

AASHTO Guide for Design-Build Procurement

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AASHTO GUIDE FOR DESIGN-BUILD PROCUREMENT 2008



American Association of State Highway and Transportation Officials
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CHAPTER 1

Introduction

1.1 Guide Overview

This Guide for Design-Build Procurement is intended to assist state transportation agencies in procuring design-build projects, including preparing requests for qualifications (RFQ) and requests for proposals (RFP) and selecting the successful proposer. Design-build procedures are rapidly evolving concurrently within individual states. Between 1990 and 2002, approximately 300 projects representing \$14 billion were proposed using design-build contracting under the Federal Highway Administration's Special Experimental Project No. 14 (SEP-14) by state and local transportation agencies in 31 states, the District of Columbia, and the Virgin Islands. A survey of State DOTs in late-2007 revealed that over 700 design-build projects have been proposed, are active, or have been completed, and the number of state agencies participating in design-build delivery has increased to 39 (see Figure 1.1). Four of these states—Florida, Ohio, Pennsylvania, and Texas—have experience with 75 or more projects.

This Guide is based on best practices from experienced state transportation agencies and other public sector agencies. This Guide is intended to be flexible for varying project

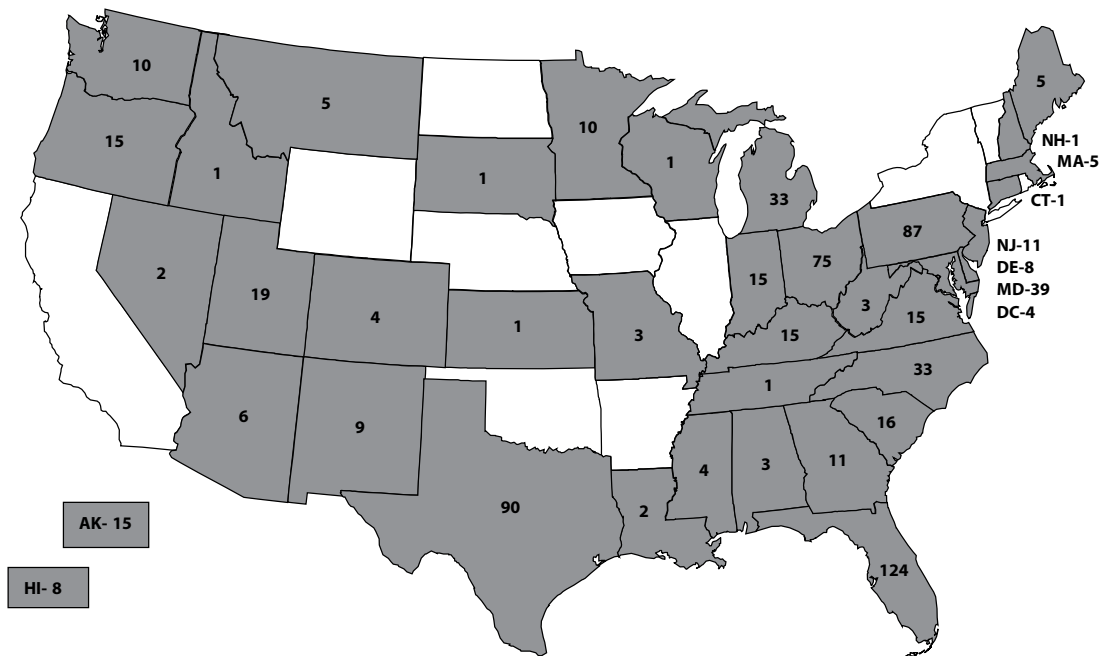


Figure 1.1 Number of Design-Build Projects Completed, Active, and Proposed by State DOTs

Source: AASHTO Design-Build Project Survey, December 2007.

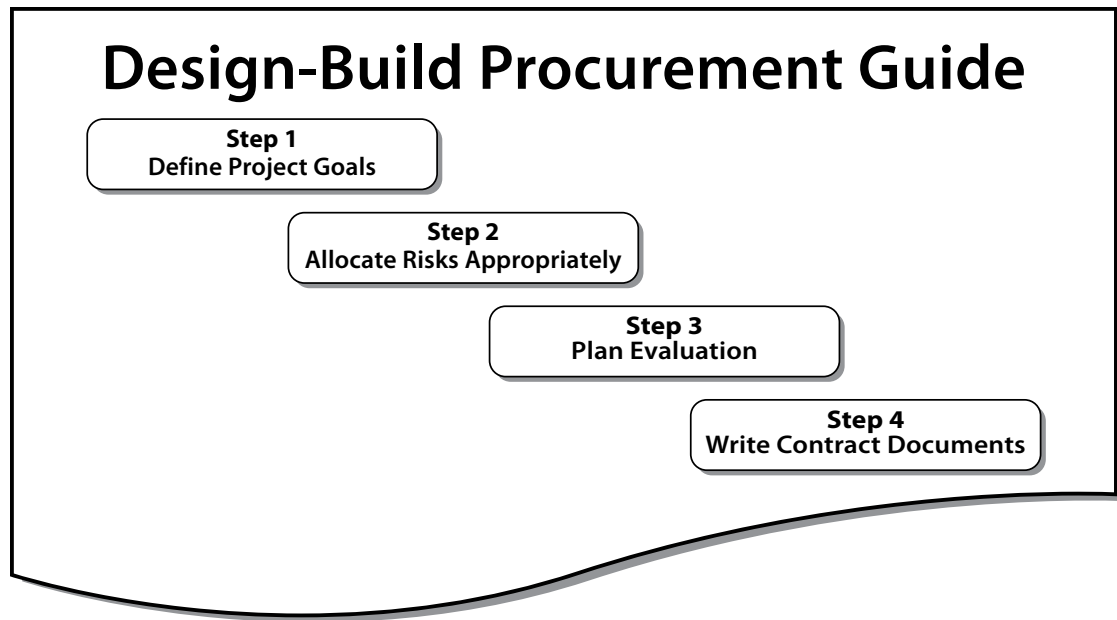


Figure 1.2 Guide Approach

types, sizes, and procurement requirements. Finally, this Guide promotes a common design-build “vocabulary” for better dissemination of lessons learned and incorporation of continuous improvement.

It is important to note that this Guide is not intended to be a “procedures” manual. While a procedures manual provides a step-by-step process, this Guide supplies an overarching description of the strategies and methods for successful design-build implementation. Each state has its own laws and regulations that vary significantly between agencies in their execution of design-build. Therefore, this Guide is generically written for broad application, but it also offers specific examples of agency practices to assist with process implementation. While this Guide focuses on those transportation agencies that have less experience with design-build procurement, it also provides details on selected critical topics so it can be a valuable supplement to experienced agencies as well.

Figure 1.2 provides an overview of this Guide’s approach to writing a successful design-build RFP and forms the basis for this Guide. While the four step approach of defining project goals, allocating risk, planning the evaluation, and writing the contract documents may seem overly simple, these four elements, and the order in which they are performed, are critical to project success. Transportation agencies must not overlook or improperly communicate these critical concepts when procuring design-build contracts. Following these four steps will 1) align the agency’s team while writing the procurement and contract document, 2) align the design-builder’s team with the end customer’s needs when proposing on and performing the work, and 3) provide the most efficient use of both the agency’s and the design-builder’s resources.

This Guide is intended to be used as a reference when developing design-build project RFQs and RFPs. It also may be used as a reference for developing agency design-build manuals or establishing design-build policy. Chapters 1 through 4 will be helpful for all agency team members as an introduction to design-build. Chapters 5 through 7 and the

Appendixes will be most helpful for those team members developing the design-build contract.

1.2 Definitions of Critical Design-Build Concepts and Terms

Design-build is a new way of doing business. Transportation agencies need a common vocabulary and framework for sharing best practices and lessons learned. The following definitions have been taken from various design-build procurement guidelines and contract documents and are used throughout this Guide.

Advertisement—Public announcement requesting statements of qualifications or design-build proposals for specified work or materials.

Agency—The State Highway or Transportation Department, Commission, or other organization that administers highway or transportation work. Also known as *owner*.

Award—Agency acceptance of proposal.

Best-Value Selection—A procurement process where price and qualitative factors are considered in the evaluation and selection process.

Competitive Range—A list of the most highly-rated proposals based on the initial proposal rankings. It is based on the rating of each proposal against all evaluation criteria.

Design and Construction Criteria Package—The design and construction requirements that clearly define the criteria essential to ensure that the project is designed and constructed to meet the needs determined by the Agency. This package is part of the Request for Proposal.

Design-Bid-Build—The traditional project delivery method for building highways and making highway improvements where the Agency sequentially designs the project, solicits bids, and awards the construction contract to the lowest responsive bidder (construction contractor) to build the project.

Design-Build—Combining the design and construction phases of project delivery of a project into a single contract.

Design-Builder—The individual or legal entity contracting with the Agency to perform the work included in the design-build contract.

Notice to Proceed—Written notice to the design-builder to begin work. The notice includes the contract starting date.

Proposal—A proposer's written offer to fulfill the requirements of the design-build contract. Depending on the selection process used, a proposal may have two distinct components: a technical proposal—the portion containing the design solutions and other qualitative components as required by the RFP; and a price proposal—the portion containing the proposer's price to provide the required design and construction work for the contract.

Proposer—The individual or legal entity submitting a proposal to the Agency to perform the advertised work. Also known as *bidder* or *offeror*.

Request for Proposal (RFP)—The document that describes the procurement process, forms the basis for the final proposals, and potentially becomes an element in the contract.

Request for Qualifications (RFQ)—The document issued by the Agency in step one of a two-step selection process. The RFQ typically describes the project in enough detail to allow potential proposers to determine if they wish to compete and forms the basis for requesting qualifications statements from which the most highly qualified proposers can be identified.

Statement of Qualification (SOQ)—The written information prepared and submitted by a proposer in response to an RFQ.

Responsive Proposal—A proposal meeting all requirements of the RFP.

Stipend—A fee paid to unsuccessful proposers for development of a responsive proposal. Also known as *honoraria*.

Subcontractor—The individual or legal entity to which a design-builder sublets part of the work.

1.3 Relationship to AASHTO References

Since agency design-build programs have developed independently, RFQs, RFPs, and design-build contract documents have evolved in significantly different forms. Some states, like Pennsylvania, New Jersey, and Ohio, create design-build contract documents that follow very similar formats to their traditional design-bid-build contracts, and these states often complete a large amount of design in the design-build criteria package. Other states, such as Minnesota and Colorado, develop unique design-build contract documents that significantly vary from the traditional design-bid-build documents that are based on the *AASHTO Guide Specifications for Highway Construction*.

This Guide is intended to coordinate with the general organizational format and broad-based national references used in the *AASHTO Guide Specifications for Highway Construction*. The time and effort required to develop RFQ and RFP documents for design-build transportation projects is significant, even for projects in the \$10 to \$100 million range. For traditional projects, AASHTO and Federal Highway Administration (FHWA) provide global guidance to member agencies. This Guide encourages the use of a “stand-alone” General Conditions for design-build contracts and provides examples that support this approach. It is noted that these examples may not necessarily apply to public-private partnership projects developed under a comprehensive development agreement. The approach is intended to expedite the development process and promote consistency. While this is not the approach of all states, it will provide the best continuity with the *AASHTO Guide Specifications for Highway Construction*. Even if agencies wish to develop their own revisions to the Standard Specification terms and conditions, this Guide will still provide appropriate guidance.

CHAPTER 2

Understanding Design-Build

Design-build is an alternative project delivery method that combines both the project design and the construction under one contract.

Traditionally, transportation agencies define the scope and requirements of a construction project by fully completing design documents (within the agency or with the assistance of design consultants) and then procuring construction contractors to build the project through a low-bid process. In design-build project delivery, agencies define the project scope and requirements through initial design documentation and then procure both the final design and the construction through an evaluation of technical proposals and/or price. Design-build projects can significantly vary in the amount of design included in the RFP, risks allocated to the design-builder, and procurement methods, but the key element in each project is a single source of responsibility for the agency through one contract for both the design and the construction.

Figure 2.1 presents a comparison of the design-bid-build and design-build methods of delivery by depicting the primary roles and responsibilities of the agency and the contractor/design-builder. Figure 2.1 also depicts the basis of the contracts for each delivery method.

As seen in Figure 2.1, the roles and responsibilities are significantly different for design-bid-build and design-build delivery. The agency delegates responsibilities for final design to the design-builder and assumes a design oversight role during the

DESIGN-BID-BUILD		DESIGN-BUILD	
Typical Roles and Responsibilities		Typical Roles and Responsibilities	
Agency	Contractor	Agency	Design-Builder
• Environmental Approvals • Complete Design	• Construction Means and Methods • Site Safety	• Environmental Approvals • Initial Design and Design Oversight • Right-of-Way	• Final Design • Utilities and Permits • Construction Means and Methods • Site Safety
Basis of Contract		Basis of Contract	
• 100 percent Complete Design Documents • Contract Specifications		• Agency RFP • Design-Builder Proposal • Referenced Design and Construction Standards	

Figure 2.1 Comparison of Responsibilities and Contracts

final design development. The agency also may choose to delegate certain aspects of quality assurance (QA) and/or quality control (QC), third party coordination, and construction oversight, but they must carefully consider the possible risks and associated costs of allocating these aspects of the project. In the same manner, the design-builder assumes responsibility for the final design as well as the responsibility for the coordination of construction with this design. This relationship significantly changes the basis of the contract between the agency and the entity performing construction. No longer are 100 percent complete plans and specifications the technical basis for the construction contract. In design-build, the agency RFP and the design-builder proposal are the technical basis for the contract. The 100 percent complete plans and specifications become a deliverable of the contract—they are no longer the basis of the contract.

This chapter of the Guide presents benefits and concerns surrounding design-build so that agencies can make intelligent decisions about when to use this alternative method of delivery. The chapter also provides information for agencies to use when preparing a justification for using design-build to project stakeholders. To aid in this discussion, a generic design-build process model is presented that forms the basis of the remainder of the Guide. This chapter concludes with a brief discussion of developing a design-build program versus a one-time design-build project.

2.1 Justification for Design-Build

Design-build use has been steadily increasing in the vertical construction sector since the early 1980s and has been gaining acceptance on transportation projects since the mid-1990s. Currently, design-build is in use on a wide variety of highway projects, from bridges to automated traffic management systems and from new freeways to reconstruction projects. FHWA has approved design-build on over 200 smaller projects since 1990 under SEP-14. With the FHWA Design-Build Contracting Final Rule going into effect in January 2003,¹ (23 CFR 636) design-build has become a fully recognized highway project delivery alternative.

Design-build is growing in the public sector for a number of reasons. Transportation agencies are in need of alternative project delivery methods to meet schedule, cost, and quality constraints and to select the best firms that can provide innovative solutions to meet these constraints. Agencies are finding that design-build is beneficial to meeting many of these challenges.

2.1.1 Schedule

Shorter Durations—Design-build delivery typically yields an overall shorter delivery of a project to the public due to the overlapping of design and construction activities.

Procurement, engineering, and construction sequences can substantially vary, but Figure 2.2 represents the typical process for both design-bid-build and design-build. Given this generic example, design-build provides faster overall project delivery. This theoretical time savings has been confirmed by numerous studies in both the highway and the building sectors, including the following:

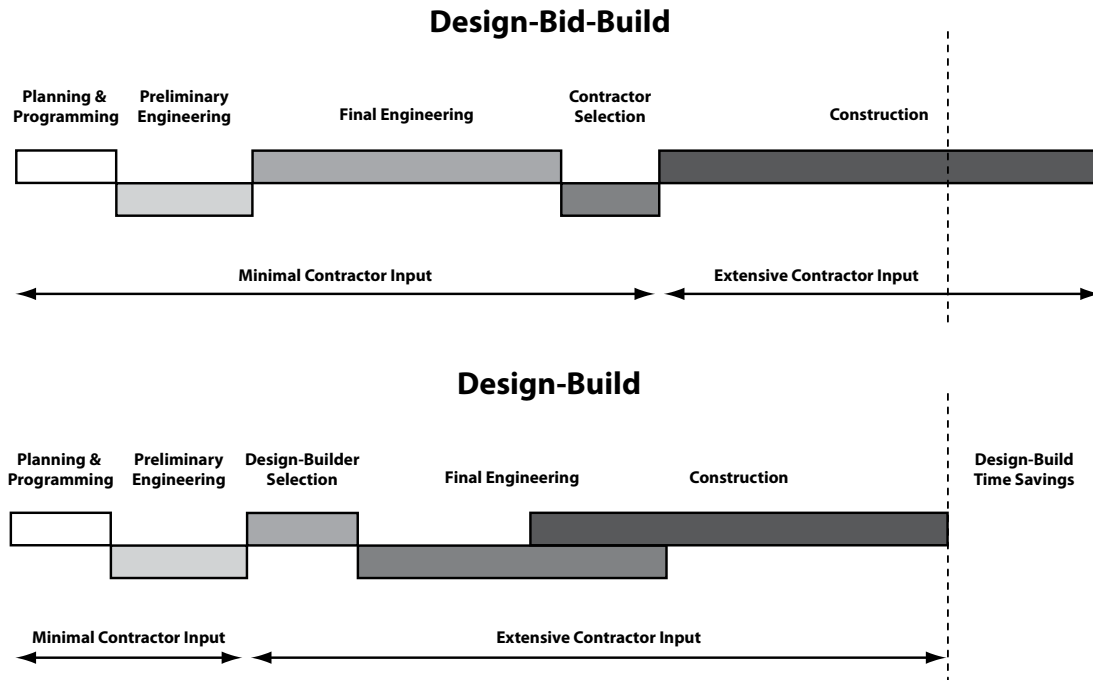


Figure 2.2 Sequence of Project Activities by Contract Approach

- Design-build projects conducted under FHWA's SEP-14 process delivered an average 14 percent time savings when compared to design-bid-build schedule estimates.²
- Florida DOT found a 37 percent time savings on their first 11 design-build demonstration projects when compared to design-bid-build.³
- On average, the managers of design-build projects surveyed for FHWA's *Design-Build Effectiveness Study* estimated that design-build project delivery reduced the overall duration of their projects by 14 percent.⁴

Earlier Schedule Certainty—Design-build project delivery also yields earlier schedule certainty than traditional methods due to the fact the construction contract is procured earlier in the project development process. As seen in Figure 2.2, the design-builder is awarded the project before final engineering is complete, and a final construction schedule is fixed at that point. Knowing the final construction completion date earlier has advantages for the agency and the traveling public for maintaining traffic flow.

Additionally, design-build has been shown to yield less schedule growth when compared to traditional projects. A study of SEP-14 design-build projects⁵ found that design-build projects produced a reduction in schedule growth during the construction phase as well as overall project delivery when compared to similar design-bid-build projects.

2.1.2 Cost

Initial Cost Savings—Evidence of initial cost savings due to design-build delivery is not as clear as the scheduling savings described above because it is difficult to find comparable projects in terms of cost due to differences in time, market conditions, and material availability. However, numerous studies have measured initial cost performance and found that design-build had no significant cost increases or minimal cost savings.

However, cost performance can vary widely depending upon the amount of risk that is allocated to the design-build contracts. Agencies must carefully consider risk allocation to minimize initial design-build cost. Risk analysis in project development is discussed extensively in Chapter 5 of this Guide.

Earlier Cost Certainty—Similar to early schedule certainty, agencies benefit from early cost certainty because the design-builder is typically contracted under a lump-sum contract before design is completed. In the traditional design-bid-build process, it is difficult to make changes to the project if the bids do not come in at the engineer's estimate. In design-build, the cost is known earlier in the project development process and flexibility still exists to implement changes if necessary; although, they should be kept to a minimum.

Less Cost Growth—Due to the fact that design-build projects are usually awarded under lump-sum contracts and design-builders have control over both the design and the construction, design-build projects experience less cost growth. The agency does not experience cost growth due to errors and omissions in plans because the design-builder is the sole source of responsibility for both the design and the construction. Due to the use of lump sum contracts, there are also no increases in cost due to variation in unit quantities. However, the scoping document should be clear and appropriate or else cost growth can occur due to omissions or errors. Similar to earlier cost certainty, less cost growth is beneficial to both the agency and the traveling public with planning and managing a design and construction program.

- A study of SEP-14 design-build projects found an average of only 3.2 percent cost growth on 36 design-build projects reviewed.⁶
- The Florida DOT study found a 2 percent cost *reduction* for its first 11 design-build demonstration projects compared to an average 9 percent cost *growth* for their design-bid-build projects.⁷
- Managers surveyed for FHWA's *Design-Build Effectiveness Study* estimated that design-build reduced the total cost of the projects an average 3 percent and maintained the same level of quality as compared to design-bid-build.⁸

2.1.3 Quality

Overall Quality—Quality can be defined in many ways, such as conformance to specifications, fitness for purpose, or meeting agency and user expectations. With

the different definitions of quality and the subjective nature of its assessment, quality is difficult to measure. Several studies have attempted to measure quality, all of which concluded that design-build was of equal or better quality when compared to design-bid-build.

Design-build projects must follow the same design standards, manuals, and guidelines used by agencies and consultants in traditional project delivery. However, when using best-value procurement, designers can be rewarded for designing and constructing projects that are above minimum standards and often make choices that increase the value of a project without substantially increasing the cost.

Quality in Procurement—Procuring design-build projects through best-value methods enables agencies to assess the quality of design, the qualifications of design-builders, and a number of other non-price factors. Traditional design-bid-build project delivery does not allow the agency to consider these important aspects of quality in the procurement decision. In fact, the ability to utilize a qualifications-based selection on the construction contractor as well as the engineer can be of great advantage to the owner. Although low-bid procurement has been used for design-builder selection, the use of best-value procurement is primarily recommended based on the fact that the design is not complete at the time of project award. Procurement methods are discussed extensively in Chapter 6.

2.1.4 Innovation

Better Constructability—Inherent to the design-build process is the early involvement of the contractor. Figure 2.2 depicts the more extensive involvement of the contractor in the design-build process versus the design-bid-build process. Interjecting contractor knowledge early into design can foster creative design and construction solutions. If used correctly, design-build can promote constructability and innovation in the same manner as traditional agency constructability and value engineering plans.

Like quality, innovation is difficult to measure. One study found that overall agency satisfaction was higher on those design-build projects that were procured through best-value with a lower level of design complete at the RFP stage. It also found satisfaction to be higher on larger and more complex design-build projects.⁹ These findings point to the notion that greater contractor input leads to better user satisfaction.

Less Impact on the Traveling Public—Perhaps the largest opportunity for innovation on design-build is in the staging of construction and the maintenance of traffic. Design-build projects have the ability to lessen the impact on the traveling public by shortening overall project and construction schedules as previously discussed, and they can use contractor innovation to design projects that minimize the effects on traffic.

A justification can be made for using design-build on the basis of faster project delivery, better cost control, equal or better quality, and enhanced innovation. However, design-build may not always be the best project delivery choice. The next section of this Guide discusses design-build project selection.

2.2 Design-Build Project Selection

The FHWA design-build regulations give contracting agencies wide discretion in identifying projects that are appropriate for the design-build project delivery method.¹⁰ However, *not all projects are appropriate for design-build*. Design-build delivery has been successfully applied on projects from simple pavement overlays to complex corridor reconstructions. However, it should only be one of many methods for project delivery. Almost any project can be delivered through design-build, but “best value” is obtained from innovation and/or from superior qualifications, technical solutions, and management approaches that may be offered by the design-builder. Design-build should only be applied to projects where: (a) the proven benefits of shortened duration, increased constructability, and enhanced innovation; and/or (b) the value of superior qualifications, technical solutions, and managerial approaches outweigh the additional costs for sharing the risk of design errors and omissions and for lump sum contracting to the design-builder. Table 2.1 summarizes findings from a study on agency satisfaction with design-build projects. The results of this table point to the following project characteristics being favored for design-build delivery based on the projects in the study sample:

- New alignments, widening, rehabilitation, and reconstruction
- Projects greater than \$10 million in value
- Projects that can utilize best-value procurement
- Projects with no more than 25 percent design completed by the agency

At face value, these project characteristics are quite clear and easy to follow. However, agencies have experienced poor project performance on projects with the same four criteria.¹² Likewise, agencies have experienced excellent project performance on resurfacing and bridge projects using low bid procurement.^{13, 14} Proper project selection

Table 2.1 Overall Agency Satisfaction by Project and Contract Type

Project/Contract Characteristic	Overall Sponsor Satisfaction*	
	Lower	Higher
Project Type	Road-Resurface/Renewal	Road-New/Widening and Rehabilitation/Reconstruction
Project Size	Smaller	Larger
Procurement Method	Low Bid	Best-Value
Percent of Design Complete at Award	Higher	Lower

* These results are based on an agency satisfaction rating and are statistically significant with a 95 percent confidence.

Source: Unpublished study of 69 SEP-14 Design-Build Projects (<http://construction.colorado.edu/Design-Build/>).

is somewhat more complex than simply following the four criteria listed above. A central premise for selecting design-build projects is as follows:

Select projects with characteristics that provide significant benefits using design-build project delivery. Once identified, develop the evaluation plan and project scope to confirm that the benefits are real, the negative impacts are minimal, and the risks are manageable.

In addition to the four project characteristics listed above, there are other compelling reasons to select a project for design-build delivery. These reasons are closely related to the benefits of design-build described in Section 2.2. A list of reasons why an agency might choose design-build includes the following:

- A compressed schedule is required
- Schedule certainty is required
- Early cost certainty is required
- The project scope is well defined
- The project has complex constructability issues
- The project is unique and the agency has limited applicable experience
- Project quality can be defined through minimum design
- Opportunity for innovation exists
- Minimal third party risks exist

Design-build project delivery should not be used on a project that will not benefit from it. There are a number of reasons not to use design-build, and early in the project scoping process, the agency should look for these red flags and ensure that none apply to the project at hand. A list of reasons why an agency might decide that a given project is *not* a good candidate for design-build delivery includes:

- The design must be complete for accurate pricing
- Project financing is uncertain
- The design must be complete for permits or third party issues
- Project risk to the agency, such as that related to subsurface conditions, has not been adequately addressed
- The project includes third-party issues that are not manageable for the design-builder
- There are sensitive environmental issues
- The project scope or location may not generate adequate competition

Finally, agencies must have proper staffing resources to pursue design-build projects. Design-build yields different agency workloads. Design-build often requires more agency personnel in preliminary design than in traditional projects due to the intensive RFP development and evaluation process. Once the design-builder is hired, agency involvement is typically less than traditional projects, but it requires individuals who are trained in design-build design and construction oversight.

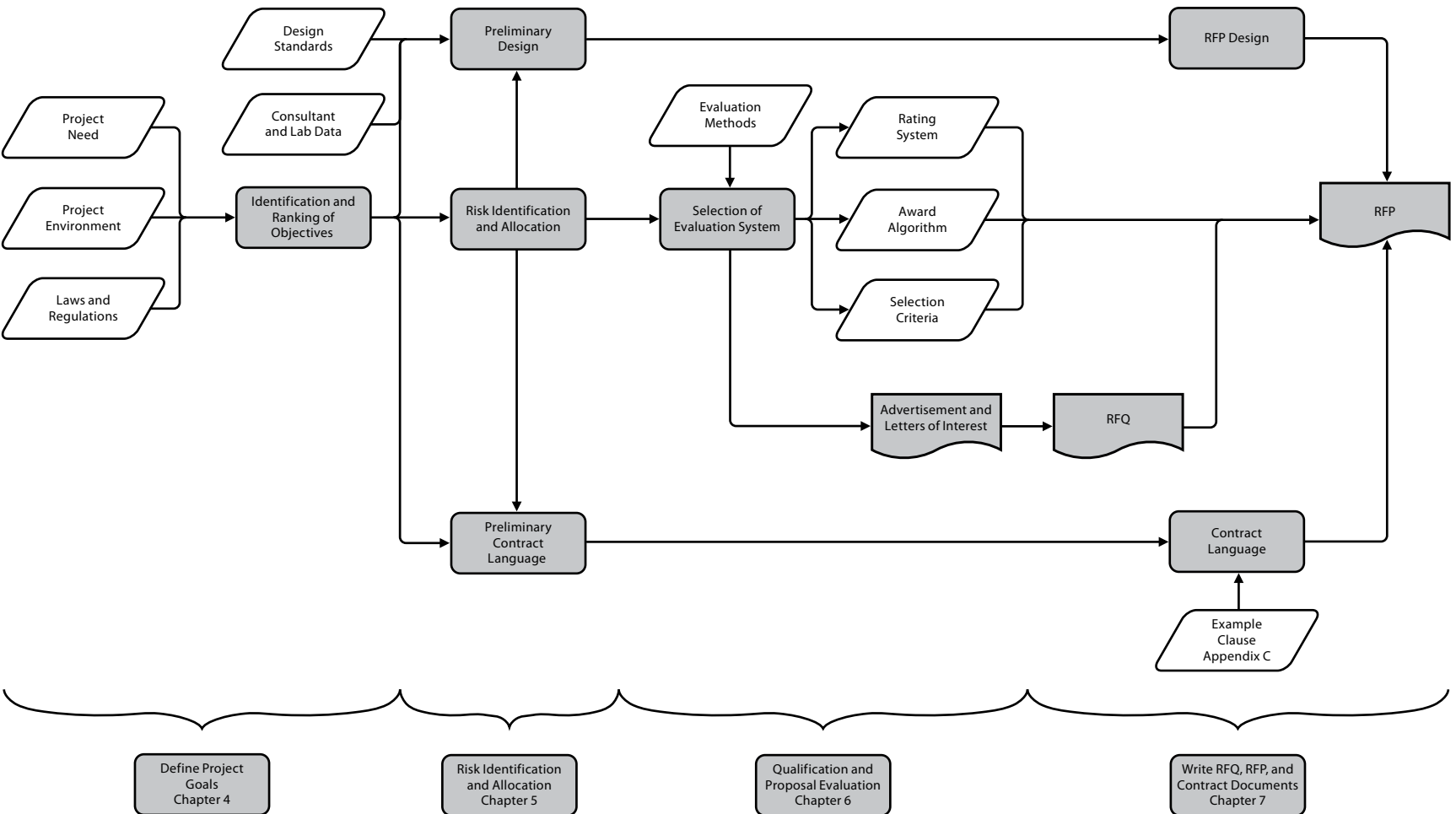


Figure 2.3 Design-Build Procurement Process Model

2.3 Design-Build Procurement Process Overview

There are perhaps as many different design-build processes as there are agencies with design-build programs. However, there are some critical steps that should be followed by all agencies. This Guide presents one model of the design-build procurement process. The process model is based upon the four steps presented in Figure 1.2 at the beginning of this Guide and corresponds to the chapters that follow.

- Step 1—Define project goals (Chapter 4)
- Step 2—Allocate project risks appropriately (Chapter 5)
- Step 3—Plan the evaluation and award (Chapter 6)
- Step 4—Write the RFQ, RFP, and contract documents (Chapter 7)

As shown in the process model in Figure 2.3, the steps are somewhat iterative. The first step, defining project goals, should occur at the planning and programming phase of the project and is done in conjunction with selecting the project as a design-build candidate. The second step of allocating project risks relies heavily on the preliminary design findings and relates closely to the drafting of contract documents. The third step of planning the evaluation and award is perhaps the most critical element to project success as it communicates the project goals and defines the project requirements. The final step of drafting the RFQ, RFP, and contract documents occurs continuously throughout the process, but it cannot be completed until the first three steps are finished. Each of these steps is discussed in detail in the remainder of this Guide.

Notes

1. 23 CFR 636.
2. U.S. Department of Transportation, Federal Highway Administration. *Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f): Final Report*. January 2006.
3. Ellis, R.D., Z. Herbsman, and A. Kumar. *Evaluation of the FDOT Pilot Design - Build Program, Final Report, No. 99700-7543-010*. Submitted to the Florida Department of Transportation. University of Florida College of Engineering, Department of Civil and Coastal Engineering, Gainesville, FL, 1991.
4. U.S. Department of Transportation, Federal Highway Administration. *Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f): Final Report*. January 2006.
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6. U.S. Department of Transportation, Federal Highway Administration. *Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f): Final Report*. January 2006.
7. Ellis, R.D., Z. Herbsman, and A. Kumar. *Evaluation of the FDOT Pilot Design - Build Program, Final Report, No. 99700-7543-010*. Submitted to the Florida Department of Transportation. University of Florida College of Engineering, Department of Civil and Coastal Engineering, Gainesville, FL, 1991.
8. U.S. Department of Transportation, Federal Highway Administration. *Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f): Final Report*. January 2006.

9. U.S. Department of Transportation, Federal Highway Administration. *Design-Build Effectiveness Study – As Required by TEA-21 Section 1307(f): Final Report*. January 2006.
10. 23 CFR 636.
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14. Ellis, R.D., Z. Herbsman, and A. Kumar. *Evaluation of the FDOT Pilot Design - Build Program, Final Report, No. 99700-7543-010*. Submitted to the Florida Department of Transportation. University of Florida College of Engineering, Department of Civil and Coastal Engineering, Gainesville, FL, 1991.

CHAPTER 3

Developing a Design-Build Program

Transportation agencies should view design-build project delivery as a program, rather than simply as a set of individual projects. The traditional design-bid-build method was established over the last 50 years or more. Design-build requires new procedures and attitudes to be successful. If transportation agencies wish to use design-build delivery repeatedly when appropriate projects present themselves, they should strive to create a set of policies and document templates. Standardization of certain documents and processes is desirable to promote internal consistency for the agency and external efficiency for the industry. The issues listed in this section are not comprehensive, but they should be considered when embarking on design-build project delivery.

3.1 Programmatic Issues and Documents

The following list of issues and documents should be considered when creating a design-build program. It is not intended to be comprehensive, but critical items are provided for agency consideration and discussion.

Changes to standard general and technical provisions for design-build contracts—Combining design and construction into one contract requires changes to critical language in standard general and technical provisions of agency contracts. Many of these changes will be repeated from project to project.

Changes to design manuals and design guides for design-build contracts—Most highway design manuals and design guides were written for agency personnel and consultants. Agencies often reference these publications in design-build contracts. Since these publications were written as guides rather than contract documents, they often need editing in areas where direction is ambiguous.

RFQ and RFP instruction templates—While each project is unique and RFPs and RFQs *must* be project specific, agencies and the industry can benefit from some standardization in the format of these documents. RFQ documents can loosely be based upon existing consultant selection documents, but the RFP is a new document for the agency.

RFQ and RFP evaluation instructions—Chapter 6 of this Guide discusses the importance of defining an evaluation plan and adhering to it during the procurement. These instructions are important to the efficiency and accuracy of the evaluation process and to avoid protests from unsuccessful proposers.

Quality assurance and quality control procedures—In design-build administration, agencies assume a role of design review rather than design approval and construction oversight rather than construction inspection. These are major differences in design and construction administration that require new procedures and new documentation, including the development of design quality management plans.

Bonding and insurance policies—Combining design and construction into a single contract raises issues about bonding and insurance. In traditional projects, designers provide errors and omissions insurance and contractors provide performance and payment bonds. Design-builders predominantly are teams consisting of contractors with subcontracted designers. The agency must be clear on bonding and insurance requirements for these teams.

Schedule of values templates—Although this issue is minor compared to the others discussed above, agencies must create pricing templates for lump sum contracts in order to use design-build. Since quantities are not known at the time of project award, design-build projects are awarded using lump sum contracts rather than unit price contracts. Lump sum contracts require payment schedules of values that protect the agency and fairly compensate the design-builder as well as define the project's cash flow.

Stakeholder input—To create a successful design-build program, continuous stakeholder input should be collected and reviewed by the agency. In addition to external groups, internal agency stakeholders must be involved in the design-build program development process. Activities used by various transportation agencies to solicit stakeholder input include:

- Design-build education workshops
- Periodic stakeholder input meetings
- Publication of draft documents for comment

Input from stakeholders also is desirable when making substantive changes to the design-build program or its major processes, such as a change in the evaluation system. A partnership consisting of state, federal, consultant, and contractor representatives can be created to discuss and resolve ongoing programmatic issues.

Design-build champions—Many agencies have found that creating a design-build program requires champions within the agency. Various titles are being used for these persons, including design-build program director, design-build program manager, design-build contracting engineer, and design-build specialist. The role of this individual is to serve as a single point of information for the design-build program and an advocate for the delivery method. In addition to necessitating procedural changes within agencies, design-build project delivery requires cultural changes as well. These champions can serve the dual role of a design-build knowledge disseminator and agency change manager.

Agency design-build policy committee—Design-build procedures will affect many different divisions or departments within the agency. Many agencies have found it useful

to create a design-build policy committee or design-build task force to discuss relevant issues that affect departmental policies and procedures. These groups may meet on a periodic basis to discuss global issues and should be available to meet as important project issues arise that shape agency policy. Representation in the group will vary by agency, but design, construction, procurement, and legal stakeholders should be included. Additionally, some agencies choose to include design consultant and contractor representatives on the committee.

White papers—A number of agencies have found the process of writing white papers on important policy issues helpful in developing design-build programs. These white papers should be written by the stakeholders who are most affected by the issue. The following topics were covered by the Minnesota DOT as they were developing their design-build program:

- Third Party Agreements
- Approach to Alternative Technical Concepts
- Approach to Notice to Proceed
- Approach to Change Orders
- Approach to Differing Site Conditions
- Approach to Dispute Resolution

Design-build education—As mentioned previously, design-build constitutes both procedural and cultural changes in most agencies. A number of agencies have found it beneficial to conduct continuing education on the topic of design-build project delivery. Continuing education can take the form of lunchtime discussions with experienced agency personnel or formal accredited continuing education delivered by external entities such as the American Society of Civil Engineers (ASCE) and the Design-Build Institute of America (DBIA). Agencies have also found that inviting industry to these courses helped to more quickly and effectively develop their design-build programs.

Design-build guidelines and manuals—A number of agencies have developed design-build guidelines, manuals, or policy guides in conjunction with their programs. These publications vary in length from 20 to 200 pages depending upon their purpose. The publications are typically intended to serve as a single source for design-build procedures and policies. Agencies have found that creating these publications stimulates discussion of important issues and can help to create consistent methods across the agency. The following are a few guides and manuals currently in use:

- Arizona Department of Transportation, *Design-Build Procurement and Administration Guide*, 2001 (2nd ed.)
- Colorado Department of Transportation, *Design-Build Manual*, 2006
- Florida Department of Transportation, *Design-Build Guidelines*, 2004 (revised 2007)
- Montana Department of Transportation, *Design-Build Guidelines*, 2004
- Washington Department of Transportation, *Design-Build Process for Highway Projects*, 1999

Pilot projects and benchmarking of performance—Numerous agencies have treated their first design-build projects as “pilots” to test the delivery method. The benefit in doing this is that there is a clear understanding that the process is new and will evolve. This method requires that the project performance is reviewed and the results are disseminated in the form of lessons learned.

Agency Cultural Concerns—Design-build brings challenges within organizations due to its departure from traditional contracting methods. State agency employees may have concerns over the change in level of direct control of elements within a given project. Those charged with developing a design-build program need to be sensitive to the many issues that exist and develop an educational program and engagement process appropriate to alleviate concerns as much as possible.

CHAPTER 4

Defining Project Goals

The clear and concise definition of project goals is critical to any project's success, but it is even more critical in design-build delivery. When a transportation agency chooses a non-traditional delivery method, it must be clear about why it has chosen this approach and must clearly and consistently communicate this decision to all of its internal and external stakeholders. Additionally, the project goals will drive decisions when writing the RFQ and RFP, evaluating the proposal, and administering design and construction. This chapter presents the process of identifying, ranking, and communicating project goals. These goals provide a foundation for the risk allocation, evaluation planning, and contract writing processes that follow.

4.1 Importance of Project Goals

The importance of clearly defining project goals at the beginning of a design-build project cannot be overemphasized. These goals affect risk allocation, procurement methods, contracts, and, most importantly, the success of the project. Design-build projects require the transportation agency to assemble a large number of resources to develop an RFP. Clear goals align the team when writing the numerous sections of the RFP. Moreover, clear goals assist in making risk allocation decisions. By conveying these goals in the evaluation plan, proposers can provide proposals that better meet

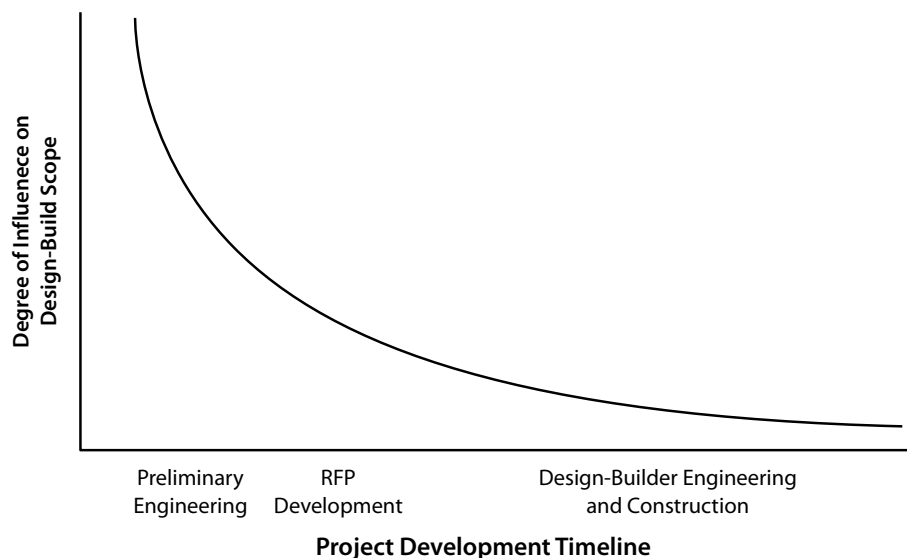


Figure 4.1 Agency Influence on the Scope of a Design-Build Project

the transportation agency's needs for the project. Finally, the goals can be used to administer the project during the design and construction phases after award.

Figure 4.1 illustrates the importance of project goals by providing a graph of the agency's ability to influence the design-build project scope. The idea is that the ability to influence the final outcome of the project is greatest early in the project's life cycle. As time goes on, the agency's ability falls off dramatically and the cost of making changes increases. Thus, it is critical to identify the full scope of work as early as possible in the project development process. Clearly defined project goals assist in this task.

Design-build and design-bid-build contracts are fundamentally different due to the manner in which the design-build contract shifts risk and responsibility for design details from the agency to the design-builder. In a design-bid-build contract, the agency develops or contracts a designer to develop the final construction drawings. The agency, in essence, "owns" the details of the design and guarantees that the plans are constructible and free from defects. However, in a design-build contract, the design-builder, in essence, "owns" the details of the design and is responsible for providing design documents and a construction facility that is free from defects. Both systems legally obligate the designer to deliver a project that meets all applicable codes and standards within a reasonable standard of care.

The fundamental difference in the contract modes is how and when the construction plans and specifications fit into the contract. In the design-bid-build system, the final plans and specifications form the basis for the construction contract and define the scope of work along with the price proposal. In the design-build system, the plans and specifications are a deliverable of the contract and it is the agency's request for proposal (RFP) and corresponding design-builder's technical and price proposals that form the basis for the contract.

There are several important nuances to the delivery systems, and agencies must be sure to clearly convey project goals. First, clear project goals help the agency's evaluators to differentiate between competing proposals during the evaluation period. Next, and more importantly, since the design is not complete at the time of project award, there can be significant "design intent" in both the agency's RFP and the design-builder's technical proposal. Clear project goals help to convey how the agency would like the final project to function. As the design-builder completes the design, clear project goals help to make design decisions when two or more technically acceptable solutions are available. Finally, the project goals carry through to the construction administration of the project for both the agency and the design-builder to follow.

4.2 Identification and Ranking of Project Goals

Identification and ranking of project goals should directly follow design-build project selection. Table 4.1 provides a list of project goals that translate to the design-build benefits as presented in Chapter 2.

Table 4.1 demonstrates a clear mapping of design-build benefits to concise project goals. Agencies with design-build experience find that it is important to clearly communicate project goals in their RFPs. Table 4.2 provides examples of project goals from a number

Table 4.1 Mapping of Design-Build Benefits to Project Goals

Possible Design-Build Benefits	Project Goals
Schedule • Shorter Duration • Earlier Schedule Certainty	Schedule • Minimize project delivery time • Complete the project on schedule
Cost • Initial Cost Savings • Earlier Cost Certainty • Less Cost Growth	Cost • Minimize project cost • Maximize project budget • Complete the project on budget
Quality • Overall Quality • Quality in Procurement	Quality • Meet or exceed project requirements • Select the best team
Innovation • Better Constructability • Less Impact on the Traveling Public	Innovation • Provide innovative solutions • Minimize impact on the traveling public

Table 4.2 Examples of Design-Build Project Goals

Agency	Project	Project Goals (in order of importance)
Colorado DOT	Colorado Springs Metro Interstate Expansion Project	1. Maximize capacity and mobility improvements in the corridor within the program budget of approximately \$150 million 2. Minimize inconvenience to the public during construction 3. Provide a quality project 4. Complete by the end of calendar year 2008 5. Provide a visually pleasing final product
Colorado DOT	Southeast Corridor Multi-Modal Project (Trex)	1. Minimize inconvenience to the community, motorists, and public 2. Meet or beat the total program budget 3. Provide for a quality project 4. Meet or beat the schedule of June 30, 2008
New Mexico DOT	US70 Hondo Valley	1. Cost not to exceed budget 2. High quality, safe, aesthetic, environmentally responsible, durable, and maintainable project 3. Contract awarded and signed by June 2002 4. Project completion not later than September 25, 2004 5. Valid basis for evaluation of design-build delivery system
South Dakota DOT	Interstate 229	1. Timely completion 2. Quality design and construction 3. Reasonable cost

(continued)



Table 4.2 Examples of Design-Build Project Goals (continued)

Agency	Project	Project Goals (in order of importance)
Washington State DOT	Everett HOV (high-occupancy vehicle) Design- Build Project	1. Deliver the project within budget. 2. Achieve substantial completion by October 1, 2007, or sooner. 3. Achieve quality of design and construction equal or better than traditional design-bid-build. 4. Provide a safe construction site for workers and the traveling public. 5. Meet or exceed environmental requirements and expectations with no permit violations. 6. Foster confidence with the environmental permitting community in the design-build process. 7. Manage traffic to minimize disruption and inconvenience to the public during construction. 8. Maintain community support during design and construction.
Washington State DOT	I-405 Kirkland Stage I	1. Quality of design and construction (On time within budget) 2. Environmental compliance and innovation 3. Maintenance of traffic 4. Public information and community involvement

of agencies. These goals were located at the beginning of the respective design-build project RFPs in the “Instructions to Proposers” or similar sections.

The project goals in Table 4.2 vary in style and emphasis due to the unique project needs, but they all help define the agencies’ requirements in terms of schedule, cost, quality, aesthetics, and end user requirements. As design-builders prepare project proposals, the project goals will help them align their proposals to the requirements. The goals will also help the design-builders make appropriate design decisions during final design. The agency will use these goals to evaluate proposals, review design, and administer construction.

Ranking of the project goals is important. It is not reasonable to expect that a project will realize all of the possible design-build benefits. On every project, there are trade-offs between schedule, cost, and quality. It is to the project’s benefit if both the agency and the design-builder are in alignment with the project goals. For example, the Colorado Springs Metro Interstate Expansion Project’s first goal was not to exceed the program budget and the second was to minimize inconvenience to the public. This ranking provides clear direction to the design-builders that maintenance of traffic is important, but not at the expense of exceeding the program budget.

4.3 Communication of Goals

Once the transportation agency team agrees on project goals, they must communicate them to the design-builders and all of the other internal and external stakeholders. Communication to internal agency team members requires good management skills and a clear evaluation plan. Communication with design-builders requires effectively written evaluation criteria in the RFP that accurately convey the agency's requirements.

Clearly writing the goals at the beginning of the RFQ and RFP helps to communicate them concisely. However, the agency also must create a transparent evaluation plan that rewards design-builders for meeting these goals in their project proposals. A best-value procurement method may be used to reward proposers for responding to the project goals.

A best-value procurement is a process in which price and other key factors are considered in the evaluation and selection process. The project goals should constitute the basis for the non-price factors. Chapter 6 discusses how to leverage the best-value procurement process to achieve a successful design-build project. The project goals are critical to crafting a good best-value procurement. Using the Colorado Springs Metro Interstate Expansion Project as an example again, the agency's first goal was to not exceed the program budget. The evaluation team was able to craft a best-value procurement in which the price proposals were fixed at the maximum allowable within the budget, and technical proposals were evaluated on the basis of the amount of scope that the design-builders proposed. This method is explained in Chapter 6 as a "fixed price/best proposal" best-value procurement, along with a number of other methods that can be used as project circumstances dictate. In this example, the project goals clearly aligned with the evaluation plan so that all agency personnel, design-builders, and other project stakeholders understood how the project could be successful.

4.4 Summary

The need to establish project goals early in the project development process is clear. Project goals create alignment between internal agency personnel, design-builders, and project stakeholders. The steps in creating project goals can be summarized as follows:

1. Justify the selection of design-build delivery for the project on the basis of the delivery method's benefits.
2. From this justification, establish project goals for schedule, cost, quality, and innovation.
3. Rank these goals in order of importance.
4. Publish the goals in the RFQ and RFP.
5. If using best-value procurement, develop evaluation criteria that reward proposers for meeting or exceeding the project goals.
6. Remain consistent with the goals after award, throughout project design and construction.

CHAPTER 5

Allocating Project Risks

Appropriate allocation of project risks is critical when developing any project contract. Risk allocation is even more critical for design-build contracts because many of the risks that are traditionally managed by the agency can and do become the responsibility of the design-builder. However, if risks are inappropriately allocated to the design-builder, the design-builder will need to include additional cost in the project proposal in the form of contingency to manage these risks.

In recent years, many public agencies have chosen to use the design-build method of project delivery to better manage their risk.¹ One reason is that the design-build system provides more flexibility in risk allocation. Design-build allows for the transfer of many risks traditionally borne by the contracting agency to the design-builder, since the design-builder is better able to manage these risks. Most notably, the risk for errors and omissions in final plans and specifications is inherently transferred from the agency to the design-builder. However, this flexibility should not result in shifting *all* possible risks to the design-builder because this leads to the potential for higher price proposals, excessive changes, and disputes. The flexibility can be beneficial only upon proper allocation of the risks.

Identification of risks begins at project inception. Throughout project development, the contracting agency must work to advance the design far enough so that the related risks are tolerable for the design-builder. The central premise is to then clearly allocate the risks to the party that can best control them to avoid any confusion, disputes, and litigation. FHWA's design-build contracting rule² recommends identifying and allocating various project risks such as:

- Governmental risks, including the potential for delays, modifications, withdrawal, scope changes, or additions that result from multi-level Federal, state, and local participation and sponsorship
- Regulatory compliance risks, including environmental and third party issues, such as permits, railroad, and utility company risks
- Construction phase risks, including differing site conditions, traffic control, interim drainage, public access, weather issues, and schedule
- Post-construction risks, including public liability and meeting stipulated performance standards
- Right-of-way risks, including acquisition costs, appraisals, relocation delays, condemnation proceedings, including court costs and others

This chapter provides a checklist of possible risks and introduces risk identification and allocation strategies. This chapter also presents a brief discussion of the appropriate

level of design to be completed by the agency because it directly relates to project risk allocation.

5.1 Appropriate Level of Design in the RFP

Design-build delivery combines design and construction responsibilities into one contract that makes the design-builder the single point of accountability for both the design and the construction. However, the agency must provide enough of the preliminary design in the project solicitation documents to ensure that the project scope is sufficiently characterized to minimize risks for proposers. This preliminary design is referred to as the “design-build criteria package” or “basic configuration.” If the agency wishes to obtain maximum innovation from the design-builder, it should only include enough design to be sure that the project is “buildable” and that the major risks are identified and allocated. If the agency provides too much initial design before procurement, it can greatly limit the chance of innovations from the design-builders that may help to meet the project goals more effectively. Therefore, it is essential for the agency to determine the appropriate level of design to complete and publish in the RFP.

The extent of preliminary design published in the design-build criteria package can vary greatly. A study in 2001 of six transportation agency design-build projects found that the level of preliminary design complete before issuing requests for bids of proposal has a broad range from 15 percent to 50 percent, with an average of 27 percent.³ A study of SEP-14 design-build projects validated these early findings. An analysis of Federal-aid design-build projects is presented in Figure 5.1. The amount of design included in the RFP ranged from 0 to 85 percent, with the largest number of projects at 25 percent.

A statistically significant correlation also was found between agency satisfaction and the amount of design included in the RFP as discussed in Chapter 2. Agencies reported higher project satisfaction from design-build projects with lower levels of preliminary design (no more than 30 percent) completed prior to the design-build contract award. This could be attributed to a design-builder’s ability to influence the project design

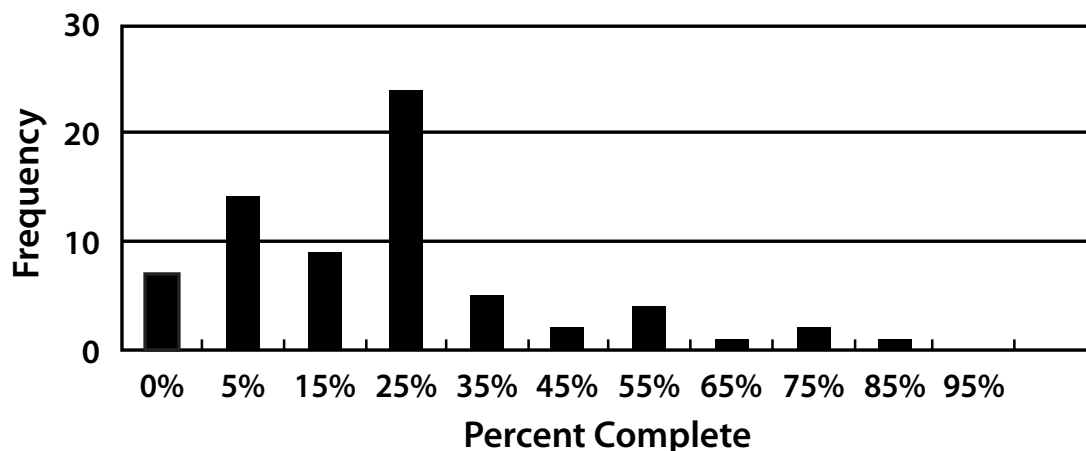


Figure 5.1 Percent of Design Complete in RFP

Source: University of Colorado study of SEP-14 design-build projects.

earlier in the process to promote its constructability and cost-effectiveness. However, the study's results are generally representative of industry-wide projects and are not true for all projects, so each project should be considered on an individual basis.

While the overall average percent design can be helpful in workload management and planning to write an RFP, agencies must be cautious not to apply the same percentage for each item in the design-build design criteria package. Agencies must examine each element of the project and determine how much design needs to be complete to convey the scope while not placing undue risk on the design-builder for design. The best RFPs will contain elements with no drawings or significant design as well as elements with 100 percent complete drawings. The goal is to convey the project's scope to the design-builder with the minimum level of design so that he may create an innovative design and be fully responsible for any errors and omissions in the end product. Providing too much design in the RFP may inhibit innovation. In addition, depending on the terms of the contract, too much design can create design liability for the agency, which in turn can result in changes, disputes, or litigation.

When deciding on the appropriate level of design, the agency should consider the following characteristics:

- Clarity of the project goals and scope
- Nature and complexity of the project
- Agency's ability to convey the scope through performance criteria
- Comfort level that the contracting agency has with outsourcing the design

Finally, agencies should consider one very important benefit of having the design-builder complete more design—the agency will not be responsible for any errors, omissions, or constructability issues with drawings that they have not designed. Experienced agencies have discovered that they should resist designing project elements unless there is only one technically acceptable solution.

5.2 Risk Identification

To understand how to carry out design on each design-build project, the agency should conduct a thorough risk analysis. The Project Management Institute's *A Guide to the Project Management Body of Knowledge* (PMBOK) has been an industry standard in risk analysis for the past decade and a number of state transportation agencies use this approach to develop their risk management plans.⁴ Table 5.1 shows risk identification techniques and related data based on the PMBOK and other sources.^{5, 6, 7, 8} The four categories are not necessarily listed in order of execution or priority. It should be noted that risk identification is an iterative process that requires continuous updating as new information becomes available.

Project examination—Project examination involves the review of project characteristics, stakeholders, physical surroundings, and community. The project goals are influenced

Table 5.1 Risk Identification

Risk Identification Technique	Related Data
Project examination	• Project goals • Project characteristics • Stakeholder characteristics
Document examination	• Preliminary design (scoping, environmental, or engineering) • Historic data • Preliminary test data • Project management plan
Personal experience and insight	• Brainstorming • Interviews
Risk categorization	• Organization of risks • Future reference database

by the risks. Clearly defining the goals can be helpful to the identification of the risk elements. A more detailed discussion of defining project goals is presented in Chapter 3.

The characteristics of the project, its stakeholders, and the environment are key information to risk identification. Different types of projects yield different magnitudes of consequences from risks. A project that involves heavy civil work, such as a tunnel, potentially bears geotechnical risks significant in number and magnitude. The characteristics of project environment, such as possible political, economical, social, and environmental factors that may impact the project, should be examined. Additionally, the characteristics of the stakeholders, including the design-builder (available design-builders in the market), financial investors, and surety may include level of experience, availability of qualified staff, or financial stability.

Document examination—Document review is a critical aspect of risk identification. The documents include available design, historic data, test data, and project management plans. Risk identification for project delivery must occur early in project development. Document examination should begin with a review of the most current design, whether that includes scoping documents, environmental documents, or preliminary engineering documents.

The historic data include risk documents such as the checklist presented in Table 5.2 and Appendix B or risk identification examples from similar projects. Although each project is unique, risk identification can begin through an examination of similar completed projects or historic risk management databases. Often a risk allocation matrix (See Section 5.4) and other products from past projects can be helpful. Some transportation departments provide a database and standard forms that have been tested and approved for future use.⁹

The data collected during the preliminary investigation of the project area, such as geotechnical reports, surveying report, etc., also may be used for risk identification. The test results can provide evidence that directly traces a possible risk. These reports can be often compared to past project reports for lessons learned.

The current project management plan will provide risk information regarding the overall project schedule, cost estimate, and human resources from the agency. A tightly scheduled or budgeted project, or one in which resources are constrained, has a higher probability of time delay and cost overrun.

Personal experience and insight—Naturally, document examination alone does not provide sufficient information for determining all possible risks. As supplements to document examination, personal experience and insight-based risk identification methods such as brainstorming among risk management team members and interviewing experts are appropriate tools. Experienced agency personnel or external experts can often provide comprehensive and efficient risk identification. Although their opinions can be subjective, their experience and judgment will be beneficial in the beginning of a project when little engineering data is available.

Brainstorming is perhaps the most widely used risk identification method.¹⁰ The brainstorming session is usually conducted among the risk management team members. Additionally, groups of external experts or contractors can help broaden the identification exercise and uncover risks that might otherwise be hidden to a particular group.

A facilitator is critical for a successful brainstorming meeting, but this individual need not be an expert in facilitation methods. The essential tasks for the facilitator include:

- Arranging and supervising the meeting
- Leading the discussion proficiently
- Encouraging critical thinking and active participation of other members
- Minimizing subjectivity and opinionating in discussion
- Recording and organizing identified risks

To ensure success, the brainstorming meeting should also include the following activities:

- Preplanning of the session
- Collecting and organizing documents, including indexing for efficient searching
- Examining documents thoroughly
- Sharing information among members
- Discussing topics openly
- Recording, updating, correcting, and supplementing the results

Interviewing is another widely used risk identification method. The risk team can consult experts to enhance the identification process and results. The risk management team should provide documents or brief the interviewee on the project goals and characteristics prior to the interview.

Risk categorizing—Appropriately categorizing risks has three primary purposes. The first is to enhance efficiency in the subsequent risk allocation process. The second is to help identify any previously omitted risks by tracking the missing piece in the organized

set of risks. When all of the risks previously identified are categorized and listed, omitted or overlapping risks become more apparent. The third is to create a historic database of risks that can be used in future design-build projects. Section 5.4 and Appendix B suggest an appropriate risk categorization matrix that also may be used for risk identification and risk allocation.

5.3 Discussion of Critical Design-Build Risk Elements

While a thorough risk analysis should be conducted on each project, there are some critical risks that agencies should examine on every design-build project. Design-build delivery inherently transfers the risk for most design errors and omissions in construction documents from the transportation agency to the design-builder. Design-build delivery also offers the opportunity to transfer other risks to the design-builder when appropriate. Risk for all or portions of items such as geotechnical investigations, utility relocations, and some environmental permitting can be allocated to the design-builder. However, the transfer of inappropriate risks may result in higher costs to the agency. The risks discussed below are often considered transferable risks when developing a design-build contract. These items correspond to the risk matrix presented in the Section 5.4.

5.3.1 Design Issues

In traditional design-bid-build delivery, the agency bears the entire responsibility and risk for any design-related issues. All responsibility for design decisions and conformance to standards rests with the agency. In design-build, several of these responsibilities shift to the design-builder. The agency is, at a minimum, still responsible for establishing the project goals, project scope, design criteria, performance measurements, and basic configuration of the project. As the designer of record, the design-builder has the risk for design errors and omissions. The accuracy of design, conformance with established standards, and constructability all rest with the design-builder.

5.3.2 Environmental Approval and Permitting

The National Environmental Policy Act/State Environmental Policy Act (NEPA/SEPA) process requires definition of major project features. In the design-bid-build process, the agency conducts the studies, prepares the documents, and applies for the appropriate clearances. Currently, the role of the agency does not change when using the design-build delivery method. FHWA has defined the approval of the environmental document (Environmental Assessment/Environmental Impact Statement) to be the point at which project authorization takes place for design-build projects.

Not all environmental permitting needs to remain the responsibility of the agency in design-build. After receiving official approval of the environmental document, a variety of permits for project impacts and construction activities need to be obtained. Many of these permits can be obtained solely by the design-builder or in conjunction with the agency. Some statutes refer to the “operator” as being responsible while others refer to the “owner” or “agency” as the responsible party. In the latter cases, the agency is

responsible for a violation even if the design-builder or its employees actually caused the violation. When the agency is required to be a permit applicant for elements of work controlled by the design-builder, the agency can require the design-builder to generate the required permit applications for review and processing. However, the overall responsibility for these impacts and timeline can rest with the design-builder, as the mitigation and timing requirements will be directly related to the design-builder's design. When it is not reasonable to assign the schedule risk to a design-builder, the agency might consider providing a guaranteed schedule to obtain a given permit.

5.3.3 Right-of-Way

On the majority of design-build projects, the transportation agency maintains responsibility for obtaining right-of-way. However, under certain circumstances, the agency may wish to transfer this activity or work together with the design-builder to obtain the right-of-way. The department typically delineates existing right-of-way and access as part of the base data collection. Right-of-way and access are potential high-risk areas that can significantly impact the project schedule both in project development by the agency and in contract execution by the design-builder. In some cases, it may be advantageous for the agency to delay purchasing a portion of the required right-of-way until the final footprint is created by the selected design-builder. This is important in areas with very high real estate costs where the agency wishes to minimize the amount of real estate purchased.

Under Federal statutes, as well as some State statutes, the agency's ability to acquire property in a timely manner is limited. Because transportation agencies are often in a better position to appraise, negotiate, and purchase right-of-way or relocate impacted facilities associated with a design-build project, these risks normally remain with the agency.

5.3.4 Local Agency, Utility, and Railroad Issues

The level of communication and coordination between the design-builder and local agencies, utility companies, and railroad companies will vary depending upon project conditions. As the design-builder is responsible for the actual design and construction, they can assume much more responsibility for this coordination in a design-build contract. However, the design-builder is in a contractual relationship with the agency, not these third parties. The local agencies, utility companies, and railroad companies will have a traditional relationship with the transportation agency, and the agency likely will have more influence in obtaining the required cooperation. For a successful project, the agency needs to have extensive preliminary and ongoing communication with outside entities as well as a strong ownership role throughout the contract. These items are discussed in more detail in Chapter 6.

5.3.5 Construction

As in traditional contracts, the contractor has responsibility for the actual construction. However, in a design-build environment, the agency no longer represents the designer.

Many of the traditional materials testing and inspection responsibilities transfer to the design-builder. Items such as surveying, spill prevention, and maintenance of traffic may shift entirely to the design-builder's responsibility. For a more detailed list of items involved in construction, see Appendix B.

5.3.6 Force Majeure/Acts of God

Agencies should consider risk allocation for force majeure events and Acts of God on a programmatic or project-specific basis. For traditional design-bid-build contracts, some agencies allocate such risks to the contractor. Such traditional risk allocation may be due, in part, to the typically smaller and shorter duration of an average highway construction contract. Issues an agency may want to consider include the size and anticipated duration of a project.

In most cases, force majeure events and Acts of God are beyond the control of either the agency or the design-builder. Since neither party can control such events, a balanced approach to risk sharing may include specific allowances for contract time extensions but no provisions for changes to the contract price.

5.3.7 Differing Site Conditions/Changed Conditions

Similar to force majeure events, agencies should consider risk allocation for differing site conditions/changed conditions on a programmatic or project-specific basis. Some agencies retain such risks for traditional design-bid-build contracts. Important considerations for such allocation of risks include the type and amount of site and subsurface information provided by the owner to the prospective design-builder, the ability of the design-builder to verify such information prior to submitting a bid or proposal, and the sufficiency of such information to support scope definition, schedule, and price submittals for the project.

Differing site conditions can be either (1) latent physical conditions or subsurface conditions discovered at the site that materially differ from conditions indicated in the contract documents, or (2) conditions that differ from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in the contract. Conditions indicated in item 1 that differ from the contract documents are sometimes referred to as Type I differing site conditions. Conditions indicated in item 2 that differ from what an experienced contractor would ordinarily expect to be present at a site are sometimes referred to as Type II.

The use of a Differing Site Conditions (DSC) clause in design-build contracts is beneficial to both the contracting agency and the design-builder. A DSC clause provides a means for the design-builder to receive compensation for cost incurred when coping with differing site conditions. For design-build projects, the contracting agency is providing the design-builder with technical information related to the project to reduce the contingency amount a design-builder must include in bids for uncertainties regarding site conditions. While this lowers the bid price, some risk is shifted from the design-builder to the contracting agency.

A DSC clause also provides a means for early resolution of potentially disruptive and costly delays when unexpected conditions are discovered. This is especially beneficial for design-build projects since the project is usually delivered on an accelerated schedule.

DSC claims by the design-builder must be reasonable and reported in a timely manner. The design-builder should conduct a thorough review of the information provided in the contract documents. It may not be practical to expect all potential proposers to perform an investigation of the site prior to bid. If differing site conditions are encountered after the contract is awarded, the design-builder must give prompt written notice to the contracting agency and provide such notice before the site has been substantially disturbed or altered. The time requirements for reporting differing site conditions should be stated in the contract documents. It is essential the differing site condition not be disturbed, to the extent reasonably possible, so the contracting agency can investigate the condition and determine what course of action can be taken to limit costly delays.

Some agencies, including the U.S. Army Corps of Engineers, use a contractual scope validation period. With such provisions, the agency retains the risks of differing site conditions/changed conditions until the design-builder has had appropriate opportunity to validate the information provided in the request for proposals and to further define the scope of the project. The risks of differing site conditions/changed conditions are then shifted to the design-builder following any such scope validation period. It is suggested that agencies conduct initial site investigations necessary to prepare an appropriate scope, schedule, and price estimate for the work.

5.3.8 Warranty

Ultimately, the final responsibility for and ownership of a project will transfer to the transportation agency. Due to the single source of responsibility with design-build, some agencies have asked for project or product warranties. The success of these warranties has varied. Warranties ultimately cost agencies money and it is often difficult to measure their true value. Additionally, if not carefully implemented, warranty requirements can cause problems for design professionals because the customary standard of care generally does not guarantee outcomes, nor does professional liability insurance cover expressed warranties. If warranties are used, the agency must be clear about which products and aspects of performance will be warranted. Before applying warranties to design-build projects, agencies are encouraged to develop and test warranty programs on traditional projects with their local industry so that all parties are comfortable with the implied risks.¹¹

5.4 Design-Build Project Risk Allocation Matrix

Agencies and consultants will find it useful to develop a checklist of design-build project risks in the form of a design-build project risk allocation matrix. The matrix is intended to be a template for risk identification and allocation. Once complete, all members of the RFQ and RFP development team can use it for their tasks. It is helpful for keeping all team members aligned as they write their portions of these documents. It provides clear direction when determining how far to carry design or when writing contract provisions.

Table 5.2 Example of Design-Build Project Risk Allocation Matrix

Risk	Design-Bid-Build		Design-Build	
	Agency	Contractor	Agency	Contractor
Design Issues				
Project scope definition	X		X	
Design criteria	X		X	
Geotech investigation—Initial borings on preliminary design	X		X	
Geotech investigation—Initial borings on proposal	X			X
Plan conformance with regulation/guide/RFP	X			X
Environmental				
NEPA/SEPA	X		X	
Permitting	X		X	
Right-of-Way				
Establishing right-of-way limits	X		X	
Acquire right-of-way	X		X	
Local Agency				
Identification of initial local agency impacts	X		X	
Establish final/actual local agency impacts	X			X
Modifications to existing local agency permits	X			X
Utility				
Establish initial utility locations/conditions	X		X	
Relocation of utilities under agreement during contract		X		X
Modified agreement with private utility based on final design	X			X
Railroad (RR)				
Obtain initial RR agreement based on preliminary design	X		X	
Coordination with RR under agreement	X			X
Public Relations				
Community relations	X		X	
Public safety		X		X
Construction				
Initial performance requirements	X		X	
Final construction/materials QA/QC Plan	X			X
Material quality		X		X
Construction quality and safety		X		X
Force Majeure				
Natural hazard (tornado, earthquake, etc.)	X		X	
Change in law	X		X	
Differing Site Conditions				
Changed and differing site conditions	X		X	
Warranty				
Long-term ownership/final responsibility	X		X	
Insurance		X		X

SHARED ALLOCATION			
Contractual responsibility items	Agency	Shared	DB
Local agency permits		✓	

INDIVIDUAL ALLOCATION		
Contractual responsibility items	Agency	DB
Obtain initial local agency permits	✓	
Modifications to existing local agency permits		✓

Figure 5.2 Risk Sharing Concept

Table 5.2 is an example of a design-build project risk allocation matrix. It is a generic table based on Washington State DOT's design-build project risk matrix,¹² which was developed in collaboration with their local chapters of the Associated General Contractors of America (AGC) and the American Council of Engineering Companies (ACEC). In addition to listing the various risk items, the matrix denotes the party that is commonly responsible for each risk. The complete Washington State DOT risk matrix is provided in Appendix B. Agencies using design-build are encouraged to develop their own template and modify it on a project-by-project basis.

Table 5.2 intentionally does not contain a category for shared risks. The concept of shared risk can be explored when authoring the contract and may be a good tool in reducing costs as engineering details become available. However, when using the design-build project risk allocation matrix at the project concept stage, every attempt should be made to clearly assign the responsibility to one party. Fundamentally, when using the risk allocation matrix, a risk should not be shared. Sharing risks should only be done in extreme circumstances as it may lead to confusion and disputes.

If a risk cannot be clearly assigned to the agency or the design-builder, the risk should be broken down into smaller components. An example of this concept is shown in Figure 5.2. The contracting agency may choose to shift the responsibility for some permits to the design-builder. The example shows the agency obtaining initial local agency permits and the design-builder taking the responsibility for modifications to the permits as design progresses. In the case of local agency permits, there are likely some permits that the design-builder regularly obtains in commercial construction and would be willing to take responsibility for those permits in their entirety. Breaking down local agency permits further than what is shown in the example may result in an even more defined allocation of risk.

5.5 Appropriate Risk-Allocation Strategies

The ultimate goal of risk allocation is to assign the risks to the party that is best able to manage them. Proper risk allocation will lead to lower costs and better achievement of the project goals. As a guide to risk allocation, this section introduces some essential risk allocation principles and techniques.

Allocation of risks to achieve project goals—When any party is responsible for a risk, it must be motivated to monitor the risk and apply preventative measures. Every attempt should be made to allocate risks in alignment with the project goals. For example, the agency may be willing to pay more for a design-builder to take the risk for utility relocation if achieving the shortest project schedule is a project priority. Design-builders will place a premium on accepting this risk since they cannot wholly control it, but they may be willing to accept it for a specified level of compensation.

Balancing the burden of risk—As previously stated, design-build delivery provides a temptation to assign many risks to design-builders that are traditionally the burden of the agency. In addition to inherent design-risks, agencies should examine risk for all or portions of items such as geotechnical investigations, utility relocations, and right-of-way and permit acquisitions. However, placing too much risk on the design-builder will raise the bid price, and the agency will end up paying more for the same end-product. At an extreme, too much burden on the design-builder can lead to forfeit or bankruptcy. Therefore, it is important to adequately distribute the risks among the parties and avoid the temptation to assign unneeded risks to the design-builder.

Allocation to the party with the highest degree of control—Holding uncontrollable risk causes a high-risk premium that may raise the bid price and diminish the positive efforts of avoidance measures. The ability to control the task and associated risk depends on the task assignment, level of experience, political regulation, industry custom, and timing of project participation. Typical examples are the allocation of permits and right-of-way acquisition. Although the contracting agency may choose to allocate these responsibilities to the design-builder, it is often prudent for the agency to retain such risks because the contracting agency is more experienced, has privilege/eminent domain, and can start the process before the selection of the design-builder.

Allocation to the party who is less vulnerable—The potential magnitude of loss is a primary factor in determining the price a design-builder must assign to accepting responsibility for a risk. The magnitude of loss is not a fixed value but can vary depending on the responsible stakeholder. Even identical values can lead to different magnitudes of loss for different stakeholders. Theoretically, parties with higher wealth have less utility on the same value, i.e., they are less susceptible to loss or gain and require less risk premium. Force majeure risks are a good example. Force majeure risks usually have a low probability of occurrence, but may cause significant loss to the responsible party. Therefore, the contracting agency, which is a representative of a government and has more wealth and therefore less utility on the same value, usually retains such risks. The contracting agency can still choose to shift the risks to the design-builder but at higher risk premium.

After the transportation agency determines which risks should be allocated to which parties, the process of authoring corresponding contract language to support this allocation can begin. The language in the RFP and design-build documents reflects the risks assigned in the design-build project risk allocation matrix. These documents serve to communicate the risks to the proposers and form the legal bounds of the contract.

Chapter 6 discusses methods to communicate project goals and project risks through the RFP evaluation plan. Chapter 7 provides direction about how to author contract provisions around many of the risks identified in this chapter.

Notes

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2. 23 CFR 636.
3. Molenaar, K. R., and D. D. Gransberg (2001). "Design-Builder Selection for Small Highway Projects." *Journal of Management in Engineering* 17, no. 4 (October 2001): 214–223.
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10. Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Project Management Institute, Newtown Square, PA, 2001.
11. For more information on warranty programs, see Anderson, S. D. and J. S. Russell, *National Cooperative Highway Research Report 451: Guidelines for Warranty, Multi-Parameter, and Best Value Contracting*. NCHRP, Transportation Research Board, Washington, DC, 2001.
12. Washington State Department of Transportation. *Guidebook for Design-Build Highway Project Development*. Washington State Department of Transportation, Olympia, WA, June 2004 (revised February 2006). This web-based guidebook is available for viewing at <http://www.wsdot.wa.gov/Projects/delivery/designbuild/>.

CHAPTER 6

Evaluation Planning and Award

The surge in use of design-build project delivery for public works projects has promulgated a number of methodologies for proposal evaluation. Public design-build procurements require a fair and equitable system to allow an agency a logical method to establish which proposal has the highest probability of successfully completing the project at the most favorable overall cost. Inherent to the success of this system is a highly developed, well-defined evaluation plan that can quantify many of the qualitative aspects of each proposal. Thus, this chapter will identify the component elements of a comprehensive evaluation plan and demonstrate the various methods in use to develop quantitative scoring systems that lead to a fair and equitable award.

6.1 Evaluation Plan Transparency

It is imperative for all parties involved in a design-build project that the evaluation plan be fair, equitable, and transparent. In this Guide, the term “transparent” is used to describe an evaluation process designed so that the proposers will precisely know how the winning proposal will be selected and use that knowledge to enhance their proposals in a manner that is responsive to project-specific requirements as well as agency technical preferences. The following list of recommendations¹ articulates the importance of clearly communicating the method for selecting the winning proposal that will, in turn, help to avoid a bid protest:

- Select design-build teams based on a two-step process where a limited number of design-builders [are] short-listed
- Clearly state the evaluation criteria and weight given for each item and ensure that the evaluation team uses them
- Clearly state the requirements of the RFP including what will be considered a non-responsive proposal
- Do not seek from design-builders the number or dollar amount of changes on past projects constructed by them
- Give equal opportunity in the second stage for each short-listed team to converse with representatives of the public agency’s evaluation team to clarify their proposal and any of the requirements of the RFP
- Provide candid feedback and a stipend to unsuccessful proposers.

This list is based on several cases where the award was successfully protested because the evaluation plan was unclear and overly subjective. Award protests and their subsequent project delays are avoidable if the agency invests the upfront resources necessary to