

Management of the design-build process in building construction



Table of Contents

1.	Executive summary	4
2.	Introduction	4
3.	Owner responsibilities	4
3.1	Introduction.....	4
3.2	Review and approval of design.....	5
3.3	Authority to change design.....	5
3.4	Inspection and approval of construction	5
3.5	Changes and claims.....	5
3.6	Payment and financial guarantees.....	5
4.	Design subcontracting	6
4.1	Introduction.....	6
4.2	Flow-down clauses.....	6
4.3	Typical standard of care.....	7
4.4	Performance-based criteria.....	7
4.5	Indemnification clauses and the duty to defend	7
4.6	Financial and delay issues.....	7
4.7	Building information modeling (BIM) ownership.....	8
5.	The teaming agreement.....	9
5.1	Introduction.....	9
5.2	Work breakdown structure and differentiation document	9
5.3	Avoiding disagreements.....	10
5.4	Alternative dispute resolution.....	10
6.	Design development.....	10
6.1	Design validation.....	10
6.2	Information management and electronic communication.....	11
6.3	Meetings.....	11
6.4	Design deliverables	11
6.5	Co-location.....	12
6.6	The design-construction interface	12
6.7	Design evolution log and changes	12
6.8	Project debriefs, best practice capture log and lessons learned.....	13
7.	Design quality control	13
7.1	Introduction.....	13
7.2	Constructibility reviews	13
7.3	Peer reviews.....	13
7.4	BIM.....	14
7.5	Code analysis and compliance.....	14
8.	Estimating, cost to complete and scheduling	15
8.1	Developing the design cost estimate.....	15
8.2	Managing the design budget.....	15
8.3	Estimating and cost-to-complete.....	16
8.4	Scheduling.....	16
8.5	Notice of delay	17
8.6	Notice of liability.....	17

9.	Risk management.....	18
9.1	Introduction.....	18
9.2	Risk registers.....	18
9.3	Ownership of documents.....	18
9.4	Personal injury and property damage.....	19
9.5	Errors & Omissions (E&O) policies.....	19
9.6	General liability insurance.....	20
9.7	Builders risk insurance.....	21
9.8	Pollution insurance.....	22
9.9	Subcontractor default insurance.....	22
9.10	Efficacy insurance.....	22
9.11	Warranties and post-occupancy issues.....	22
9.12	Statutes of limitation and repose.....	22
10.	Conclusions.....	23
11.	References.....	23



1. Executive summary

This white paper is intended to support Owner's Protective Professional Indemnity and Liability (OPPI), Contractor's Protective Professional Indemnity and Liability (CPPI), and Architects & Engineers Errors and Omissions insurance customers. It is specifically written to assist owners and design-build contractors who lead a design-build team in a post-award setting. It is not intended to be an all-inclusive document, but a review of those methodologies and practices that will promote the overall success of the project.

2. Introduction

After the project has been awarded by the owner to the design-builder, the design-builder project manager (DBPM) is assigned the project and begins the process of planning it from conception to design, and from construction to closeout. Design-build project delivery requires careful planning and professional execution to be successful. The DBPM is the single most essential individual to drive the project to success. The traditional and often contentious relationships between project managers, subcontractors and designers in a design-bid-build scenario need to be modified into a more collaborative effort on a design-build project. The design-build project is truly a team effort, where the professionalism of the participants is allowed to thrive.

The benefits to the owner on a design-build project are the single point of responsibility, time savings, clear identification of costs and cost effectiveness. In the design-build project, risks are typically allocated to the best party able to manage the risk. However, many construction and design professionals are unfamiliar with the process and can revert to traditional roles in times of stress. It is the DBPM who should lead this orchestra, of which every musician seemingly belongs to a different union.

Once the project has been awarded to the design-builder, a variety of procurement and planning activities are set in motion. The project team begins the process of interpreting the owner's intentions and creating the design. The topics below address crucial issues that should be addressed by the project team for a successful project.

3. Owner responsibilities

3.1 Introduction

The owner may take a passive role, or they may actively participate in the management of the project. In the latter mode, the owner will have a considerable effect on the success of the project. With the owner, the design-builder should immediately establish the owner's responsibilities pursuant to design. The owner may elect to retain a program manager or manage the project themselves. The owner will often produce a set of design criteria, preliminary or bridging documents that provide enough project requirements in preliminary drawings and specifications to enable design-build bidders to submit a responsive bid. Assuming Management of the design-build process in building construction that a preliminary or bridging design has been completed, the design-builder should set forth by contract the owner responsibilities in the design-build project.

Owners are typically responsible for the following preliminary information:

- Surveys describing the property boundaries and topography, including existing utilities
- Geotechnical studies describing subsurface conditions
- Temporary and permanent easements, zoning and other encumbrances
- Legal description of the site
- Hazardous material assessments
- Environmental studies or impact statements
- Permanent and temporary power, water and sanitary system, and interconnection to existing systems
- Zoning approvals with the authority having jurisdiction (AHJ)
- Necessary permitting consultants

3.2 Review and approval of design

On most design-build projects, owners have the right to review the design and construction for conformance to the original program or bridging design. Bridging documents provide enough project requirements in preliminary drawings and specifications to enable design-build bidders to submit a responsive bid. It is essential that the owner not interfere with the progress of design and construction or needlessly increase the cost of performing the work. Most owners are accustomed to working directly with designers and often feel they have the unrestricted right to monitor and manipulate the design without consequence. It is essential that the DBPM establish protocols and lines of communication immediately after award of the project, and ensure these controls are followed by the parties throughout the life of the project. Most importantly, the owner/designbuilder agreement should contain language for the parties to specifically agree on which design submissions will require a review, the process of that review and the turnaround times for those submissions.

3.3 Authority to change design

Most standard form design-build contracts state that minor changes to the design can be made by either the owner or design-builder if those changes do not alter the contract price, contract duration or quality of the work. Importantly, if the design-builder desires to make such change, the design-phase managers will need to promptly notify the owner, giving the owner a chance to react to the proposed changes.

3.4 Inspection and approval of construction

In most project delivery methods, owners are typically responsible for inspecting the work for conformance to the contract documents. The owner usually retains the right to retain an inspection and testing agency to perform the following:

- Inspect the work as it progresses, including fabrication off-site
- Review and approve the design-builder's QA/QC program and monitor compliance
- Determine substantial and final completion (on a design-build project)

Procedures and protocols should be developed for the management of inspection reports and deficiency tracking. On larger projects, it is preferred that a QA/QC manager be employed by the design-builder to oversee this process.

3.5 Changes and claims

Contractually, the owner will have the right to direct the design-builder to make changes, which may or may not be reconciled in terms of time and cost. Both the owner/design-builder agreement and the design-builder/subcontractor agreements should include clauses that specify the action to be taken in both events. This process can be more detailed in the teaming agreement (discussed further in Section 5). The process should establish who has the authority to commit to a change, the procedure for making a change, the time period for resolution of the cost and the manner in which time extensions will be granted. Additionally, all contracts should provide for the resolution of weather delays and other force majeure events.

3.6 Payment and financial guarantees

It is reasonable to request that the owner provide evidence that it has sufficient funding to meet its commitments. This information should be provided prior to the beginning of the work and also during the course of the work. Failure of the owner to provide these assurances should initiate procedures for the designbuilder to withdraw from the project. Financial guarantees can be in the form of a letter of credit, third-party guarantees, advance payment or limited retention. While this may seem onerous, the failure of a design-builder to obtain financial assurance from the owner can expose it to considerable risk from claims of subcontractors and designers.

4. Design subcontracting

4.1 Introduction

The DBPM should now procure design services. These services can be procured by retaining separate designers and subcontractors, or a mix of both. Quite often it is desirable to have the mechanical, electrical, plumbing, sprinkler and building envelope subcontractors perform their own designs, and coordinate their design services with the subcontracted architect and structural engineer.

The process of developing subcontracts for design-build is significantly different than for construct-only contracts and purchase orders. The act of design brings into play different risks than construction; consequently, design-build subcontracts should be different than construct-only subcontracts. One could simply utilize standard design-build subcontract forms, but please consider the following when using standard forms:

- Each organization that develops or sponsors the form has its own underlying philosophy and objectives. The terms and conditions may favor one party or the other, depending on the organization affiliation.
- Mixing and matching forms can create potential gaps and conflicting language. To illustrate the concept, imagine the design-build subcontract based on the American Institute of Architects AIA form, when the overlying owner contract is based on the Design Build Institute of America (DBIA) form. Risks assumed in the prime contract may not necessarily flow down to the design-build subcontract.
- Differences in the standard forms can be subtle, and only a few differences in word choice could substantially change the risks, meaning or intent.
- Standard forms are used as a baseline and are routinely changed. The “drafting” party should highlight changes through redlining to ensure the receiving party understands the changes.

4.2 Flow-down clauses

An important concept is deciding which flow-down requirements from the primary owner/design-builder contract the designers will be obliged to meet. Essentially, the design-builder will flow down most of its obligations in the prime contract to subcontractors and suppliers. A simple application of “You are responsible for everything we are responsible for” is not practical. Many obligations in the prime contract have nothing to do with design services. These responsibilities should be carefully considered and allocated, rather than summarily transferred to the design-build subcontract.

The design-build process raises unique issues between the owner and the design builder that flow down to subcontracts and need to be addressed:

- Which design submittals will the owner have the opportunity to review and approve?
- If the design-builder is terminated, does the owner have the right to use the design documents?
- If the original design-build contract is terminated, can the owner require an assignment of the subcontract to another design-build team?
- Can the design-builder rely on bridging or any other documents the owner provides during the selection phase of the project, and does it assume the risk of errors in such documents?
- Can the design-builder bill for additional time developing a design for owner-requested changes in the work?
- Who assumes the risk of a change in law, code or other regulations that require design modifications?
- Will the owner apply fee retention on design billings? This is uncommon for most designers and may need to be negotiated as part of the subcontract.



4.3 Typical standard of care

Major issues of significance that should be addressed by the design-build subcontract is the standard of care for design services, and if a performance guarantee associated with the design-build contract will govern the designer's performance. The standard of care must be violated in order to demonstrate negligence in design errors and omissions. In order for a typical professional liability policy to respond to a claim, there must be an alleged violation of the standard of care.



The typical **standard of care** is defined as the ordinary degree of skill and care that would be used by other reasonably competent practitioners of the same discipline, under similar circumstances, taking into consideration the contemporary state of the art and geographic location.

4.4 Performance-based criteria

Similarly, if a performance guarantee is required, it should also be expressly stated in the subcontract. Because design-build lends itself to performance-based criteria, there can be liability to the owner if the performance requirements are not met. The issue of concern is whether the performance criteria would require something beyond the designer's ordinary standard of care. Professional liability insurance policies typically exclude contractually based performance guarantees, so the risk should be addressed in the design-build subcontract.

4.5 Indemnification clauses and the duty to defend

Indemnification clauses should be included and should be clear and fair. Risk should be assigned only to those parties who are best able to directly manage it. Broader indemnities can create impractical and commercial challenges the designer is not able to directly manage, such as:

- Full liability, when the designer may only be partially responsible for a problem
- Full or partial liability, even though the designer did not do anything wrong
- Requiring the designer to defend the design-builder when it does not have the ability to ask insurers to assume this defense. Professional liability insurance does not extend to anyone other than the insured. Design professional liability policies do not add additional insureds and do not provide defense coverage for the designer's clients.

4.6 Financial and delay issues

Financial and delay issues to consider include:

- Timing of payments to the designer. Is there a pay-when-paid or pay-if-paid constraint? Will there be any retainage?
- Contingencies if the project is delayed (beyond the control of the designer) and if the designer will be obligated to accelerate the design work. Will the designer be paid a premium?
- The consequences if the designer is behind schedule through their own fault. Are designer's backcharged for resultant delays or acceleration costs incurred by trade subcontractors?
- What are the financial consequences of design errors? Will each party bear the risk of its own mistakes? Or will a project contingency be established for design errors? Under what circumstances can this contingency be applied?
- Are the design-builder's obligations to the designer for owner-caused problems limited to that which is ultimately recovered from the owner?

4.7 Building information modeling (BIM) ownership

The following should be considered and addressed in the design-build subcontract:

- If the designers are working on different models, what happens if there are errors in translation or data is dropped?
- How will tolerance differences between design disciplines be addressed?
- Who owns the information in BIM?
- How will parties be able to determine who prepared which parts of the BIM model?



The **Spearin Doctrine** is a legal principle that holds that when a contractor follows the plans and specifications furnished by the owner, and those plans and specifications turn out to be defective or insufficient, the contractor is not liable to the owner for any loss or damage resulting from the defective plans and specifications. The courts in virtually all states have adopted this rule.¹

As BIM is a collaborative process, the true liability exposure of those involved in the BIM process is unresolved by court decisions at this time. Issues like standard of care and the Spearin Doctrine liability should be addressed through contract language. It is more likely that over time, case law will help the industry better understand these exposures. In addition to the normal terms and conditions that set forth the instruments of service, design-build subcontracts should address the following:

- What constitutes basic services?
- The deliverables provided by the design-build subcontractor as part of basic services
- When are the deliverables provided (i.e., schematic design, design development, construction drawings and as-builts)?
- What exactly is provided at each level of design? The AIA has developed several documents that set forth the expected scope of deliverables at each stage of the design.
- How often is the designer expected to visit the site?
- What are the designer's responsibilities pursuant to permitting or pricing?
- Frequency and locations of design development meetings
- Requests for information during construction (process and timing)
- The architect's supplemental instructions during construction (process and timing)
- Shop drawings and product data during construction (process and timing)
- Will the designer be required to certify constructor invoices?
- What are the notice requirements for additional services?
- What is the markup for additional services?
- What are the legitimate reimbursable costs?
- Teaming agreements (to be discussed below)



5. The teaming agreement

5.1 Introduction

To establish successful working relationships within the project team and enable a seamless design process, the design-builder should establish a teaming agreement that is attached as an exhibit to all subcontracts for design or design-build services. The teaming agreement sets forth the structure and interaction of the project team. Such teaming agreements are cited by the Design-Build Institute of America (DBIA) as a best practice.²

Items that should be addressed in the teaming agreement:

- The structure of the project team and contractual privity between members
- A complete contact list of all project team members and how each is designated with decision-making authority
- The process for changing project managers or those personnel with decision-making authority
- The level of design performed for each phase of the project (i.e., schematics, design development and construction drawings)
- A complete description of deliverables expected at each design phase
- A differentiation document (see Section 5.2)
- The designer's involvement in monthly design development and cost-to complete meetings
- The constructors involvement in the design process and constructibility reviews
- A decision/authority tree that outlines leadership
- The deliverable production schedule
- Commitments to confidentiality and exclusivity
- Identification of any proprietary systems or processes
- Meeting frequency and methods of communication between in-person meetings
- Meeting minutes and documenting objections to meeting minutes
- Communication technology, drawing and text formats to be used
- Presentation requirements, such as physical models, virtual models or renderings
- BIM considerations
- How performance incentives and other premium payments will be divided among team members
- Language that allows the DBPM to enforce the teaming agreement
- Owner- and designer-directed change process and logs
- Alternative dispute and claim resolution process (see Section 5.4)
- Project punch list and closeout process
- Contingencies for minor design errors not involving negligence
- Management of design and construction contingencies

5.2 Work breakdown structure and differentiation document

The design-build team begins by developing a design work breakdown structure for the design. Work breakdown structures are commonplace in construction, but not in design. A work breakdown structure is an organizational framework which depicts a project's critical design tasks, as well as their relationships to each other and to the project as a whole. A differentiation document, also known as a responsibility matrix, is a powerful tool that assigns responsibility for each task or subtask in a project to a specific owner, AHJ, designer or constructor. It delineates who is supposed to program, manage, budget, design, specify, approve, supply, install and operate every part of the development process. This is a document that takes great care and consideration to compose, as it is generally the bible of "who does what." Once the document is created and agreed upon by all parties, its effectiveness is increased if the document is regularly reviewed and refined at meetings.

5.3 Avoiding disagreements

Considering that disagreements are an inevitable part of the design-build process, the following points are essential:

- Understanding the owners, construction and design contingency assumptions built into the estimate and establishing a reasonable way to manage and mitigate those contingencies
- Ensuring that the parties conduct a post-award risk management discussion to orient them to potential problem areas and develop a project risk register (see Section 9.2)
- Preparing and discussing change trend logs with subcontracted designers to understand potential/actual problem areas and develop solutions to mitigate these problems
- Establishing a “no surprises” philosophy with the project team, and letting them know promptly about problems and how they will be mitigated
- Convening regularly scheduled senior-level management meetings between the DBPM and principals of designers to forecast issues and address project-level management issues

5.4 Alternative dispute resolution

For those disputes that involve resolving the impact of a cost event (i.e., errors and omissions, design delays or owner-caused delay or changes), the parties should consider a non-binding process of stepped negotiations. This is a sequential process that starts at the project level, by which the dispute is raised through the management levels of the parties:

- Attempt to resolve the disputes at the project level by frank discussion, based on reason, with all parties willing to compromise. If conflicts appear to develop, provide each side with ample opportunity to fully state their positions. As simple misunderstandings can lead to conflict, ensure all participants fully understand the issue. Require those with opposing viewpoints to listen and paraphrase what they’ve heard, then allow the other party to confirm or clarify before they counterargue.
- Elevate the issue to senior management within the respective organizations. The parties can meet during quarterly principals meetings and negotiate within a reasonably short period of time. These representatives, who are not involved in the day-to-day details of the project, can be more objective and open to compromise.
- It may be helpful to retain a neutral party who is area subject matter expert to render an informal advisory opinion on the issue.
- The mediation process is a structured negotiation. The sessions are confidential and each party is expected to have a representative with decision-making authority to resolve the dispute.
- Arbitration is a form of alternative dispute resolution which occurs outside of the courts. Each party agrees to be bound by the decision which is rendered by a mutually agreed-upon third party.

6. Design development

6.1 Design validation

The first step after the award of the project is to validate the design with the owner. Design validation refers to the process by which the entire design-build team, including the owner, reviews the bridging and/or proposal documents in detail to resolve any concerns or questions before designers move ahead with the design. The meeting should be attended by a representative from every design discipline, as well as estimators, project managers, site supervisors and major subcontractors. Each design discipline should present and review its aspect of the initial design, including all assumptions and contingencies. The owner’s primary Management of the design-build process in building construction decision-makers, major stakeholders and end users should be involved and be prepared to make decisions. The initial validation meeting is the best opportunity to discuss any value engineering proposals. Some adjustments can be made in the meeting, while others may require investigation and time to resolve; however, all discussion items, assignments, decisions and pending issues should be documented in the minutes.

As a follow-up, an informal idea-sharing meeting is conducted among the major design team members. The DBPM invites suggestion and criticism without regard to rank or responsibility. A follow-up meeting should be held with the owner to review and potentially approve these suggestions, and then move forward with the design. The success of the initial meeting is crucial, because it sets the tone for the organization and management of project.

6.2 Information management and electronic communication

From the beginning of the project, the DBPM determines communication and file sharing software available to the team and establishes guidelines for use. Concurrently, the DBPM establishes an electronic storage location with open access for all team members, such as a cloud-based file-sharing and collaboration site. Computer aided design (CAD) and BIM standards and procedures should also be established and maintained through construction. If feasible, staff is assigned to manage the BIM model effort along with the creation and implementation of a BIM plan.

Email is an effective communication tool, but it can also waste time, become overwhelming and result in postponed decision-making. Email protocols should be established, including:

- What types of issues require a meeting or conference call in lieu of endless emails?
- When “Reply All” should be used, and when the DBPM should be copied
- What to include in the subject line so distinct issues can be tracked
- How email will be stored

6.3 Meetings

Meetings can be highly effective ways to share creative ideas, resolve issues and expedite design. However, meetings can be counterproductive if they are unfocused or too frequent.

Meetings are needed for:

- Owner review/approval of design concepts and integration of ownerinitiated changes
- Regular team gatherings to expedite design
- Code analysis and compliance with the AHJ
- Constructability reviews
- Cost-to-complete reviews
- Peer reviews

When planning or conducting meetings, the DBPM should consider:

- Are any key people missing?
- Is the group too large?
- Are focused breakout sessions desirable?

6.4 Design deliverables

Design deliverables encompass everything from concept drawings to detailed schedules and complete 3D models. While no one set of design deliverables is the same for all projects, the following list includes the types of deliverables that will likely be expected:

- Preliminary zoning analyses
- Master plans
- Programs
- Physical massing models
- Conceptual or bridging designs
- Code analyses
- Permitting plans
- Site plans
- Construction plans and specifications
- Exterior enclosure designs
- AHJ submittals
- Bid analyses
- Addenda

- Architect Supplemental Instructions (ASI's) and Request for Information (RFI's)
- Punch lists
- As-built drawings

The DBPM should be crystal-clear about the level of detail needed for each deliverable, which is dictated by the anticipated use. If the level of detail is not known, the DBPM should discuss document needs with the recipients, including final approval authorities. The AIA and DBIA produce several documents that detail the level of design for each phase of the design process, broken down by design discipline; these concepts should be expressly documented in the teaming agreement. As most design-build projects are fast-tracked, the DBPM should facilitate between the design and scheduling/procurement teams to ensure the designers know what is expected of deliverables and when they are expected for the fast-track strategy.

6.5 Co-location

If it is economically feasible, the most effective way to facilitate the discussions that should take place during design development is co-location of the project team, preferably on the site. Designers and constructors can share offices, even if they are from different firms. Co-location office space can be rented near the project or in on-site trailers. It is also desirable, and often cost-effective, to locate the AHJ on the site. If the AHJ's availability is limited, consideration can be given to retain the services of an independent, on-site consultant to perform the role of the AHJ. Once the team is co-located on the site, and especially in the event the project design team must work remotely, site tours should be given high importance and even performed daily, if possible.

6.6 The design-construction interface

During the schematic design phase, the design team should make it a priority to meet with the construction superintendent and major subcontractors to understand how they envision the project, their concerns, how they intend to approach the project and what logistical challenges exist. Managing the design construction interface also involves understanding the impacts of the design on procurement needs so the release of drawings is integrated with construction requirements. In addition, the designers should discuss the long lead items with constructors, as well as the documents necessary for the procurement of same.

6.7 Design evolution log and changes

The DBPM should develop and maintain a design evolution log to record all design-related decisions, along with the rationale for those decisions and the people involved in making them. On a typical design-bid-build project, problems in the field are addressed by a draft RFI and typically require two weeks for a response. On a design-build project, particularly when the designers are co-located at the site, the process can work in reverse. Field issues can be immediately addressed on the site, with the documentation issued afterward.

The DBPM or constructor may require post-design changes upon determining a better way to build and/or due to errors or omissions in design. This type of change may be covered by the design contingency, which should be agreed upon at the beginning of the project and included in the teaming agreement. Minor design errors typically involve up to five percent of the overall project cost.

Design changes may also occur due to unforeseen or changed conditions. Time is usually of the essence in these cases, so the DBPM should have a mechanism in place to reconcile the changes to ensure the design and/or construction can move forward. The owner should be involved in the discussion so that decisions can be made quickly.

From the beginning of the project, the DBPM should develop design and construction contingencies (at least five percent each) to address both design and construction errors. The owner can set the terms or at least take part in developing the use of the contingencies. The teaming agreement should set forth when such mistakes can be charged against agreed contingencies, and at what point individual team members will bear the cost of the remedy. These contingencies should not be limited to architects and engineers, but should also include subcontractors, subconsultants, major vendors and fabricators.

6.8 Project debriefs, best practice capture log and lessons learned

Project debriefs take place shortly after the completion of a project, ideally within a 60-day period. Many companies conduct some type of project debrief session at the end of each project. Collecting best practices and implementing them as standard operating procedures fits in with efforts associated with quality management and continuous improvement. An analysis of errors and associated corrective actions should be compiled in a lessons learned summary. By using a best practice capture log and lessons learned summary, design-builders can make efficient use of this valuable information to train their staff and ensure consistent performance on future projects.

7. Design quality control

7.1 Introduction

An effective design quality control program should be a continuous process that starts at the inception of design and continues through the construction process:

- Requires the participation of the owner, designers and construction team
- Increases the likelihood of procuring the most efficient subcontractors and supplier proposals
- Promotes maximum productivity in the field
- Reduces the need for field-initiated changes
- During the monthly design meeting, the DBPM should display the drawings on the wall for an informal team presentation by each discipline leader. The entire team will critically review and comment on the design. These pinup sessions should be performed early and occur no more than monthly during each design phase.

Periodically throughout design, the DBPM, in conjunction with each design discipline leader, should conduct coordination reviews. These should be pinup sessions. In addition, BIM clash-detection exercises can illustrate potential conflicts. The coordination review will reveal space interferences, but it may also look at how the drawings have been coordinated with the specifications and whether different disciplines have been coordinated adequately. It is essential that the construction team participates and comments during these pinup sessions, particularly the project superintendent and possibly assistant superintendents and subcontractors who are responsible for critical aspects of the project.

7.2 Constructability reviews

The constructability review considers the design in relationship to the realities of construction, including fabrication, shipping, assembly, storing, lifting, installing and finishing. In addition to the basic concern that the design can be built efficiently, the constructability review should also address procurement and sequencing. Constructability reviews should be an ongoing process during the design, and not just at design milestones. The DBPM should lead the constructability review team, which should include the construction project manager, key project engineers, general superintendent, key assistant superintendents and major subcontractors. It is also possible to retain third parties for the constructability reviews. Designers should present the designs to the assembled construction team, then open the discussion to critique. If there are concerns, the designers can argue the rationale of the design. The results of the constructability review should be noted and immediately conveyed to the design team with clear comments, explanations and instructions. The construction team and major subcontractors can also then perform subsequent in-depth evaluations and takeoffs to validate that the design is efficiently constructible and conforms to the project budget.

7.3 Peer reviews

The peer review is the evaluation of the design by a second set of eyes involving an independent qualified third party. The purpose of the peer review is to validate the design conforms to the owner's program and to reduce errors and omissions. The peer reviewer's contract should be a simple agreement that defines the roles, responsibilities, scope of the review, professional service fees and liabilities. Given the major concern of a peer reviewer is liability, the review should be conducted under

a limited liability basis. The peer reviewer's liability could be limited to the professional service fee or some multiplier of the fee. A written report should be provided after each review and within a specified timeframe, so the information can be quickly disseminated to the design team.

7.4 BIM

The DBPM's role in managing the BIM process is to establish a BIM execution plan. One resource is the BIM Project Execution Planning Guide (<http://bim.psu.edu/>), which can be downloaded from the Penn State Computer Integrated Construction Research Group.

In establishing a BIM platform, the DBPM should address the following issues:

- What is the project team's experience with BIM?
- Which BIM software should the design team use?
- Which BIM processes are relevant to achieve project goals?
- How will compliance with the BIM plan be measured?
- How are modeling decisions coordinated with the design and construction teams?

7.5 Code analysis and compliance

Designers should be expressly required by contract to conduct a code analysis of the design. However, an essential part of design quality control is the retention of a code consultant as part of the design team. This is an absolute must, particularly on Federal Acquisition Regulation (FAR) projects. The code consultant should be required to perform a monthly review of the current design and provide a report within a specified timeframe. The code analysis should start early and then be updated as the design progresses.

Some of the codes that are evaluated in the code analysis include:

- Fire and life safety
- Health and sanitation
- Hospital and healthcare
- Accessibility
- Sustainability and green building
- Energy
- Zoning regulations
- Utility regulations
- Seismic requirements
- Hurricane requirements
- Railroad and aviation requirements
- Department of Transportation - Federal Highway Administration

Additionally, the AHJ may have codes that modify the above. At some point, occupancy inspections may reveal additional required changes. It is suggested to have the AHJ walk the site at least three months prior to substantial completion.

8. Estimating, cost-to-complete and scheduling

8.1 Developing the design cost estimate

Design services typically include basic design (i.e., schematic design, design development and construction documents) and construction administration. Basic design services do not include the cost of legal services, independent cost estimates, renderings, physical models, computer animations, full-time construction administration or attendance at regulatory agency meetings. Reimbursable expenses typically include travel, printing and reproduction services, telecommunications, and postage or courier services are typically additional. The DBPM should seek estimates for reimbursables from each designer and include those in the design budget.

8.2 Managing the design budget

Once design development ensues, the DBPM should continually reconnect with the design team to monitor the design costs. Key drivers that impact design costs include:

- Uncontemplated additional services requests
- Slow decision-making by the owner or designers of record
- Changes due to the owner, constructor or design team
- New or unfamiliar technology, such as BIM
- Changes to permitting requirements or codes

Design budget management strategies include:

- Review the scope of services with the design team and ensure no change requests are being contemplated. The DBPM should complete the strategy at the beginning of each design phase and periodically throughout the design process.
- Review the technology the design team intends to use and verify appropriateness for the project.
- Ensure the design team is requiring the subcontractors, vendors and fabricators to provide detailing of certain aspects of the design, such as steel, curtain wall, mechanical and other proprietary designs.
- Avoid having critical team members swapped in and out of a project, such as a design lead or superintendent. Language to support this can be enforced through the teaming agreement.



8.3 Estimating and cost-to-complete

The DBPM should continually review the various elements to ensure that the overall design stays within the original project scope and budget. Failing to properly monitor and oversee the design-cost interface can get a project in real trouble. Vast experience forecasts that design and construction cost issues lead to more project team conflicts than any other type of issue. Cost-to-complete meetings should be held monthly to review the design, pricing and available contingencies. A common and costly mistake that an inexperienced DBPM can make is to allow the design to become too advanced before determining its cost. The eventual redesign results in more than lost time and money. It can damage the DBPM's credibility with the owner and create division within the team. The DBPM is responsible for ensuring the design never outgrows the scope of the project or becomes more elaborate than the cost-to-complete can accommodate. The proactive approach is to design to an estimate, rather than reacting after estimating a design at predetermined milestones. The DBPM should use preestablished design and construction contingencies to cover the additional costs associated with problems. Savings that arise from value engineering and buyout can be allocated to construction or design contingencies. The teaming agreement should clearly set forth how contingencies are to be used, how value engineering and buyout savings are to be applied, and how any residual savings can be shared by the project team.

8.4 Scheduling

Once design development ensues, the DBPM should continually reconnect with the design team. In addition to the actual design time required to perform the design deliverables, time for the following items should be built into the schedule:

- Quality management
- Owner reviews
- Budget evaluations
- Value engineering
- Permit procurement
- AHJ reviews
- Bid support for trade packages
- Peer reviews
- RFI processing
- Submittal processing
- Payment application processing
- Payment application certifications
- Modification documents
- General construction administration
- Site observations and reports
- Punch lists and final inspections
- Record documents
- Long lead material procurement

On most fast-track design-build projects, the design deliverables are divided into separate design packages so that construction can get started on certain elements before the entire design is complete.

Early design release packages include:

- Rough grading plans to start site work before the civil drawings are fully detailed with utilities
- Structural steel drawings to place the steel mill order
- Equipment specifications for long lead items, such as curtain walls, chillers, boilers, electrical switchgear, transformers and other specialty items

8.5 Notice of delay

Designers are typically uncomfortable with the process of issuing a formal notice of delay for changes requested by the owner that cause potential delays. The DBPM should work closely with the designers to identify changes that may constitute a notice of delay and the owner should be so advised as soon as possible. Failure to promptly issue such notice may be interpreted by the owner as a non-time issue change.

8.6 Notice of liability

Designers are similarly uncomfortable with the process of issuing a formal notice for changes requested by the owner that cause liability issues for the design team. Failure to promptly issue such notice may be interpreted by the owner – and worse yet, the courts – as the designer’s acceptance of such liability.



9. Risk management

9.1 Introduction

Design-build projects pose different risks than a constructor is typically accustomed. Given the design-builder is a single point of responsibility for the project, the owner no longer needs to prove whether or not the designer or constructor is responsible for an issue. Most insurance and bonding products anticipate separate designers and constructors; therefore, there is potential for gaps in risk management.

Potential risks on a design-build construction project can be categorized as follows:

- Economic loss caused by performance of the constructor with respect to managing the project
- Economic loss caused by the failure of an owner to timely perform its responsibilities
- Personal injury and property damage to third parties
- Force majeure event
- Unforeseen conditions
- Design errors and omissions that affect the viability of the project

Several other aspects of the design-build process present major areas of liability exposure for the design-builder. These arise through contract and procurement issues, including contract formation and copyright.

9.2 Risk registers

It is imperative that the design-builder develop a risk register to identify, plan and address the project specific risks. A typical risk register might include, but may not be limited to, the following:

- Identification of project risks
- Determination of which risks will be retained by the owner
- Determination of which risks will be transferred to the design-builder
- Determination of which risks will be transferred to the subcontractors and other third parties
- Development of insurance programs, contingencies or controls to handle project risk
- The cost of these risk transfers
- Who pays deductibles in the event of a claim

9.3 Ownership of documents

Some important considerations relative to ownership of documents should be addressed during contract negotiations and include the following:

- What happens if the design-builder defaults and the owner is required to reprocur others to perform design and/or construction services?
- What happens if the owner terminates the design-builder for convenience and later uses the design-builder's design for the completion of the project?
- What happens if the owner executes the design-builder's design on another project with a different build team?
- What happens if the owner provides the design to subsequent renovation designers?

9.4 Personal injury and property damage

On projects delivered under a design-bid-build approach, the responsibility of project safety and personal injury rests largely with the constructor, who will develop an overall safety plan and require trade subcontractor adherence. The owner will typically require that the general contractor indemnify the owner and architect/engineer from any third-party injury caused by the negligence of the general contractor or its subcontractors. On a design-build project, these indemnifications do not exist for a designer, who could be found contributory to negligence.

Some of the above risks can be partially managed by transfer to an insurance or bonding company by:

- Professional liability errors and omissions (E&O) insurance
- Commercial general liability (CGL) insurance
- Builders risk insurance
- Performance and payment bonds
- Subcontractor default insurance
- Waivers of subrogation

9.5 Errors & Omissions (E&O) policies

It is important for the design-builder to understand which professional liability insurance will be provided by the designers. Unsophisticated owners may be indifferent as to whether E&O insurance is provided. They will frequently either rely on design contingencies, construction contingencies or the design-builder's balance sheet to handle the consequences of design problems, or require the design-builder to furnish a surety bond that covers all the design-builder's obligations, including design. Design-builders, on the other hand, will almost always have a strong interest in knowing how the subcontracted or joint venture designer will mitigate any liabilities associated with their design. The capital structure of most design firms is typically inadequate to pay significant damages arising out of an error or omission. As a result, design-builders need subcontracted or joint venture designers to maintain a certain level of E&O insurance during the course of the project and several years after completion.

E&O insurance policies are typically structured on a claims-made basis (i.e., the policy covers claims made during the policy period). As a result, claims that relate to incidents occurring before the coverage was active may not be covered, and there also is no coverage if the policy is not maintained after substantial completion. A designer's practice policy covers all of the claims against an insured during the policy period. In the unfortunate event the designer has the experience of having several claims during the policy period, the policy limits will have been eroded by the time the design-builder's claim is resolved. Depending on the policy, attorney fees may also erode coverage limits. Unlike Commercial General Liability policies, insurers do not allow the insured to add additional insureds. As a result, a design-builder will not have the right to make a claim directly against the designer's policy. Rather, the designer is obligated to notify the insurer that a claim has been made against it. The resultant effect is the design-builder may never know of what policy limits remain to satisfy a claim, and has no direct right via contractual privity, to sue the carrier. The final blow is that absent Insurance, most designers are undercapitalized to absorb significant claims.

A means of mitigating this type of risk is for the design-builder to request that the designer provide a project-specific type of policy that sets aside limits. A designbuilder can also procure their own contractors type of professional liability policy, or contractors protective professional indemnity (CPPI), which responds in excess to the designer's policy limits. The design-builder might also have the option of including Rectification coverage in their CPPI policy. Rectification coverage will indemnify the design-builder for actual and necessary costs incurred in rectifying or correcting construction works resulting from a design defect prior to the completion of the project with the intent of avoiding a claim from the owner.

Another important issue most construction professionals may be unaware of is the concept that an E&O policy is not intended to cover every design error, and one should assume that errors are covered by a design contingency. The trigger of an E&O policy is a breach of standard of care that is typically exercised by a professional in a similar circumstance and location. In addition to the breach, there must also be a duty to the claimant, and the claimant must allege and then prove, that damages were caused by the breach. This standard measures the design professional's conduct against the degree of care and skill exercised by similarly situated professionals performing similar tasks on similar projects in the same geographic region as the project. If the insured contracts to provide a more severe standard of care, such as the "highest standard of care in the industry," damages flowing from a breach of this standard will not be covered by conventional E&O policies.

The design-builder should also be aware that the typical designer E&O insurance policy excludes the following:

- Any contractually incurred warranties or guarantees
- Construction defects and faulty work
- Means and methods of construction
- Failure to complete any instrument of service within a defined period of time
- Providing estimates of probable construction costs
- All or some Pollution perils

9.6 General liability insurance

General liability (GL) insurance is a standard insurance policy issued to business organizations to protect them against liability claims for bodily injury and property damage arising out of premises, operations, products, and completed operations; and advertising and personal injury liability:

- The policy is purely defensive in nature
- The policy protects the insured from liability exposures (i.e., the possibility of loss due to a claim by a third party)
- The party causing the damage or injury is the first party
- The party who has been wronged or injured is the third party
- The insured must be legally obligated to pay damages to a third party
- Voluntary payments by insured are not insured by the policy
- Policies provide for a legal defense of the insured

The GL insurance policy protects the contractor against third-party bodily injury and property damage claims arising out of:

- The contractor's ownership, maintenance or use of its business premises (e.g., offices, shops, warehouses, etc.)
- From the contractor's operations in progress
- From the contractor's products and completed operations
- From the actions of independent contractors (i.e., subcontractors and subsubcontractors)
- From contractual liability assumed by an insured contract by the insured

For example, most contracts – such as lease agreements, equipment rental agreements and construction contracts – are considered insured contracts. Conversely, no coverage is provided if a contractor holds an architect or engineer harmless for design or engineering activities.

Liability can result from:

- Negligence of the insured or the insured's employees
- Contractual liability assumed by an insured contract

Construction defects, completed operations coverage and the “your work” exclusion.

Completed operations respond to bodily injury or property damage claims that would occur after the completion of a project, resulting from the negligence of the work performed. For example, if a contractor were to build a deck and fail to secure the railing properly and someone were to lean on the railing and suffer bodily injury, the completed operations portion of the GL policy would respond. It is important to note, however, that this does not cover the faulty work itself, just the resulting bodily injury and/or property damage. Once operations are completed, damage to the work of the insured resulting from the insured’s work is excluded (it’s not a warranty policy). Exceptions are as follows:

- Damage to work of the insured’s subcontractor arising out of the insured’s work
- Damage to work of the insured’s subcontractor arising from that subcontractor’s work
- Damage to work of the insured’s subcontractor arising from the work of another subcontractor’s work
- Damage to work of the insured’s work arising out of the subcontractor’s work

A good example showing the practical effect of the “your work” exclusion and subcontractor exception is where the general contractor hires a subcontractor to install windows. The subcontractor’s faulty workmanship results in water penetration at the window area, causing the walls to rot (i.e., property damage). When the owner sues the general contractor for negligent construction, the general contractor’s CGL policy will provide coverage because the faulty workmanship was performed not by the general contractor, but by the subcontractor. If, instead of hiring a subcontractor to install the windows, the general contractor installed the windows itself and property damage occurred, the general contractor’s CGL policy will not provide coverage due to the “your work” exclusion.

9.7 Builders risk insurance

Builders risk insurance is property insurance that indemnifies against damage to buildings during the course of construction. Builders risk insurance also protects a contractor’s interest in materials, fixtures and/or equipment used in construction, should those items sustain physical loss or damage from a covered cause (e.g., fire, wind, theft and vandalism).

Common exclusions are:

- Construction defects
- Faulty materials or machinery breakdown
- Design errors
- Earthquakes, volcanoes, landslides, floods and tidal waves
- Leaking pipes, seepage through foundations and frost
- Loss of use or liquidated damages
- Pollution



9.8 Pollution insurance

Construction general liability and E&O policies frequently exclude many pollution based claims from coverage. Pollution liability policies are used to cover this gap. Their primary purpose is to insure the costs associated with cleaning up unknown, pre-existing environmental damage and to address environmental damage that may occur during the duration of the insurance policy. A design-builder might have the option to add pollution liability to their CPPI policy.

9.9 Subcontractor default insurance

Subcontractor default insurance is an insurance policy that indemnifies the insured for direct and indirect costs incurred as a result of a default of performance by a subcontractor. Default means a failure of the subcontractor to fulfill the terms and conditions of the construction subcontract, which results in a loss to the insured.

Typical exclusions include the following:

- Bonded subcontractor/supplier
- Pre-existing defaulted subcontractor/supplier
- Transferred subcontract
- Material breach of warranties and covenants
- Professional services of insured (not an E&O policy)
- Bodily injury (not a GL policy)

Subcontractor bonding does not respond to warranty issues beyond one year after substantial completion, leaving the design-builder unprotected until statutes have expired. Not all subcontractors chosen for the initial installation of systems will be properly positioned to operate those systems post-occupancy. This could necessitate securing additional team members to fulfill the requirement. The design-builder's surety firm may object to the extended nature of the agreements, necessitating alternate forms of guarantee to satisfy the contract provisions.

The direct costs that are covered under the subcontractor default insurance policy are the costs of completing a subcontractor's obligations, sums a subcontractor is required to pay to third parties, and the cost of correcting defective or non-conforming work.

Direct costs also include fees for attorneys and consultants, as well as expenses associated with the investigation, adjustment and defense of disputes. The indirect costs that are covered under the subcontractor default insurance policy include extended overhead, job acceleration, delay costs, liquidated damages and other expenses associated with a default of performance.

9.10 Efficacy insurance

Efficacy insurance protects against losses from contract provisions that impose economic liability on the insured. It is intended to cover risk of loss for liquidated damages due to schedule delay, performance shortfalls and other warranties or guarantees.

9.11 Warranties and post-occupancy issues

Subcontractor bonding does not respond to warranty issues beyond one year after substantial completion, leaving the design-builder unprotected until statutes have expired. Not all subcontractors chosen for the initial installation of systems will be properly positioned to operate those systems post-occupancy. This could necessitate securing additional team members to fulfil the requirement. The design-builder's surety firm may object to the extended nature of the agreements, necessitating alternate forms of guarantee to satisfy the contract provisions.

9.12 Statutes of limitation and repose

Statutes of limitation accrue from the date an improper act was committed, or in some states, the date of discovery of the improper act. Because construction defects may not be discovered until many years after the work was completed, statutes of repose provide a specific date from completion of the project that invalidates claims regardless of when the defect was actually discovered. Laws and requirements vary by state.

10. Conclusions

The most successful design-build projects start with selection of an effective project delivery system, as well as fair and equitable contracts that allocate risk to those parties who are best able to manage and mitigate it. All members of the project team should be trained with the mindset to ethically collaborate, instead of the all-too-typical “us against them” strategy adopted on public hard-bid projects. It is imperative that the DBPM consider their designers as vital partners instead of low-bid subcontractors to be sued for any perceived change that increases the project cost. The owner should be an engaged and integral part of the project team, remain intimately involved the project and reward all members when the project is successfully completed.

11. References

1. “Spearin Doctrine.” Where Our Ethics Come From | IRMI.com, www.irmi.com/term/insurance-definitions/spearin-doctrine.
2. Reifsteck II, DBIA, CRIS, William. “Ten Operational Strategies to Make Your Design-Build Project More Successful.” The DBIA Webinar Series, Vol. 2, No. 3. 22 Apr. 2014.
“There’s a Better Way to Build.” DBIA, dbia.org/.
Jackson, Barbra J. Vol. 1: Design Build Essentials. 1st ed. Clifton Park: Delmar, 2011.
Charles Pankow Foundation. Professional’s Guide to Managing the Design Phase of a Design-Build Project. BNi Publications, Inc., 2014.
Charles Pankow Foundation. Design Management Guide for the Design-Build Environment. BNi Publications, Inc. 2014.

The Zurich Services Corporation
Zurich Resilience Solutions | Risk Engineering
1299 Zurich Way, Schaumburg, Illinois 60196-1056
800 982 5964 www.zurichna.com



The trademarks depicted are registered in the name of Zurich Insurance Company Ltd in many jurisdictions worldwide.

The information in this publication was compiled from sources believed to be reliable for informational purposes only. All sample policies and procedures herein should serve as a guideline, which you can use to create your own policies and procedures. We trust that you will customize these samples to reflect your own operations and believe that these samples may serve as a helpful platform for this endeavor. Any and all information contained herein is not intended to constitute advice (particularly not legal advice). Accordingly, persons requiring advice should consult independent advisors when developing programs and policies. We do not guarantee the accuracy of this information or any results and further assume no liability in connection with this publication and sample policies and procedures, including any information, methods or safety suggestions contained herein. We undertake no obligation to publicly update or revise any of this information, whether to reflect new information, future developments, events or circumstances or otherwise. Moreover, Zurich reminds you that this cannot be assumed to contain every acceptable safety and compliance procedure or that additional procedures might not be appropriate under the circumstances. The subject matter of this publication is not tied to any specific insurance product nor will adopting these policies and procedures ensure coverage under any insurance policy. Risk Engineering services are provided by The Zurich Services Corporation. A1-P0568888-A (08/23) P0568888