

## Guidance for **General Contractors**



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**“ People will still instinctively play the blame game, but in a true integrative process, teams have to take ownership of a problem. It’s a matter of getting teams to function differently. ”** – Dave Kievet, Bolt Company

General contractors are responsible for the construction of a project. They typically subcontract out much of the work, while playing a management and coordination role.

### Role to Play in an Integrated Approach

General contractors are usually responsible for completing a construction project on budget and on schedule. They manage the sequencing and integration of the trade subcontractors and support the work of the commissioning agent. In an integrated approach, the general contractor is usually selected early in design to provide cost and constructability input. It is important that the contractor engage in the alignment workshops in order to understand the expectations around collaborating during design and avoid change orders during construction.

**As the project contractor, you have a vital role:**

- **Provide cost and constructability input during design.**
- **Support owner and team values and goals throughout construction.**
- **Collaborate with the owner, architect, and engineer to solve problems.**

### Opportunities

The current way of doing business often puts contractors in a tenuous position. In design-bid-build projects, contractors are given just a week or two to estimate the cost of a design that has taken thousands of man-hours to conceive. Then they are handed construction documents that are likely to have at least a few errors, omissions, or ambiguities. Addressing those problems takes time and money, which makes the owner unhappy. Then, contractors are liable for making sure that all the trades and subcontractors complete their tasks properly, though in many cases, there is no time or resources to communicate how their work is supposed to interact as a part of the larger system or to share the project’s green goals.

Integrated design and delivery requires more upfront work from contractors during the design stage, but will save time and frustration down the line. Having been involved from the outset in the alignment and design workshops, contractors can ensure that the construction documents include the level of detail they will need and they develop a full understanding of the project’s scope and design for when construction begins. This preparation work prevents change orders and delays and saves time usually set aside for the bidding process. Contractors can also advocate for the early involvement of the trades, which will reduce the risk of installation mistakes, therefore lowering the contractor’s liability.

**Appreciate the differences IDD makes from design-bid-build construction:**

- **Collaborate in the creation of construction documents that are actually sufficient for construction.**
- **Face fewer change orders and delays.**
- **Feel confident that subcontractors and trades are all on the same page.**

## Initiating an Integrated Project

Integrated design and delivery is sometimes viewed as an owner-driven process, but increasingly contractors are initiating an integrated approach. Some contractors who have developed a reputation built around Lean construction now market a specialty in integrated design too. Pitching those services as common practice to owners could help educate them about the potential benefits. In an integrated design and delivery approach, contractor selection is based on qualifications and collaboration skills (just as for the architect), rather than on the ability to deliver the project at lowest cost. The model recognizes that bids are often just a best guess, based on sparse information that does not take into account the many factors that could influence construction. In order for the entire team to jointly agree on the project goals, scope, and target cost, the owner needs to select a contractor that it trusts can deliver the best value—not one that picks the lowest number. That means owners who understand this concept will likely welcome the contractor (especially one they've used before) proposing a new way to go forward with a project.

An example of a contractor-initiated integrated project is the Mosaic Center case study (p. 60).

### **Key Points for a contractor contemplating initiating an integrated approach:**

- **Integrated design and delivery is sometimes viewed as an owner-driven process, but it does not have to be.**
- **Approach owners with whom you have a positive, long-lasting relationship.**
- **Demonstrate the value of selecting the contractor for quality and potential instead of for lowest-cost bids.**

## Selecting the Team

The success of an integrated project is highly dependent on the caliber of the team. For that reason, the architect will have a vested interest in the other parties that are selected for the team. The contractor can suggest to the owner that he or she ask for proposals from pre-assembled teams of firms, instead of individual parties. That would allow the contractor to submit a proposal with an architect with whom the contractor already has a good working relationship.

Leading Integrated Project Delivery expert Howard Ashcraft compares creating an integrated team to a corporate merger (Ashcraft 2011). In a successful merger, members from different firms created a single organization with a common culture that reflects their beliefs and values. Choosing team members or partnering with firms with which the owner has a strong working relationship helps ensure cultures are complementary rather than antagonistic.

If it is not possible for the contractor to advocate hiring a firm with which they already have an established rapport, the contractor would ideally select firms who have demonstrated an ability to adapt to a new system and make a strong commitment to a culture of collaboration. This applies to both a design partner and trade subcontractors. The same process that allowed the contractor to be selected based on quality and attitude rather than low-bid should also apply to the trades. Demonstrated creativity and persistence will go a long way to help team members who have not worked together before overcome the hurdles of an integrated project.

### **If you can, work with those you know or with whom you have done integrated design and delivery before. If you do choose new partners:**

- **favor partners with competency and capacity, and**
- **prefer team members with an interest in collaboration.**

## Selecting the Team: In the Interview

Contractors must demonstrate their capacity for collaboration, even without prior experience on an integrated design and delivery project. This can be demonstrated by emphasizing experience with Lean design and construction or integrated design, and by describing ways in which they adapted to projects that are more collaborative. It is useful to engage subcontractors and key trades at this stage, to receive the benefits of having accurate cost and constructability feedback and an aligned team going into construction.

### Key Points in selecting the project team:

- **Carefully consider the individual's prior experience.**
- **Examine claims: Ask, "How did you collaborate differently on that project from on others?"**
- **Engage key trades as early as possible.**

## Overcoming the Learning Curve: Co-learning and Joint Decisions

Existing case studies show that once a team successfully completes a first integrated project, it will become successively much more efficient on others (case study: Lion's Gate Wastewater Treatment Plant, p. 59). For the team members, adjusting from being "the expert" to being a "co-learner" will be possible only in an environment of collaboration, where suggestions and openness are encouraged. The contractor must foster a culture of collaboration and be persistent in engaging all participants. If all players stay committed through the full process, they will be much more efficient when working together again on the next project.

- **Teams that have done one or more integrated design project(s) are successively more efficient on others.**
- **Learning how to make joint decisions is a skill.**
- **Foster a spirit of collaboration by encouraging trade partners to speak up.**

## Utilizing BIM

In 2012, the percentage of contractors using BIM surpassed that of architects, with 74 percent of firms doing so (Smart Market Report 2012). BIM software helps identify where ductwork would run into structural members and aids in visualizing the final components so that fewer errors and misunderstandings result. Models can also be used in the prefabrication of systems across various trades, which reduces labor onsite, increases quality, and creates a safer work environment. Timing and weather data layers in the model also enable the contractor to compare various sequencing options. BIM models can be used as a collaboration tool because they require a high degree of trust and communication between the contractor and the design team. At each iteration, where design features are added or changed, it is useful to run a clash detection scan and resolve issues with the team as they arise. During construction, the model should be maintained and act as an orientation point for subcontractors and trades.

### Key Points in getting the most from BIM:

- **Use the model to support multi-trade prefabrication.**
- **Run clash detection scans concurrent with design iterations.**
- **Maintain modeling during construction.**

## Building on Lean Practices

With the mantra of “maximizing value while minimizing waste,” Lean design and construction practices encourage collaboration as a means to efficiency and provide an entry point into integrated design and delivery because of some of their overlapping principles. They also support the efficient use of materials, which is an important sustainability objective. To that end, many Lean practices could be useful tools in an integrated project: The Last Planner® System consists of layers of increasingly detailed schedules that help create a more reliable production schedule during construction, created by “collaborative pull scheduling”; Just-in-time Delivery offers a system that minimizes materials waste and storage problems; and Root Cause Analysis offers a collaborative problem-solving tool. These tools and more may all be incorporated into the construction process, but a focus on early alignment and participatory input in early design are still needed to ensure that they are successful.

### Examples of key Lean practices to implement:

- **Last Planner® System,**
- **“pull” planning and production,**
- **Just-in-time delivery, and**
- **Root Cause Analysis (the 5 Whys Analysis).**

## Tools to Manage Obstacles

Integrated design and delivery will not prevent all possible obstacles and project-specific challenges that may arise, but it will help find solutions collaboratively even if construction is already complete. If those problems do arise, Lean construction offers tools to help find solutions. The “5 Whys Analysis” technique helps a team find the reasons for a problem by formulating a question five times in response to each answer. This may be particularly useful to help identify who should be involved in finding a solution, since so many players have had a stake in the project by the time construction begins. Another tool, the “Constraint Log,” helps keep track of challenges and holds certain players accountable for resolving a problem by a certain date. This ensures progress is made and that issues are resolved as quickly as possible (Lean Construction Institute 2015).

- **5 Whys Analysis: The problem-solving technique used to dig for the root cause of a condition by asking “why” successively (at least five times) whenever a problem exists, in order to get beyond the apparent symptoms.**
- **Constraint Log: A list of constraints, with identification of an individual promising to resolve each item by an agreed-upon date. Typically developed during a review of the Six-Week Look-Ahead Plan, when it is discovered that activities are not constraint-free.**



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