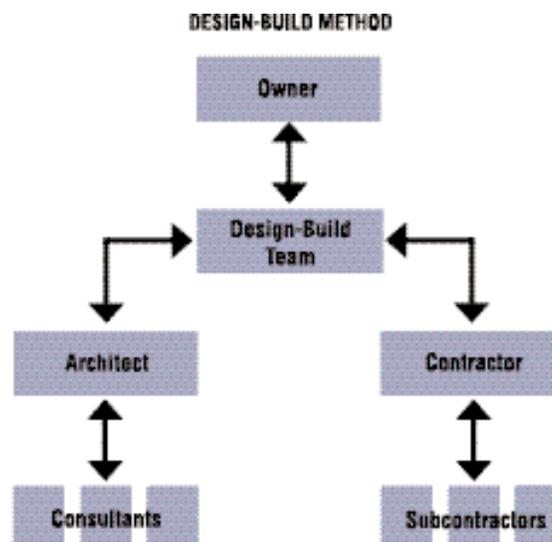
negotiation between agencies, officials and constituent communities is expected or required, a vendor led project delivery process may minimize the opportunities for user involvement. The design-build entity is focused on the delivery of a contractually defined product. Since single point responsibility leaves no independent agent representing the owner's interests, the owner will often be required to engage an administrative architect to assist in defining the building program, writing performance requirements, selecting the design-build entity and administering the design-build contract for the owner. The owner will often also hire a separate construction management entity to monitor its interests. Without early additional program/ design/specification development, the owner is likely to get less building for the price.

## Advantages of Design-Build

1. Generally fastest project delivery system.
2. Single entity responsible for design and construction.
3. Early cost and scheduling commitment.
4. Conflicts between project professionals internalized; may not involve owner.

## Disadvantages of Design-Build

1. Design-Builder may provide less building than a bid approach to protect margin of profit. Construction costs are non-competitive.
2. Involvement of owner is generally limited to early stages of project.
3. Hidden reductions in quality are possible when cost-savings and design changes are determined by design-builder. Short-term construction savings may outweigh life-cycle costs.
4. Construction documents not complete when cost commitment made. Disagreements about quality and design intentions may arise later.
5. Major conflict of interest with role as designer and contractor.
6. No objective agent to represent owner's interests.



## Contractor Pre-Selection

Contractor Pre-Selection has evolved from Design-Build in order to obtain the benefits of an independent designer, shortened schedule and early cost commitment. The owner holds separate contracts with the architect, who functions as an independent owner's agent, and with the contractor, with whom he negotiates a construction price. Final construction cost may be negotiated to provide for bids from subcontractors, with cost savings going partially to the owner. The owner/user is involved in programming and design decisions. A construction manager may be added to the team if required.

### Advantages of Contractor Pre-Selection

1. Provides early cost and scheduling benefits and saves time.
2. Architect acts as agent protecting owner's interest.
3. Architect's involvement with owner addresses building quality and function.

### Disadvantages of Contractor Pre-Selection

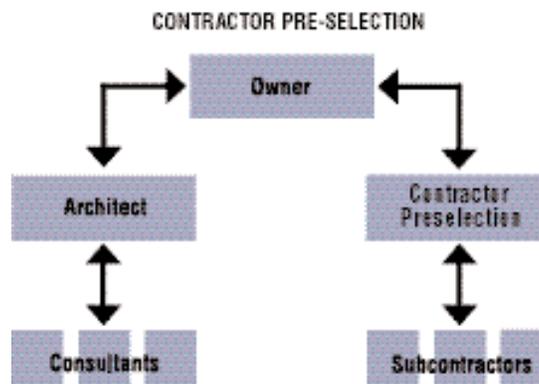
1. Without competitive bidding from the contractor, owner may not obtain lowest construction price, but this can be mitigated by mandatory subcontractor bidding.

## Balancing Cost, Time, Quality and Accountability

When evaluating the ideal project delivery system, a building owner should prioritize project cost, time, quality and accountability. Design-Build and Contractor Pre-Selection can overlap design and construction to address a tight time schedule. Straightforward projects with known requirements are often suited to Design-Build project delivery. Design-Build schedules require participants to make decisions quickly. Changes to plans become increasingly difficult and expensive as work rapidly progresses. And there is a limit to the amount of time that may be squeezed out of a project, no matter how many people are working at the task or which approach is used.

If the proposed building is programmatically complex or of a monumental quality, it may require additional design effort and input from many stakeholders. The traditional Design-Bid-Build project delivery system encourages a thorough and interactive design process. Public entities are also directly accountable to their constituents and may favor approaches where construction is competitively bid in an open market as with Design-Bid-Build or Construction Management.

Design and construction of public buildings, like most complicated human endeavors, requires thoughtful review and consideration of how they will best function and endure to provide valuable service over many, many years. If public architecture is seen as the handwriting of a civilization, then it must be the best it can be because it is truly the people's architecture.



# 20 Questions to Ask in the Delivery of Public Projects

Many issues arise in the early stages of a project involving construction and the shaping of new or renovated space. Often the most challenging task, when large cost and complexity of construction is involved, is having enough information available, in a timely manner, for key decision makers to reach the best decision. Some questions that arise in these early stages include the following:

1. Who needs to be involved in making decisions?
2. Will you assign staff to oversee the project? Do they have experience in building projects?
3. What are the goals of your project? What are the constraints?
4. Have you clearly defined the scope of the project?
5. Have you done this type of project before?
6. How will the project be funded or financed?
7. What are the critical limits of the schedule?
8. Has a site been selected and purchased?
9. How do you obtain the best value for your unique requirements? What are the qualities you value in your facilities?
10. What are some special considerations that may emerge in the design process requiring attention?
11. Do you have concerns about the life-cycle and operational costs of the building?
12. Can we be responsible to the limited resources of our environment? (Sustainable Design)
13. What are some of the special technologies a project may require?
14. What is the financial commitment and risk on this project? Are there options?
15. How do you identify the construction cost of the building?
16. What is the role of the design professional in representing the owner's interests?
17. What is the role of the contractor in representing the owner's interests?
18. What is project delivery?
19. When might an owner need to select a particular project delivery method?
20. Which project delivery system is best suited for our project?

Questions



# Some Terms Defined

## **Bid**

- A signed proposal to do the work for the amount stipulated.

## **Construction Administration**

- Administration of the owner's contract for construction during construction period until final payment to the contractor is due.

## **Construction Cost**

- The cost of the construction work to the contractor and their subcontractors. Does not include other costs referred to in the Project Cost (compare with project costs).

## **Construction Documents**

- Drawings and specifications detailing the requirements for the construction of a project.

## **Construction Management**

- This is a broad term covering a variety of project delivery systems in which a construction manager is added to the building team.

## **Construction Manager (CM)**

- Additional consultant such as an architect, contractor, engineer or developer added to project team to oversee scheduling, cost control, constructability, project management, building technology, and the bidding or negotiating of construction contracts or construction.

## **Contractor (general contractor)**

- The primary contractor who oversees and is responsible for all the work performed on the site and to whom any subcontractors on the same job are responsible.

## **Contractor Pre-Selection**

- Selecting the contractor on qualifications, not price, early in the process to team with the architect for time savings.

## **Cost Plus Fee**

- The contractor in an owner-contractor agreement is reimbursed for the direct and indirect costs of performance of the agreement and, in addition, is paid a fee for services.

## **Design-Bid-Build**

- The most common form of project delivery. Architect and contractor hold separate contracts with the owner. It is characterized by three phases: design, bidding and construction.

## **Design-Build**

- A project delivery method that offers an owner the ability to contract with a single entity to provide both design and construction services.

## **Design-Builder**

- Entity that contracts with a building owner to provide design and construction services through a single contract.

## **Design Development Phase**

- The second phase of an architect's basic service, which includes developing structural, mechanical and electrical drawings and specifying materials and the probable cost of construction.

## **Fast-Tracking**

- Construction delivery approach which overlaps design and construction, thereby shortening project schedule.

## **GMP**

- Guaranteed maximum price.

## **Lump Sum**

- A contract in which a specific amount is set forth as the total payment for performance of the contract.

## **Performance Specification**

- Standards for product quality, construction methods or building systems to be used in a building project.

## **Prime Contractor**

- A contractor who has a direct contractual relationship with the owner for work, as distinguished from a subcontractor whose contractual relationship is not with the owner, but with a general or prime contractor.

## **Program**

- A written statement setting forth design objectives, constraints, and criteria for a project, including space requirements and relationships, flexibility and expandability, special equipment and systems, and site requirements.

## **Project Costs**

- The total funds budgeted for the project, including construction cost, design fees, furnishings and equipment, fees and permits, and contingencies (compare with construction costs).

## **Project Delivery System**

- A formalized contractual approach which allows an owner to secure planning and design services and build a project, assuring effective management throughout.

## **Schematic Design Phase**

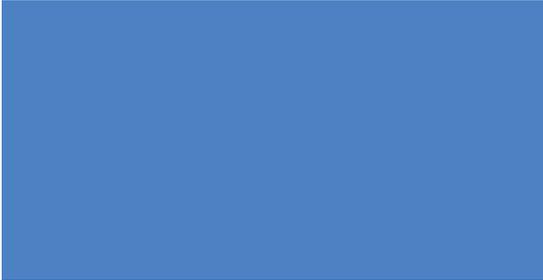
- The phase of the project in which the architect consults with the owner to ascertain the requirements of the project and prepares schematic design studies consisting of drawings and other documents illustrating the scale and relationship of the project components to the owner. The architect also submits to the owner a statement of probable construction cost.

## **Subcontractor**

- A person or entity who has direct contact with the contractor to perform any of the work at the site.

## **Value Engineering**

- The process of reviewing elements of the project design in terms of cost benefit. Value engineering involves substitution of less costly systems or materials without changing the function or overall appearance of the building.



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