Pertti Lahdenperä

Design-Build Procedures

Introduction, illustration and comparison of U.S. modes

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Pertti Lahdenperä
VTT Building and Transport

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ABSTRACT

Design-build is a project delivery system where one party, the design-builder, is responsible for both the design and construction of a project under a single agreement. This book sheds light on the design-build practice as applied in building construction in the United States, where the system's popularity has increased dramatically.

The report divides into two parts. The first part provides a general introduction of design-build and outlines some of its key characteristics and related practical considerations. It also defines design-build in relation to other project delivery systems. Some comparative studies on project delivery methods are also summarized in order to illuminate the talked up superiority of design-build over the other methods.

The second part constitutes the main portion of the book by presenting the various procedures that are part of design-build. It focuses on six different aspects of design-build: the design-builder selection process, the design practice and related division of labor, proposal evaluation and comparison methods, pricing and incentive systems, organization of the design-build entity, and distinction between the construction of shell and core and interior systems. Thus, the presented issues are mostly related to the interfaces between the owner and the design-builder.

Design-build is not, however, just a rigid procedure for carrying a project through which is the key reason for writing this book. There are many alternative operational modes and procedures. Therefore, the book deals with these alternatives by examining design-build practices from one standpoint at a time. Each previously listed aspect is dealt with by introducing modes that are, at least to some extent, alternatives. Each presentation of an alternative emphasizes its mode, advantages and weaknesses, and applicability. For instance, the design-builder selection process is such a standpoint providing various options for operations. Similarly, design-builder selection can be based on qualifications or it may follow a two-stage process involving design proposals, etc.

The applicability of various procedures, naturally, depends on the complexity, size and scale of the project as well as the objectives, experience and available resources of the owner, etc. These issues are also discussed in connection with each procedure. The same structure has been used for all alternative procedures independent of the aspect in order to maintain the illustrative and comparative format. In addition to alternative procedures proper, around forty thematic boxes have been included in order to inform the reader about some key issues and examples related to the design-build practice in general. These are called "nutshells" and "mini-cases", respectively.

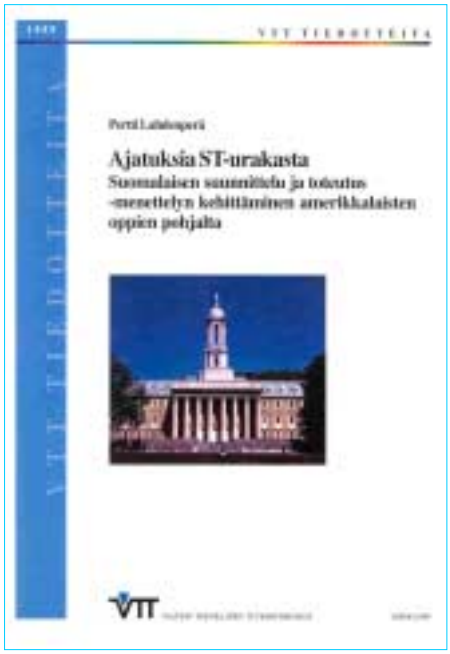
FOREWORD

This report presents the various procedures that are part of design-build in building construction in the United States. The aim has been to describe different procedures by an easily embraceable standard format in order to communicate the many possibilities of design-build. This has, after all, been a subject area that has not been properly covered.

There are excellent detailed reviews of design-build as well as basic works – guides and manuals – which provide precise instructions and descriptions concerning procedures and nuances. Yet, these books are so detailed that they do not actually serve popular study of the principles of this project delivery method. On the other hand, design-build is treated in outline in works that deal with and compare different project delivery methods and, at best, arouse interest for design-build without explaining what the method means in practical terms.

Thus, we are left with the problem of finding a concise book on the principles of design-build which nevertheless has more to give than works presenting a general outline of various project delivery methods. This report attempts to tackle that problem.

The goal-setting behind this report may best be characterized by how it came to be written. The starting point of the work was to look at the procedures used in U.S. design-build projects through the eyes of an outsider and to determine what could be learned from them for use in other countries. This report is a summary of the first phase of the work where procedures were described to client companies in many different ways. In the second phase of the work, the need and possibilities of using the presented operational models in Finland were evaluated and reported separately.(*



The study was launched and financed by Finnish enterprises: Rautaruukki, Seicon, Skanska Finland and YIT Construction. Substantial funding was also provided by the National Technology Agency (Tekes); this work is part of its ProBuild technology program. The work was done by yours truly representing VTT Building Technology, which is a branch of the Technical Research Centre of Finland (VTT).

(* Lahdenperä, P. (1999) Ajatuksia ST-urakasta. Suomalaisen suunnittelu ja toteutus-menettelyn kehittäminen amerikkalaisten oppien pohjalta. [Thoughts on DB. Development of Finnish Design-Build on the basis of U.S. experiences.] Espoo, FI: Technical Research Centre of Finland (VTT). VTT Research Notes 1988. 40 p. + app. 2 p. (in Finnish)

The study was launched in the autumn of 1997 followed by my stint of a good year as a Visiting Research Scholar at Pennsylvania State University, Department of Architectural Engineering. In addition to the literature, dozens of company visits also played a central role in the data acquisition required by the report. Moreover, the work involved numerous days spent at conferences and seminars – some of which were prepared particularly for our Finnish delegations. A large number of U.S. experts have thus participated in the effort through presentations, interviews, discussions and by supplying material. They include the persons listed below under Acknowledgements, with their employers at the time.

I wish to express my thanks to all of them for their assistance and good cooperation as well as to all other above-mentioned parties whose contributions made my work possible.

Tampere, October 2000

Pertti Lahdenperä

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ABBREVIATIONS

ACEC American Consulting Engineers Council

AGC Associated General Contractors of America

AE Architect-Engineer

AIA American Institute of Architects

ASCE American Society of Civil Engineers

ASID American Society of Interior Designers

BAFO Best and Final Offer

CM Construction Management

CO Certificate of occupancy

CSI Construction Specifications Institute

DB Design-Build

DBB Design-Bid-Build

DBE Disadvantaged Business Enterprise

DBFO Design-Build-Finance-Operate

DBIA Design-Build Institute of America

DDB Develop-Design-Build

EJCDC Engineers Joint Contract Documents Committee

FF&E Furniture, Furnishing and Equipment

FIDIC International Federation of Consulting Engineers

FO Fit Out

GMAX *see GMP*

GMP Guaranteed Maximum Price

HVAC Heating, Ventilation and Air Conditioning

JV Joint Venture

LCC Life Cycle Cost

LLC Limited Liability Company

LLP Limited Liability Partnership

MBE Minority Business Enterprise

NSPE National Society of Professional Engineers

OB Open Building

RFP Request for Proposal

RFQ Request for Qualification

WBE Women's Business Enterprise

Part I:
Preparation

This part introduces the book by outlining its aim, scope and structure. It also explains why design-build is worth examining, and how it differs from other project delivery systems. This is done by focussing on differences in both organizations and performance according to time, cost and quality metrics. Moreover, the text brings out the likely benefits and caveats in the use of design-build.

1. INTRODUCTION

1.1 Starting point

The built environment forms a large share of the national wealth of an industrialized country. Its construction, repair and maintenance constitute a significant part of the GDP. Thus, it matters how efficiently the construction sector works for the common good. On the other hand, the profitability of the industry at the macro level is a reflection of the operational models used in individual building projects. All projects are launched after serious planning, and they have a big influence on their clients operations, finances and/or well-being. Therefore, the efficiency of a project's implementation and effectiveness of its outcome are of extreme importance for all clients, whether investors or occupants.

Good project performance is the result of various factors. There is no single factor that can guarantee success. However, it can be argued that the organizational framework of a building project is one of the most important factors contributing to successful realization of a project since it creates conditions and gives incentives for profitability.

There are, naturally, many alternative ways to organize a project. During the last few decades, the so-called design-bid-build system has dominated. There, the owner hires a designer and solicits bids from contractors to perform the work on the basis of complete design documents made by the designer. Another main option is the construction management system where a separate project management organization, either a consultant or a cost risk-bearing contractor, manages the overall project and implementation is generally realized through numerous partial contracts. According to the roughest categorization, the third option is design-build, where the owner signs a single contract for the design and construction of the building or facility. Therefore, it differs from the above-mentioned alternatives where design and construction are bought from separate parties which is an effective way to split up the project.

Design-build is an old method of construction. The master builders of old operated as integrated service providers as to design and construction. The past century was, however, dominated by the use of other systems due to the emphasis on competitive bidding, for instance. Recently, the situation has changed and the popularity of design-build has increased dramatically. It is used more and more in all kinds of construction and its future looks very promising. The superiority of design-build over the other project delivery systems has also been proven by research.

The change is grounded in the fact that methods which consider the clients needs and competitive procedures, especially, have been developed in a direction that enhances cooperation and makes it easier to apply design-build in a profitable way. Therefore, it is

possible to think in terms of meeting the needs of clients and competing on the value provided to the client. Procedures related to traditional practice based on the minimization of resources, such as selection of implementers solely on the basis of price, do not support this goal sufficiently.

The development of the project procedures and the changes in the market give us good reason to focus more closely on the secrets of the design-build system.

1.2 Aim and scope of the review

This book aims to shed light on the design-build practice as applied in the United States of America. Design-build is not, however, just one rigid procedure for carrying a project through. In fact, there are many alternative operational modes and procedures. Therefore, most of the book (*Part II)* deals with these alternatives by examining design-build practices from one standpoint at a time.

The design-builder selection process and the internal structure of a design-build entity are two such standpoints. These standpoints provide various options for operations. The design-builder may be, for instance, a contractor-led entity subcontracting the design, a joint venture or an integrated company providing both design and construction services. Similarly, design-builder selection can be based on qualifications or it may follow a two-stage process involving design proposals, etc. The book aims to shed light on these and many other related procedures, their pros and cons, and applicability in general. The presented issues are mostly related to the interfaces between the owner and the design-builder.

The application of design-build to an actual building project involves selection of alternatives from all presented standpoints or categories. Naturally, the appropriate combination may vary according to the complexity, size and scale of the project as well as the objectives, experience and available resources of the owner and many other constraints.

Great emphasis has been put on the introduction of the alternatives by employing a simple, illustrative and comparative format. The aim has been to remain as neutral as possible by not advocating one methodology over another. It is also important to notice that *Part II* does not compare the selected project delivery options comprehensively or universally. Instead, it discusses all options in relation to the other ones presented in this book. Since all included methods and procedures have already been selected on account of being design-build-related modes, the presented pros and cons also lack many features that should be included in order to describe them universally. For instance, the statements of *Part II* should not be considered to refer to traditional design-bid-build. In order to clarify these issues, *Part I* gives a more universal introduction to design-build as regards other project delivery systems.

As concerns design-build, it is a project delivery system where one party, the design-builder, is responsible for both the design and construction of a project under a single agreement. Correspondingly, the book supposes that both tasks are largely carried out by the design-build team, and it does not address design-build as a mere means of risk transfer. Moreover, the presentation also confines itself to design and construction while other possible services that can be included in design-build packages, such as development and facility operation activities, have not been actually examined. It is also assumed that there always is an owner, who outsources the work; speculative building is not examined.

1.3 Structure of the book

The book consists of two parts. *Part I* gives a general introduction of design-build. It defines design-build in relation to other project delivery systems and outlines some of its key characteristics and related practical considerations. Here, traditional design-bid-build serves as the standard method of project delivery against which the selected "family of methods" is compared whenever a benchmark is needed. This is due to the fact that the design-bid-build method has predominated for so long and is best known among the professionals of the building industry. Accordingly, the reader should be familiar with the method and the building project practice in general.

Part II forms the main portion of the book. It deals with various procedural alternatives of the design-build practice from one key standpoint at a time – as explained above. In addition to alternative procedures, some thematic boxes have been included in order to inform the reader about some key issues and examples related to design-build practice in general. These are called "nutshells" and "mini-cases", respectively. Like all other sections of the book, these boxes were formulated for easy recognition in order that the reader can quickly decide whether to skip them or stop to read.

2. PROJECT DELIVERY SYSTEMS

2.1 Introduction of the systems

The implementation of a building project involves the cooperation of many parties: the owner, various designers, contractors and suppliers. Consequently, there are numerous project delivery methods for establishing the division of labor between these parties, their contractual and operational relations, and the rules of the game in general.

According to the roughest division, there are three primary methods:

- Design-bid-build (DBB), where the client assumes responsibility for design and the contractor is involved only in construction, i.e. the "traditional method".
- Construction management (CM), where a separate management organization is involved in the supervision of design and carrying out of the construction activities.
- Design-build (DB), where a contractor under contract to the client is responsible for the project's design and implementation as an entity.

Table 1 explains the project delivery systems and their essential differences and variations in more detail.[1]

The project delivery system is a key factor in enabling successful implementation of a building project. The right method may help avoid problems and be the key to the attainment of project-specific special goals. These goals may include, for instance, quick project completion, low acquisition price, practical assignment of risk between the parties, and providing the owner the possibility to affect the details of the design solution and the amount of self-performed work, etc. Certain procurement methods are typically used for certain projects but there is also variation.

2.2 Comparison of the systems

Design-bid-build has been the project delivery system used the most during the last few decades. There, the owner is able to communicate his/her needs to the designer, and design is continued until the facility is accurately depicted, so that the owner can verify the compliance of the design solution with needs. This has given the owner full control over design details but has separated design from construction.

CM can provide a more cost-effective product to the owner than the traditional method of project delivery, especially in complex cases. This is due to better consideration of the construction aspect in design and extreme price-oriented competition. However, the

[1] For more information on the properties, divergence and applicability of various project delivery systems, see: Handbook on project delivery (1996); Dorsey (1997) AND Sanvido & Konchar (1999).

Table 1. Nutshell: Project delivery systems on the most general level.

Design-bid-build is a project delivery system where the owner contracts separately with a designer and constructor. First, the owner normally contracts with the architect/ engineering company for a full set of design documents. Then, based on these predescriptive drawings and specifications, the owner usually solicits fixed price bids from construction contractors to perform the work, and moreover, enters into a contract for the work. The main variations are:

- the one contractor system, and
- the multiple prime system.

The former is more common and frequently referred as the "traditional" system.

Construction management is a project delivery system where the owner also contracts separately with a designer and a construction entity, but typically nearly simultaneously. This primary construction entity provides leadership for the project and has significant input in the design process. There are two main variations:

- agency CM, where the construction entity does not take on financial risks for the execution of the actual construction, and
- at-risk CM, where the construction entity, after providing agency services during the pre-construction phase, takes on the financial risks for actual construction under a specified cost agreement.

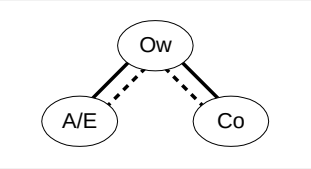
Design-build is a project delivery system where the owner contracts with a single entity to perform both design and construction under a single design-build contract, which offers the owner a single point of responsibility for design and construction services. Portions or all of the design and construction may be performed by a single design-build entity or subcontracted to other companies. From the owner's viewpoint the organizational variations include:

- design criteria design-build with a separate design criteria consultant, and
- direct design-build, where the design-builder typically has a larger role in planning.

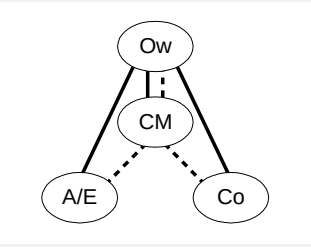
The latter, especially, may also cover services other than just design and construction, and is then called "design-build-plus".

Explanations for figures:

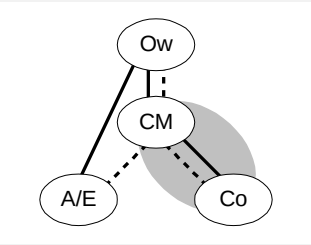
- Owner: ……Ow
- Designer: ……A/E
- Constructor(s): ……Co
- Design-build entity: …..…...……..DBe
- Team or integrated (likely): …..."Shaded"
- Contractual relation: ……..…..……..▬▬
- Operational relation: ……..…..…….▪▪▪▪



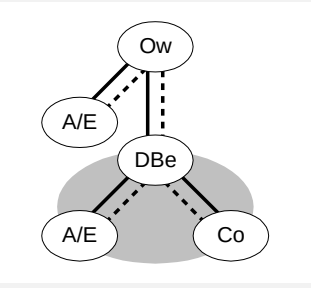
Design-bid-build



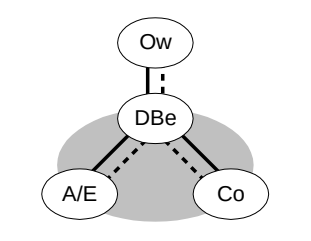
Agency Construction Management



At-Risk Construction Management



Design Criteria Design-Build



Direct Design-Build

fundamental relationships between the parties remain the same as in the traditional method because the design and construction functions are being performed by separate entities and the possibilities of cooperation are not fully utilized.

Design-build integrates design and construction and, moreover, offers the owner a single point of responsibility for the design and execution of the project. One of the drawbacks is that the owner loses control over many of the checks on design inherent in the traditional systems.

Design-build also offers interesting options for the owner who may not only receive design and construction services from a single entity but also lot acquisition, financing for the facility and maybe operation and maintenance services as part of the total package in accordance with "turnkey" principles.

2.3 Study results

When the profitability of different delivery systems has been studied, design-build has typically scored the highest marks. *Table 2* presents the result of one such study. It is obviously the most comprehensive and systematic one involving diversified projects as to facility type, size and location, etc. The study covers project delivery methods where the party responsible for the management of construction assumes, at least, the financial risks of the actual construction work. The covered methods are also the three most common project delivery methods employed in the US.

In another comparative study, 209 completed military construction projects were compared against such performance indicators as cost growth, schedule growth, contract modifications and design deficiencies.[2] The projects fell into four categories: traditional design-bid-build, partnering, design-build and a combination of the last two. According to the results, each alternative showed significantly better average performance than design-bid-build while partnering alone was not able to compete with design-build.

A third empirical analysis was made of the impact of design-build on various types of federal construction projects.[3] Twenty-seven design-build projects, mainly ones characterized as being of high complexity, were analyzed by comparing them to similar projects carried out according to the traditional design-bid-build method based on several factors: functionality, costs, and quality of design and workmanship, etc. In most respects, the results achieved with design-build were at least as good as those based on the traditional approach; in many respects the results were significantly better.

Despite the success of design-build in the comparative studies, it is important to note that this form of contracting is not right for everyone, or for every project, and its risks and rewards must be balanced case by case.

[2] Pocock & Liu (1996)
[3] Experiences of Federal Agencies… (1993)

Table 2. Nutshell: US project delivery systems compared.[4]

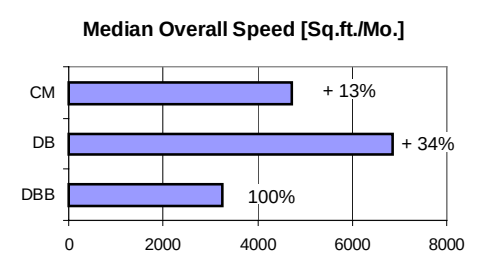
The most comprehensive comparative study on the US project delivery methods has been made at the Pennsylvania State University, commissioned by the Construction Industry Institute (CII). The study compared the three principal project delivery systems used:

- construction management at risk (CM)
- design-build (DB), and
- traditional design-bid-build (DBB).

The research was based on a statistical analysis of 351 building projects, focussing on the comparison of the cost, schedule and quality attributes of these different delivery systems. Speed and cost performance were analyzed on the basis of actualized data and quality attributes were based on the scores given by the project owners.

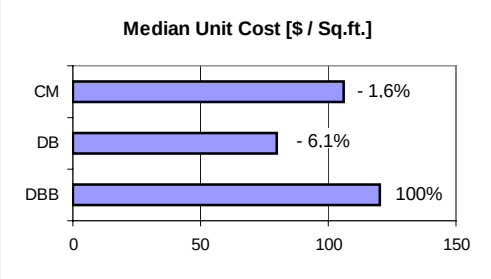
As regards speed and cost data, the bar charts below present the univariate results. The percentages, again, depict CM's and DB's minimum difference to DBB's performance when the impact of other possible variates was eliminated.

According to the study results, the overall time needed for the design and construction is significantly less in projects utilizing design-build compared to the other types. Median values for overall speed were:

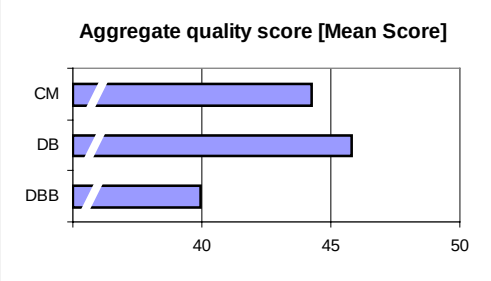


As regards the time required for actual construction, the results are parallel with those for overall speed, but the differences are smaller. In the case of design-bid-build, schedule growth also seems to be a bigger risk than for its alternatives.

Correspondingly, cost growth from contract cost to final cost was the largest in design-bid-build projects while it was slightly less in Construction Management and, especially, Design-Build. Total project costs per unit were the following:



Qualitative evaluations also supported the superiority of the design-build system. There were seven qualitative measures used and the aggregate scores were as follows:



Four of the qualitative metrics focussed on the functioning of various systems of the building. The division of systems was:

- Envelope, Roof, Structure & Foundations
- Interior Space & Layout
- Environment, and
- Process Equipment & Layout.

The three other qualitative metrics used were:

- Start Up
- Call Backs, and
- Operation & Maintenance.

Based on the valuation of quality, Construction management is vying with Design-Build almost evenly. Only according to the measure of operation and maintenance cost, was Design-Build superior. Design-Bid-Build, again, was put at a disadvantage by all the other quality measures except in operation and maintenance.

[4] Konchar (1997); also: Project Delivery Systems...(1997); Konchar & Sanvido (1998) AND Sanvido & Konchar (1999)

3. OUTLOOK FOR DESIGN-BUILD

3.1 Fundamentals

3.1.1 Definition of the system

Design-build is a project delivery system, where the owner contracts with a single design-build entity to perform both design and construction under a single agreement, and which, therefore, offers the owner a single point of responsibility for design and construction services.

The single point of responsibility is the most central and appealing aspect of design-build. It can be approached from the point of view of the liability for design. For example, under traditional contracts, it is the owner who warrants to the construction contractor that the drawings and specifications are complete and free from error – the A/E cannot be made responsible for design defects (under the existing standard of care) unless gross negligence is proven. The contractor, again, is only responsible for strictly implementing what is described in the drawings and specifications.

By contrast, in design-build the contractor warrants to the owner that the design documents are complete and free from error and, in case of a problem, there is no need for the owner to find out whether the designer or the constructor caused it. Correspondingly, any costs and delays related to design errors or omissions are absorbed by the design-builder while in the traditional system they are the responsibility of the owner. Besides, if the contract is based on performance specifications, the system makes the design-builder responsible for the functioning of the facility (or the compliance of the completed facility with the functional requirements).

Accordingly, design-build reduces the number of key actors compared to other project delivery systems. While other types typically involve at least three major actors, design-build is more likely to involve two. That helps avoid many of the conflicts that arise between separate design and construction firms – as stated above – and makes it possible to streamline the process in many ways. Integration of design and construction enables consideration of both aspects concurrently in the early process which makes the process more profitable as discovered in the previous chapter.

3.1.2 Allocation of risk

While the allocation of risk for design errors and omissions is established already in the definition of design-build, there are many other risks that have heretofore been borne by

owners under the traditional form of project delivery. The risks may also be reassigned or shared by the owner and design-builder. From the viewpoint of cost, schedule and quality performance aspects, it is appropriate to assign individual risk to the party best able to handle and minimize that risk taking into account the unique circumstances of the project. Risk assignment decisions are usually based on a cost-benefit analysis, with some risks handled by obtaining insurance or through other third party risk management techniques. For each risk that the owner hands over to the design-builder, there will be a corresponding cost. In some cases, the costs are covered by contingencies built into the contract price; in other cases, there is a gain (or loss) in control by one of the parties.[5]

Appropriate risk allocation is up to the project and parties, and therefore, the parties should consider it case by case. Table 3 sheds light on a typical case of allocation of risks in design-build for an entire project by using traditional design-bid-build as a benchmark. As can be noted from the table, the design-builder is not necessarily in the best position to control or manage risk related to unforeseen site conditions, hazardous materials, governmental interference and “force majeure” events.

3.1.3 Scope of services

Another situation in relation to risks may occur if the owner intends to extend the scope of services purchased from the design-builder beyond conventional design and construction. In the context of a "turnkey" model, where the design-builder carries out all the duties from the owner's initial ideas to completed facility, it would be rather artificial and against the model's objectives to transfer any particular "second tier" construction-phase risk to the owner.

Design-build in particular, offers the possibility of a wider scope of services according to the single point of responsibility. These forms of operation are often referred to as "design-build-plus" methods since there delivery may include site acquisition, project financing, operation or maintenance for the facility, etc. in addition to the more customary design and construction.[6] The design-builder may, for instance, be made responsible for the operation of the completed facility in order to debug the facility or to drive the party to design excellence from the viewpoint of operability.

As far as financing is concerned, the possibilities are manifold. Instead of a more conventional stepwise system of payments, the owner may pay everything at once at the end of the project which puts the design-builder in charge of interim financing of the project. Another customary option is the lease-purchase arrangement where the prospective owner occupying the building pays rent until the ownership is transferred to him at an agreed price a few years later. All in all, "design-build-plus" offers many options while these issues widen the subject area and, thus, they have been mainly left out of this book which focuses on actual design and construction operations.

[5] Design-Build Dateline, vol. 2, no 4 (July–August 1995), p. 4.
[6] Especially in infrastructure projects, numerous abbreviations are used in reference to various design-build-plus types: BOT, BOOT, BOO, BTO, BRT, BOOST, DBFO [Levy (1996)]. Abbreviations are based on initials of words Build, Finance, Own, Operate, Rent, Subsidize and Transfer, and the modes have different meanings, respectively.

Table 3. Nutshell: Comparing risk allocation in design-build and design-bid-build.[7]

	Design-Bid-Build			Design-Build		
Risk / Responsibility Category	O	D	C	O	DB	C = Constructor, D = Designer, DB = Design-builder, O = Owner
Design Reviews	●			1)	●	1) Reviews of compliance with design criteria
Differences Between Design Criteria and 100% Design	●				●	
Errors or Omissions Revealed During Construction	●	2)			●	2) Only if negligent
Project Site Safety			●		●	
Constructibility of Design; Establishment of Project Cost; Redesign if Over Budget	●				●	3) Obtains overall approvals 4) Obtains most permits
Coordination of Construction			●		●	5) Limited to major approvals
Permits and Approvals	3)		4)	5)	6)	6) Obtains most approvals or permits
Environmental Impact Review	●			7)	7)	7) Negotiable
Coordination with Other Work	●		8)		●	8) Coordinates subcontractors only
Quality Control and Quality Assurance	9)		10)	11)	●	9) Significant inspection and testing 10) Responsible for quality of workmanship 11) Oversight only
Differing Subsurface Conditions	●		12)	13)	14)	12) Responsible for conditions inherent in type of work 13) Negotiable, responsible for information given 14) Negotiable, but typically responsible for most conditions
Design Defects	●	15)			●	15) Only if negligent
Construction Defects			●		●	16) May be responsible for some
Strikes or Labor Disputes; Weather Conditions	16)		16)		17)	17) Usually, but negotiable 18) May be responsible for some
Catastrophes: Fire, Flood, Earthquake	18)		18)	19)	20)	19) Negotiable 20) Usually, but negotiable
Unidentified Utilities Affecting Site	●				●	21) Negotiable 22) Negotiable, but may not be cost-effective for owner to shift
Inflation			●	21)	21)	
Hazardous Waste; Environmental Clean-up or Encapsulation	●			●	22)	23) Typically responsible for materials & workmanship for 1 year
Third Party Litigation	●			●		24) Negotiable
Warranty for Facility Performance	●		23)	24)	25)	25) Supplying design & product; performance warranties negotiable

[7] Modified from: Design-Build Dateline, vol. 2, no 4 (July–August 1995), p. 5.

3.2 Characteristics

3.2.1 General

As already stated, design-build offers some benefits over the other project delivery methods. This section deals with advantages that can be normally gained. On the other hand, Section 3.3 below focuses on issues, which are also relevant when the owner selects a method for a project and may also make owners less interested in using design-build.

3.2.2 Competitive quality

The single-point responsibility inherent in the design-build process is a powerful quality motivator. Because the design-builder is solely responsible for the completed product and cannot shift responsibility for defects to another party, it is motivated to emphasize quality throughout the design and construction process. While traditional delivery often relies upon restrictive contract language, audit and inspection, and the legal system to ensure project quality, design-build relies upon proactive, internal, self-policing quality assurance of the highest order.[8]

The design-builder is compelled to particular alertness, since the owner's expectations are, typically, articulated in performance terms, and the design-builder is held comprehensively responsible for meeting them. This makes the design-builder solely responsible for quality and performance of the completed product. An additional incentive for quality is created by the fact that the quality produced in a project is a means to make oneself competitive in forthcoming projects as references and satisfied customers are one of the key means of competition in design-build. This is contrary to, for instance, the traditional method where price is too often critical and does not motivate to produce good service and/or quality, but just to work in accordance with the minimum requirements of project specifications. The design-build method, and the subsequent integration of design and construction, are also the only realistic way to longer than normal warranties or to performance warranties that actually guarantee the operation of the completed project for a period of time (see Table 4). Whenever used, these are also incentives for and clear manifestations of good quality.

3.2.3 Short duration

In many cases, fast delivery has been the most important motivator for the owner to select design-build.[9] Fast completion may be critical for many businesses. A short time span between the investment decision and occupancy is usually a benefit and may increase income. At the minimum, it diminishes the costs of construction time financing.

[8] Design-Build Manual of Practice (2000), Document Number 303, p. 5.
[9] Songer & Molenaar (1996)

Table 4. Nutshell: Different types of warranties.[10]

In construction contracts it is customary for the actor to warrant that certain minimum levels of quality will be attained. Sometimes these warranties are linked to the overall performance of the facility.

Performance warranties

Quantifiable warranties of performance given by the contractor guarantee that the finished facility will meet certain standards of performance which, depending on the nature of the facility, may be measured in widgets produced per hour, minimum temperature differentials, kilowatt hours, etc. The warranty may guarantee:

- the actual performance of the facility while in use for some period of time, or
- successful passing of a performance test when the plant is mechanically complete which is designed to simulate or predict the actual performance of the facility.

There are two significant differences between these two types of warranties:

- A warranty of actual performance depends on the actual operation of the facility, a concern that is ordinarily not present in a performance test warranty.
- An actual performance warranty extends for a fixed and agreed period of time after completion, whereas a performance test warranty does not have this element of duration.

Thus, guaranteeing of actual performance may be complicated. There are numerous other uncontrollable factors that cause the risk of substandard performance of the facility to increase with time. It may also be necessary for the performance warranty to be conditional. For instance, the feedstock for the facility must be within certain parameters or the condition may concern important equipment being supplied by the owner or outside the contractor's control.

Qualitative warranties

In traditional project delivery the warranties are qualitative. They guarantee that:

- all material, equipment, etc. supplied are new, of suitable grade, free from defects, and fit for their intended purposes
- non-professional services provided are performed in a good and workmanlike manner in accordance with contract documents, regulation, etc., and
- professional services, like engineering, are provided in accordance with the terms of contract, etc. and conform to the standard of care required of similarly situated professionals performing similar services.

Distinction

There are some differences in the scope between the mentioned warranties:

- Qualitative warranties apply to issues not directly affecting performance of the facility. The flooring or roofing systems might not be directly important to the operation of a plant, and therefore would be warranted only under the general, unquantifiable warranties covering the quality of the materials and services provided.
- Latent defects, or items of construction which were defective when installed but whose defective nature and consequences did not become apparent until after the passage of a period of time, may not be covered under a quantifiable warranty of plant performance. Qualitative warranties cover such latent defects.

Thus, the owner needs to have a qualitative warranty despite the existence of a performance warranty:

- A performance warranty guarantees plant performance without fault – even if the reason for the facility's failure to perform properly cannot be traced back to any defects – but it is of rather limited duration.
- The qualitative warranty protects against plant failure due to fault – it applies only if the contractor's equipment/materials or services were defective – but there is no limit on the time (other than any applicable statue of limitations) during which it can be enforced.

[10] Summarized from: Friedlander, M. Time Limitations on Warranties of Quality in EPC and Design-Build Contracts: The Owner's Perspective. In: Professional Design-Build: A National Conference for Owners and Practitioners (1995).

In design-build, the overlapping of design and construction (preparation) phases and compressing of the competition stage often shorten the overall time needed for the realization of the project significantly, although there are differences between the various procedures within the design-build concept as well. The team approach and good communication, elimination of redesign, and good construction preparation and starting of material acquisition before completing the construction documents make it possible also to accelerate actual construction (e.g. Table 5). Fast completion is not, however, the only speed-related benefit offered by design-build. The date for substantial completion of the project can also be fixed earlier in the process in design-build than in other alternative project delivery systems.

3.2.4 Favorable costs

The team approach allows the accumulation of multi-faceted know-how needed for contemplating the project from various viewpoints and, moreover, for optimizing the solution. Especially the involvement of the construction party in design development enables consideration of production aspects in building design. While the method ensures better constructibility and better knowledge of the cost effects of design decisions, it also diminishes redesigning and streamlines the subsequent process and reduces the related uncertainty, which also means lower costs for the owner. Another key factor is the possibility given the construction party to select between equal materials and components. Thus, the design-builder is able to order from its regular partners and utilize the negotiated open policies.

Another critical cost-related issue is how early in the process does the owner get to know the firm costs of the project. In design-build guaranteed construction costs are typically known much earlier than in other methods, which diminishes the owner's risks and uncertainty. Thus, the owner is able to decide early on whether to continue with the project in its current form. The owner also avoids the risk of increased costs due to later redesign or change of concept and the resulting delay in the process.

3.2.5 Smooth execution

In a traditional construction project, one of the owner’s major problems is to determine whether the architect or the contractor is responsible for project failure. Usually, both the contractor and the architect/engineer claim that the project’s failure was caused by the other party. In a design-build project, however, the owner is protected because the design-builder is liable to the owner for any default in contract performance caused by either the contractor or the architect/engineer, including any failure in design or construction quality.[11] Even if there are no major failures, both the designer and the constructor may have factored arbitration and redesigning into their prices, which, on the other hand, tends to increase costs with the traditional method.

[11] Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), p. 122

Table 5. Mini-case: Teaming for success.

Vitesse Semiconductor Corporation is a leader in high performance integrated circuit solutions. In 1996, the firm turned to the construction industry for a state-of-the-art wafer fabrication facility to meet its rapidly growing manufacturing needs. In due course, the company had a two storey 110,000 sq.ft. facility with 15,000 sq.ft. of class 1 cleanroom, offices, etc. in Colorado Springs, CO.

Vitesse first approached an engineering firm. After programming and the definition of performance criteria by the firm, Vitesse requested design-build proposals via two-stage selection.

Teaming in advance

M.A. Mortenson Company was one of the few competitors due to the extremely severe price limit set by the owner. To win the competition, the Mortenson's Advanced Technology Group involved the needed expertise in advance and selected recognised partners, with whom it had also worked previously, to join the design-build team:

- Symmes, Maini & McKee Associates for architectural and engineering services
- Egan-McKay Electric for electrical work
- Fullman Company for process piping and wet/dry side piping work
- General Sheet Metal for the sheet metal/fantowers/AHU work, and
- Johnson Controls for control work.

Due to the inclusion of multi-faceted expertise early in the process, the team was able to get an award and develop preparedness to meet any forthcoming challenge in the stream of the project.

Project challenges

Since the project involved a special purpose facility, it was subject to strict manufacturing specifications. It was made especially challenging by the following features:

- The owner wanted to pay significantly less for his wafer plant than what other semiconductor manufacturers were paying for their facilities. The budget requirement meant that the completed facility could cost no more than $22,500,000. The cost of designing, installing and hooking up of the initial set of the owner's process tools costs an additional $2,500,000.
- The start of construction was delayed 1½ months due to the owner but, yet, he required that the date for cleanroom certification and delivery of the first process tool remain unchanged. This meant that the design-builder now had to complete the cleanroom and have it certified in 8 months rather than 9½ months. This changed the foundation system totally as well as concreting and required also other rescheduling.
- When site work was already proceeding at good speed, the owner decided that his growing business called for an increase in the number of process tools in the initial tool set. This was a substantial change increasing the cleanroom size by 33%, process tool quantity by 33% and enlarging many of the primary mechanical, electrical and process systems. Another $3,000,000 in new work was available but no changes were made in the schedule.

Conclusions

The used process provided a designed and constructed facility in 12 months. Through the inherent flexibility of single source design-build, the team was able to absorb the changes during the process. Also, the price was much more affordable than the industry pays for its facilities under the traditional delivery methods

Yet, the design-builder met every one of the owner's tough requirements, and the design-builder made no change order interpretations. Moreover, the project was a financial success also for the design-builder.

The key element of the success was the early assembly of a versatile design-build team for the project. The cooperation of the expert team members, and the possibility to analyse the reciprocal effects of any solution, were critical integration of design and cost information and the value engineering approach playing a big part. All in all, the project gives an example of how teaming in advance provides the owner a highly advantageous facility solution.

Since the design-builder is responsible for execution within the set quality, budget and schedule constraints, conflicts between design and construction are the design-builder's problem. Therefore, there is potential for the owner's diminished administrative burden after entering into an agreement with a design-builder. No longer does he have to worry about the coordination and arbitration between the designer and builder. All in all, dramatic decreases in claims have been reported by owners changing over from the traditional method to design-build.

3.2.6 Best value

Design-build allows the owner to extend competition far beyond the limits of the traditional approach which focuses merely on the price of construction. While price-only competition does not promote the creation of cooperative attitudes among the actors of the project, it also disregards many of the possibilities that are available (cf., e.g. Table 6). Firstly, the emphasis on the design-builders' project-specific qualification is a key issue in design-build intended to create preconditions for a successful project although the practice is not actually unknown in other systems, either.

Even more important is the competition based on the design-build teams' technical proposals, which meet the client's performance criteria and are the results of product development and the cooperation networks they have created. Invitation of competitive bids from several implementers gives better opportunities for searching and evaluating alternative design solutions and their later implementation in a highly versatile and innovative fashion compared to the possibilities of a single designer employed by the owner. Thereby, firms are also motivated to develop production technology and the product as an entity. Further, evolving technical solutions make possible, or are results of different and more efficient process-related innovations. This makes it appropriate to seize the process-related improvements in competion, construction time being the most usual example.

All in all, the preconditions for a more advantageous solution, an optimal relationship between price and quality, improves. The owner is able to select a proposal that reflects the greatest value for him/her and not simply the lowest initial cost. Moreover, design-build is a practical way of extending the services of the supplier – it is usual to add services like lot acquisition even into competitive contracts when design is a responsibility of the constructor. Interim financing, lease-purchase and the design-build-operate method are examples of other extended services coupled with design and construction for the owner's benefit whenever he considers it appropriate.

Table 6. Mini-case: Striving for customer satisfaction.[12]

Ciba Specialty Chemicals Corporation, to wit its Additives Division decided to consolidate operations into Tarrytown, NY which required building a new state-of-the-art laboratory facility.

The majority of the professionals intended to occupy the new facility were working in the Research Department. Since the company considered research a cornerstone of its success, it had to produce a facility, which would make the users happy and productive.

Therefore, the challenge was to design and build a laboratory and office complex, under stringent time and cost pressures, without compromising the interests of the managers, scientists, etc. who would occupy the facility.

The solution

HLW International was engaged to carry out the programming and schematic design, and Skanska Sordoni was selected as the constructing party. Subsequently, contractual responsibility for the architect was shifted to the contractor and, together, they formed a design-build entity offering a single point of responsibility to the owner.

The preliminary engineering phase was carried out on a cost reimbursement basis. The stage was to result in design detailed enough for a definitive cost estimate, which would be the basis for a guaranteed maximum price (GMP) for the remainder of the project.

Then, the contract proper was concluded. However, in order to maintain the objective of customer orientation, a special incentive system was developed. The parties to the design-build team agreed to have their "fee at risk" compensation based not only on cost and schedule performance, but on the satisfaction of the end users of the facility as well (see Table 41 on page 113).

User engagement

The lab team leaders from the owner's side and the design-builder had the duty – and a real hunger – to engage the end users in the project process throughout the programming, design, construction, and relocation process.

This involved developing the design and layouts together with various lab teams. This highly interactive process saved time on potential redesign since solutions were reviewed directly with the end-users. The other means applied included:

- Floor plans, perspective renderings and other 3-D representations were presented to the users in order to help them clearly understand the design, and for comments.
- The designers met with each laboratory user to review lab casework and equipment connection requirements for the building.
- The builders maintained a project display board in the old building that was updated biweekly to keep the users informed about the building progress.
- Lab employees were shown different types of environmental conditions (e.g. background noise) while the feedback functioned as a guideline for design.
- A full-scale mock-up laboratory was completed to demonstrate what the final product would look and feel like and, therefore, to ascertain its compliance with the users' needs.
- A month before move-in date the occupants were invited to tour the facility for final acceptance and to identify any issues that had to be addressed.

The result

The project team delivered a laboratory facility very successfully in terms of time, cost and quality. Everyone – the owner, designer and constructor – benefited.

The core of the solution was the used incentive arrangement and the organisational structure it requires. Together they constitute a formula that promotes team-building and customer-satisfaction.

[12] Partial source: The Martin Dexter Laboratory. Ciba Specialty Chemicals Corporation, Additives Division. 22 p.

3.3 Special considerations

3.3.1 General

For the design-build method of project delivery to function, the owner must have a clear idea of what he wants. This point and other things to consider when using design-build are dealt with in this section.

3.3.2 Needs definition

An invariable prerequisite of design-build competition is that the owner's needs are described precisely, and in a manner that can be interpreted and understood universally. The necessary research and investigation have to be done by the owner, possibly with the help of a design criteria consultant. This contrasts sharply with the traditional project delivery process where needs may be defined loosely to the designer, and through a consultative and iterative process of design and review, the solutions are defined more fully. The same concerns, at least partially, the model where the design-builder is selected directly or on a negotiated basis.

The fact that the requirements and quality standards should be stated in terms of performance makes the task even more challenging (cf. Table 7). The design criteria package should be comprehensive enough to ensure compliance by the offerors, but avoid restrictive details that would inhibit creative solutions. When quality standards are stated in performance terms and related to recognized industry standards, the approach not only provides flexibility to the offerors in meeting the desired objectives, but fixes responsibility upon the design-builder in clearly understood objective terms.[13] Therefore, the owner's ability to define the project scope precisely and unambiguously before it is submitted to the design-build team is the most critical factor for project success.[14] Otherwise there is a threat of inadequate or inappropriate quality in design-build.

3.3.3 Project control

In a traditional contracting scheme, design professionals are obligated to exercise their professional judgement so as to work for the owner's best. Because there are no ties between the designer and the contractor, design professionals are free and likely to exercise their judgement independent of the wishes of the contractor. In the design-build scheme, however, there is no longer an independent architect to oversee the process in the same way.

If the owner's organization has no in-house personnel with expertise in preparing design-build requests for proposals and contracts and administering the design review, a separate design criteria consultant is needed – unless the owner uses direct or negotiated

[13] Design-Build Manual of Practice (2000), Document Number 101, pp. 4–5.
[14] Songer & Molenaar (1997)

Table 7. Nutshell: Comparing different types of specifications.[15]

The design approach can be based on the use of different specifications. There are four basic types of specifications:

- **Descriptive specifications** detail the requirements for material properties and workmanship. They describe the building and all its details exactly as it is to be built; but manufacturers and products are not named.
- **Performance specifications** describe the required results, how a product or facility element is to perform, not actually what it is or how it has to be constructed. The constructor has a choice of products, materials and methods that will be used to achieve these results – but it is not arbitrary since the choice is usually sublet to owner's decision-making as a part of proposal comparison or otherwise.
- **Proprietary specifications** require a specific product from a specific manufacturer indicated by a brand name or model number. The specifier has complete control over what will be incorporated in the project when a proprietary specification is used.
- **Reference standard specifications** include the requirements of the standard (set by an accepted authority) in specification by reference. It tends, thus, to be the briefest type of specification—and due to all provisions of the standard, sometimes difficult to understand if used carelessly.

Descriptive drawings and specifications are used primarily in the traditional design-bid-build project delivery system, and thus, also called predescriptive design documents while the design-build method aims to take advantage of the performance contracting approach.

These two are the most relevant to discuss about, though most project specifications incorporate features from more than one of the four types. For instance, FF&E specifications are commonly proprietary while reference standard specifications are used almost everywhere.

As far as the two main types are concerned, the use of **predescriptive drawings and specifications** is appropriate:

- when the owner is not able to determine exact requirements for the project but needs to see the anticipated result to be able to make decisions
- when the owner assumes that the specific expertise needed is not available in the market and thinks itself to be the best expert on the specific project
- when the owner wants to or is obliged to hold a price-, not a quality-oriented competition, and
- when the owner wants to save in design costs by using the same specifications in many projects.

On the other hand, for a normal project, there are at least five good reasons for using **performance specifications** instead of predescreptive ones:

- to expedite construction and streamline the construction process
- to access a wide range of designs, systems and materials options in a competitive way
- to access extended performance specification-based warranties
- to encourage the development and utilization of new and more efficient technology, and
- to delegate technical design responsibilities from generalists to industry specialists.

It is also possible to successfully combine and use performance specifying and descriptive specifying in the same project. Some products may be specified with descriptions of components, and other products with performance statements. However, using both descriptive and performance modes for a single requirement should be avoided because it would be redundant and open to contradictions.

[15] Partial sources: McGowan (1996) AND Manual of Practice (1998).

selection to involve the design-builder at project inception to work as an agent of the owner. Engaging an owner's design-build consultant to represent the owner throughout the design and construction process will provide an independent professional solely responsible to the client for general oversight, review, and approvals[16]. This may be a solution also due to the surety's need to review certificates of payment to ensure that the design-builder is not overpaid. Having an independent party review the performance of the design-builder may also be in the lender's interest unless the risk is balanced by a benefit to the lender.[17]

3.3.4 Licensing requirements

Although licensing requirements vary from state to state, all states make it unlawful for any person, partnership, or entity to engage in the practice of architecture or engineering unless duly licensed. Therefore, a design-build contract entered into by an unlicensed entity, such as a contractor or a joint venture, may sometimes be held void or unenforceable even if design is subcontracted to a licensed architect/engineer.[18] This prevents the use of some design-build team organization types in some cases although only very few states, if any, do not allow the arrangement whenever the actual design is made by a licensed entity. Other obstacles to the use of design-build may well also exist.

On the other hand, it may be required that the architect/engineer working as the prime contractor on design-build contracts, must also be licensed as a general contractor. Moreover, some states do not allow combined design and construction contracts at all or the design-build arrangement may be subject to authorization, etc. These regulations are, however, subject to change and corresponding situations should be clarified by potential design-build actors[19].

3.3.5 Availability of bonds

The bond, simply stated, promises to the owner that if the contractor fails to perform per the terms and conditions of the contract, the surety will.[20] In contrast to the traditional project delivery system, where the surety is primarily concerned with the performance of the construction work in accordance with the plans and specifications, design-build requires that the bond covers design and construction as an entity. This has been disagreeable to sureties who have not been willing to accept the design performance exposure. Subsequently, the situation has changed along with the establishment of design-build project delivery. This should, however, be realized and understood as a reason for slightly more expensive bonds for design-build.

Another problem is that when design-build is used with fast-track construction, wherein construction begins before the scope of the works has been fully determined, the surety will not always be able to determine the size of the bond needed for a project[21].

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[16] Design-Build Manual of Practice (2000), Document Number 101, p. 5.
[17] Loulakis, M. Single point responsibility in design-build contracting, pp. 15–16. In: Cushman & Taub (1992)
[18] Loulakis, M. et al. The joint venture agreement, p. 145. In: Cushman & Taub (1997)
[19] For more information: Survey of State Engineering... (1997); Survey of State Procurement... (1996) and corresponding updates.
[20] Ryan, K. Bonding design-build contracts, pp. 164–165. In: Cushman & Taub (1992)
[21] Loulakis, M. Single point responsibility in design-build contracting, p. 15. In: Cushman & Taub (1997)

Moreover, a joint venture (or partnership) does not carry a performance bond in the full amount of the project in its own name. Therefore, each participant must ensure that its own bond covers the full amount – not just the portion of the work that it will undertake which would be enough in a traditional project.[22]

3.3.6 Insurance coverage

The world of design and construction risk is complex and multi-faceted. Traditional methods of categorizing insurance direct separate policies for the design and construction part of the project. There is a professional liability policy for designers to cover claims against design professionals arising from professional negligence, or errors and omissions. An alternative is comparable project insurance purchased by the owner and used more commonly in large projects. For contractors, there is commercial general liability insurance, which traditionally provides coverage to contractors against claims for bodily injury or property damage arising from construction work. [23]

When design-build responsibilities are placed in the same entity, insurance coverage may have either gaps or overlaps. However, different policies have been generally used, and the organizational solution has determined the type of insurance needed for the parties. Therefore, the insurance coverage the design-builder obtains should be carefully reviewed. Another option is, if appropriately available, a specific insurance for design-build, that has been launched more recently. In that case, design-build is covered on a project-by-project basis largely on the terms of the project at hand.

3.4 Summary

The benefits and caveats related to the design-build system were discussed above in general terms. Parties, especially an owner, who intends to use the system, should deliberate these items carefully per project. If the owner chooses design-build, that is only a start since design-build is not merely a predefined way of carrying out a building process. Instead, projects can be implemented following different alternatives and observing various degrees of freedom, and the owner has to choose between these procedures as well.

These alternatives are presented and discussed in the forthcoming *Part II* of this book. There are a few standpoints from which the alternative procedures have been introduced while the "nutshell" and "mini-case" text boxes aim to widen the scope and understanding. It should be also noted that the level of design-build characteristics and related practical considerations described above are largely dependent on the actual procedural alternatives selected.

[22] Werther, B. Necessary corporate documents, p. 32. In: Cushman & Taub (1997)
[23] Hum, B.L. Insurance aspects of design-build construction. In: Cushman & Taub (1992)

Part II:
Project Procedures

This part focuses on six different aspects of design-build: the design-builder selection process, the design practice, proposal evaluation methods, pricing systems, organization of the design-build entity, and distinction between the construction of shell and core and interior systems. Each aspect is dealt with by introducing modes that are, at least to some extent, alternatives. Presentation of an alternative emphasizes its mode, advantages and weaknesses, and applicability. The same structure has been used for all alternative procedures despite the aspect.

4. SELECTION PROCESS

Design-builder selection is one of the key activities of the owner in a design-build project. There are many alternative selection process types that are closely linked to the amount and degree of detailedness of the owner's own planning of the facility. Thus, in many cases the decisions on these two issues are made concurrently, at least in practice, although quite often the owner's desire to influence design is likely to take precedence; in this regard, the type of the intended facility means a lot. Sometimes the owner's willingness to participate in the work and rapidity of the process, etc. may be definitive. There are also many restrictive rules for public bodies.

A strategic planning process – focusing on circumstances and the owner's needs, aims and objectives as to the product, its implementation schedule and budget– precedes the actual selection process in any case. Thereafter, the easiest option is to involve a qualified design-builder to carry out the design from the very beginning. This process often takes the form where the design-builder carries out the design as a consultative process until the needs and solutions are clear and the final contract for the completion of the design and construction is made just on these grounds. Then, the selection process proceeds according to the concept of sole source or negotiated selection, or competitive negotiations based on the design-builder's qualifications and fee, for instance.

Another option for the owner is to carry the design further – perhaps with the help of a separate consultant – which makes it possible to arrange a formal competition including technical and price proposals by design-build entities. For this purpose, the owner’s requirements must be described precisely, and in a manner that is universally understood. This contrasts sharply with the traditional project delivery process where needs may be loosely defined to the designer, and the solutions are defined more fully through a consultative and iterative process of design and review. On the other hand, this kind of a "loose approach" may also be used in the design-build context. It results in a hybrid of design-build and the traditional design-bid-build where the design-related risks are shifted to the constructor despite the fact that the owner also dominates design development.

All the above mentioned selection processes are introduced in this chapter. The presentation offers, however, only a rough framework as can be seen from Table 8. It presents a few company-specific applications of these general types and links completeness of design at the time of solicitation and pricing system to be used with the selection progression. These other viewpoints are dealt with later in the book as is proposal evaluation, etc. Thereafter, the process follows the accustomed path. The owner may solicit for proposal revisions and "best and final offers" (BAFOs) from the most highly rated proposers, etc. After design-builder selection, the process is supposed to continue as cooperative development of the design solution and construction of a building to meet the owners's needs.

Table 8. Mini-case: Application of various selection processes within one company.[24]

Over the last ten years design-build has been the primary procurement method used for new construction and expansion projects by The United States Postal Service (USPS), an organization with over 50 billion in revenue. The reasons are, as reported, many:

- single point of liability
- easiness of management
- less adversarialism
- saved time and, possibly, money
- improved coordination, and
- maximization of contractor's input.

Currently, three basic processes are applied in contractor selection:

1. *Competitive selection, Fixed price*. This process is applied to smaller facilities where the scope can be defined easily. The phases are:
   - Detailed requirements and full scope definition (30% of design) are supplied to prequalified and shortlisted candidates.
   - Proposers submit qualifications and fixed price.
   - Award to complete design and construct facility is made to lowest bid meeting basic qualification criteria.

   The process resembles the traditional bid process and payment is made on basis of price.
2. *Competitive selection, Cost reimbursable GMP*. The mode is considered appropriate for larger projects whenever the scope can be defined easily. The phases are:
   - Detailed requirements and nominal scope definition (10%) is supplied to prequalified and shortlisted candidates.
   - Proposers submit qualifications and guaranteed maximum price (GMP).
   - Award to design and construct facility is made to best-qualified low offeror meeting basic criteria.

   Payment is made on the basis of actual cost up to the GMP.
3. *Negotiated selection, Cost reimbursable GMP*. The process is used for larger facilities for which it is difficult to define the scope:
   - Only minimum requirements and nominal scope definition (10% of design) is supplied to prequalified and shortlisted candidates.
   - Proposers submit qualifications and detailed management plan (schedule, phasing, staff, management approach) – the cost limit being set by USPS.
   - Award to develop full scope design (>30%) and corresponding GMP is made to the one with the best technical qualifications.
   - Design and cost review by USPS, followed by decision to "go or not to go" and negotiations on GMP.
   - Award to complete design and construct facility is made.

   Payment is made on the basis of actual cost up to the GMP.

All the processes involve prequalification as a preceding step, and later, the qualification proper is ascertained in the bid evaluation phase. Quite many companies are qualified for the actual competition phase; the number varies from 7 to 15. This is possible since the USPS does not typically use laborious design competitions as a part of its selection method.

Thus, selection is based on qualifications and cost issues. In the case of smaller facilities, the process even resembles the traditional design-bid-build process. The key principle of design-build, single point of responsibility, is, however, always followed. Moreover, only 10–30% of design is made by the US Postal Service, or its consultant.

Another extreme is negotiated selection where qualifications are emphasized as grounds for selection and cost is only reviewed in the forthcoming process. This seems to be appropriate, especially, since USPS knows the price level due to its huge construction volume.

[24] Enverso, G. (1997) Design/Build. The Postal Service Way. In: Finland/USA Design-Build Workshop. Embassy of Finland, Washington, DC.

4.1 Qualifications-based selection

4.1.1 Description

Qualifications-based selection refers to a design-builder selection process, where one design-builder is selected for the project, at least conditionally, on the basis of its reputation and qualifications– typically in an early phase of a project, and at once, without actual phasing.

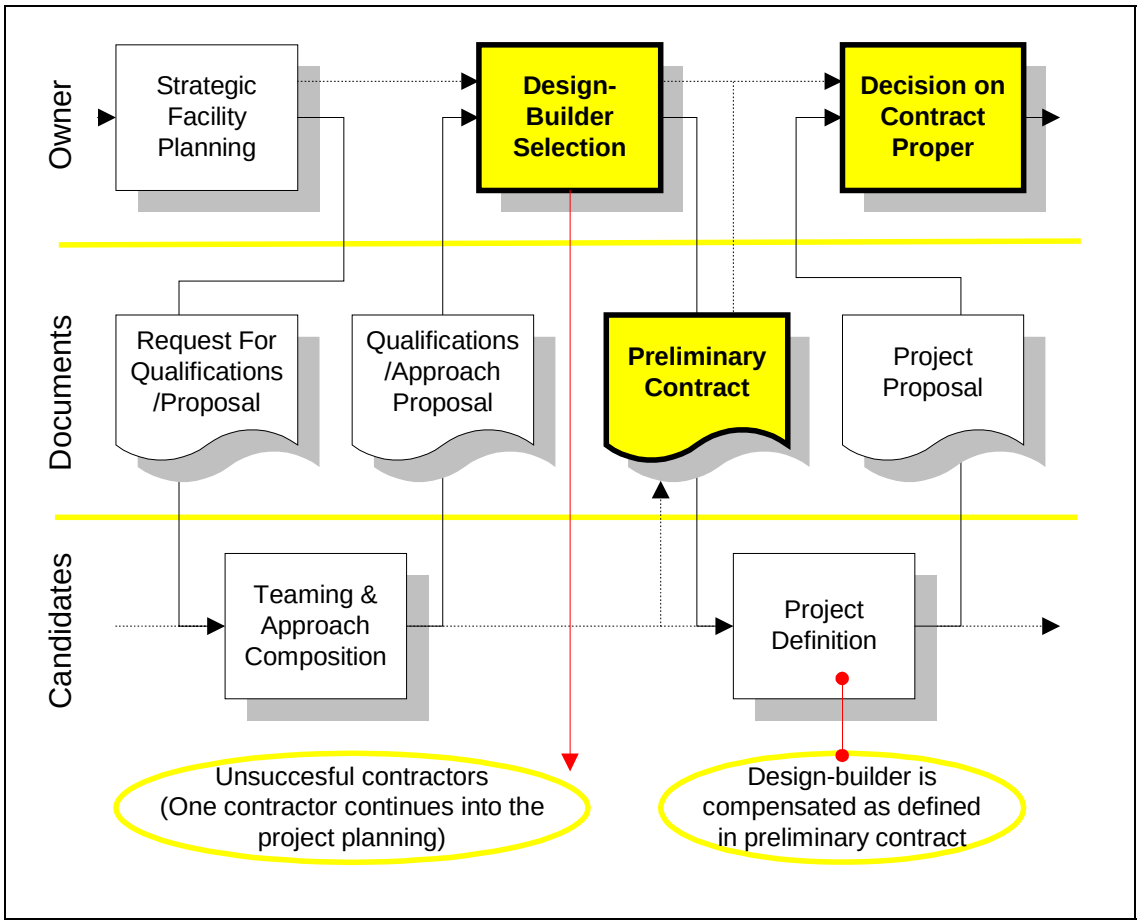

Figure 1. The main features and phases of the qualifications-based selection process.

Overall process. Qualification-based selection refers, literally, to design-builder selection on the basis of such factors as reputation, technical and managerial qualifications, past performance, and prior association. This mode is followed especially when there are no design criteria or concepts available for design competition or

definition of price. Thus, qualifications-based selection is, in practice, tied to the design-builder selection early in the process.

The owner selects a contractor for the project but generally makes only a contract that, in the first phase, authorizes design sufficient to fix the price and to conceptually describe the project. This split contract feature allows the owner a convenient checkpoint before committing to complete the project, which he will likely do if satisfied with the deliverables of the first phase. Then, the second part confirms the selection and completes the design and authorizes construction. All in all, the main steps of a typical construction process involving a qualifications-based selection procedure are in broad terms the following:

1. *Strategic Facility Planning.* The owner identifies the prospective project in broad business terms: needs are established in terms of project area, population, technology content, performance criteria, etc. A site may or may not have been identified. The owner also determines that design-build, and this process specifically is the desirable mode of propagation for the project.

2. *Selection of Design-Builder*. A few potential design-builders are identified based upon factors such as reputation, previous owner experience, capacity, pricing methods, fees, etc. The short listed design-builders are interviewed or requested to submit more detailed qualifications and, on these grounds, evaluated against criteria established by the owner. A single design-builder is preliminarily selected.

3. *Conclusion of First Part of Contract*. Contract language and terms are negotiated and typically a contract is executed to authorize preliminary design, some design development and outline specifications, all sufficient to define the project conceptually, describe the performance of the intended building, and fix the price.

4. *Project Definition.* The design-builder joins with the owner in the establishment of overall project objectives, requirements, and target budgets and schedules. Design is started by the design-build entity, and design decisions proceed along with consideration of construction factors. The work is carried out as defined in the contract.

5. *Design-Build Contract Award.* Well before the drawings are complete, often as early as the concept phase, a lump sum price (or guaranteed maximum cost) is established by the design-build entity. This is typically done on an "open book" basis where competitive pricing is obtained from subcontractors and vendors in the marketplace. If the owner is content with the design and price proposal, the design-builder is contracted for the completion of design and construction.

6. *Construction Documents and Construction*. Upon completion of the design documents for all elements or for specific phases of the project, construction commences. The review and approval process is structured (typically 30-60-90-100% design complete) to ensure that the owner has the say also in the subsequent

design process. The process continues in the customary manner but is enhanced by the incorporation of design and construction responsibility.

There are a few issues concerning this basic procedure that deserve to be explained more due to variations in practice. They are the formality or thoroughness of the analysis of alternatives, and staging and scope of the contract.

Formality (see item 2 above). In principle, selection is based upon factors such as reputation, previous owner experience, capacity, project personnel, pricing methods, and maybe fees, overhead and mark-up, etc.[25] Since this selection process is applied mainly by private owners, it can take the form of subjective selection or may be based on interviews and negotiation. It is not always as strict and formal procedure as those followed in the context of other major selection processes. In fact, the scale of alternatives here ranges from an intuitive to a formal process as evidenced by the following terms:

- *Sole source selection* refers to the practice where the owner does not seriously consider any other options but the one favored due to past experience and/or association, a strategic partnering relationship[26], or know-how or product appreciated by the owner.

- *Negotiated selection* is a selection process, where the owner selects one potential design-builder and approaches it with the aim of negotiating contract terms that satisfy both parties and then entering into the contract. In case the negotiations are not fruitful, he has recourse to another candidate.

- *Competitive negotiations* means that the owner interviews two or three potential design-builders and evaluates them according to criteria established by him. Based on the evaluations, the owner selects tentatively one design-builder with whom he starts to negotiate about terms of contract.

- *Qualifications-based competition* refers to a selection process, where the owner issues a solicitation for qualification statements and evaluates them according to criteria established by him. Based on the evaluations, the owner selects tentatively one design-builder with whom he starts to negotiate about terms of contract.

Staging (items 3–5 above). The procedure presented above was based on sequential contract practice, where, on the basis of the deliverables from the first commission, the owner has to make a decision whether to continue with the party or have recourse to another one. The owner is free to change the partner if he deems it appropriate, but the mode is not, however, intended as a device for acquiring the design-builder's documents for other contractors.

[25] Generally, these items are rather similar to those used in the first stage shortlisting in two-staged selection, which is dealt with starting from page 48. The selection criteria used are described in the RFQ framework under the titles “General qualifications for prospective proposers” and “Project-specific qualifications for proposers” in Table 10.

[26] For more information on partnering, see e.g.: Schultzel & Unruh (1996) AND Partnering... (1995) – the latter, however, deals only with applying the principles of Partnering on a project-by-project basis.

Usually, the design-build entity continues it works, and only in exceptional cases is the design-builder replaced. In many cases, it would not even be worth doing since the entity having carried out the preliminary design, etc. has based the solution on its own know-how and technology whereby it can be considered the best available actor to implement the plan. Another drawback resulting from the change would be a considerable delay in the schedule while the owner would have to pay remobilization and learning costs.

On the other hand, although it is common to enter into contract in stages, it is not a must. It may be that "the first part" authorizes completion of all design and contract. This is the case when fast project completion is of primary interest to the owner and the scope of the intended facility can be defined unambiguously enough already at the initial stage. It may, however, require the negotiating design-build candidate to work more on the design concept already in the negotiation phase.

4.1.2 Pros & cons

In this process the owner engages the design-builder for the project on a negotiated basis, more or less, which, according to the experience of some, makes the design-builder (including the design professional) the agent of the owner, with a professional responsibility to represent the owner's interest.[27] It also offers a fast process and saves costs of tendering while the lack of a wider competition and consecutive analysis of alternatives may be considered weaknesses by many as explained in Table 9. Correspondingly, cost efficiency might be a concern to the owner unless the practice follows the normal "open book" principle, where the owner has access to the cost structure of the design-builder's offer and work.

4.1.3 Applicability

Appropriateness. The qualifications-based selection process is used mostly in cases where the owner understands exactly what he is going to get based on the contract. He may have confidence in the design-builder, who may have supplied similar facilities to the owner earlier or has special technology for producing them. In such cases the design-builder may have been able to study the owner's needs and operational principles which provides an excellent basis for the project. Often this means some kind of project-to-project partnering relation between the two parties.

Qualifications-based selection can be applied to a wide variety of building and facility development projects. For instance, the facility may be a high technology process-oriented one where certain key criteria can be easily defined. They may, for instance, be related to the performance of a function intended to be carried out in the facility, but may have little to say about the building itself. Thus, in the construction of certain special manufacturing facilities, full use of this process can be made. The same applies, of course, to simple warehouses, etc. where the criteria are easy to define.

[27] Design-Build Manual of Practice (2000), Document Number 101, p. 5

Table 9. Advantages and drawbacks of the qualifications-based selection mode.

Advantages	Drawbacks
• Compared to other alternatives, the method enables wider overlapping of design and construction, which accelerates the process when the parties attain full speed early on. • When the owner is not able to speak in terms of performance, the process makes possible the "traditional approach" where a solution is sought with the design-builder as the owner's "trustee". • Due to the elimination of multiple proposals, the costs of proposal compilation and evaluation are minimized. • Due to the availability of construction-cost knowledge already in early design, the method ensures early price certainty and is likely to result in a highly cost-efficient solution. • The model offers the owner an easy and smooth way of procuring a facility, if the parties can be sure about the compliance of the owner's needs with the prospective solution as in the case of simple facilities.	• The absence of multi-criteria competitive bidding may cause, or at least make the owner think, that he is not getting the best-value solution for the facility. • Due to the lack of multiple proposals, the approach may lead to omission of thorough analysis of alternatives as in traditional design-bid-build. • In some cases, the design-builder's cost commitment may not be based on full design and documentation, and thus disagreements may arise over what was implied in the documents. • When contracts for one-of-a-kind projects are concluded early on, numerous design changes may occur, resulting in a cost higher than the original contract price.

Compatibility. *Qualifications-based selection* is accompanied by the *direct design-build* practice as regards division of labor in design. Correspondingly, the earlier the contract proper is made, the more likely it is a *guaranteed maximum price* contract instead of a *fixed price* one. The evaluation methods naturally apply the *quality-oriented approach*. As far as the design-builder's scope of services is concerned, this procurement method quite often also encompasses, for instance, acquiring financing and is referred to as the "turnkey" model.

4.2 Two-stage selection

4.2.1 Description

Two-stage selection refers to a design-builder selection process where the first phase involves shortlisting of candidates on the basis of the qualification statements they supply, and the second phase involves final selection on the basis of technical and price proposals, etc. from the shortlisted offerors.

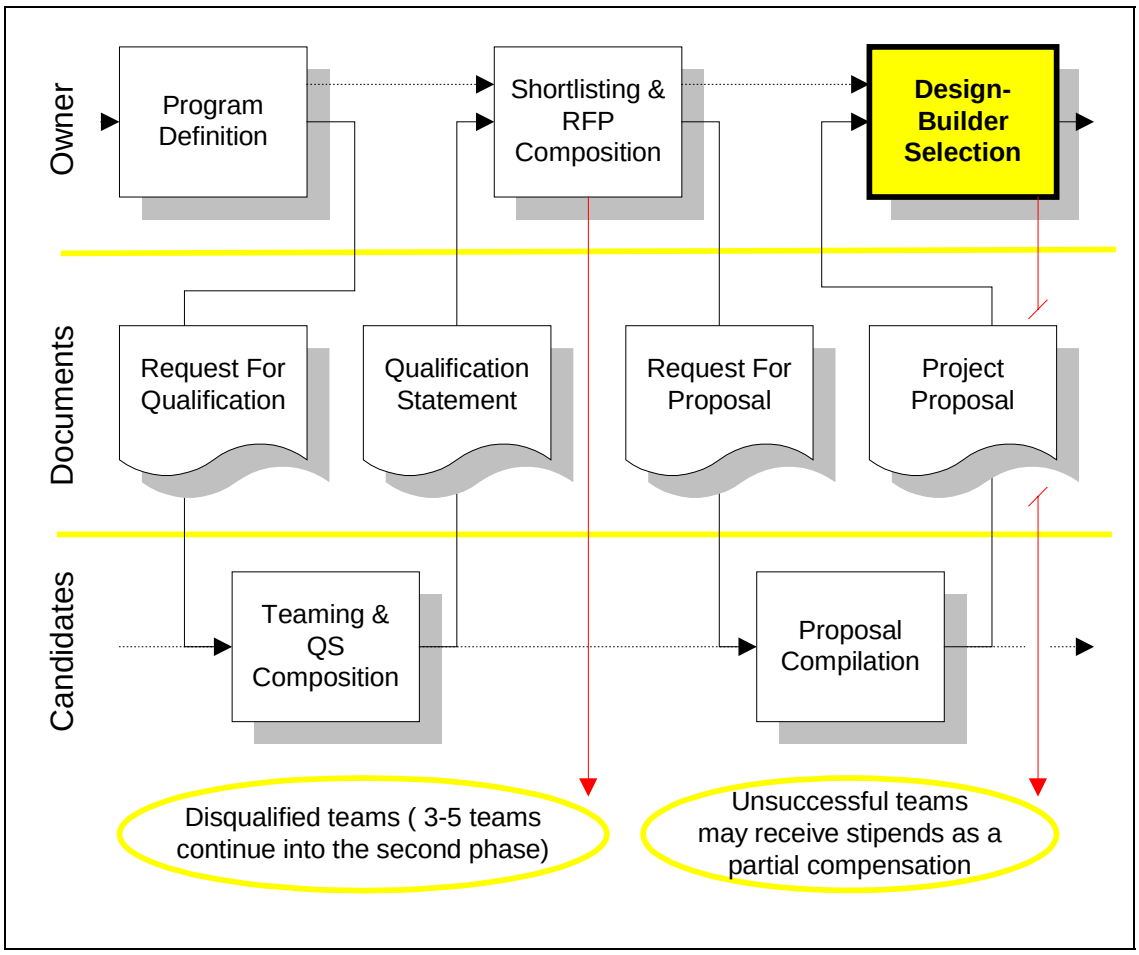

Figure 2. The main features and phases of the two-stage selection process.

Overall process. In this selection process the prospective candidates are first evaluated and only the best are selected for the second stage of competition. The method is typically formal but otherwise the criteria correspond very closely to those used in the qualifications-based selection described above. Here, the owner however presents design criteria for shortlisted design-builders, who then prepare and submit their

proposal for meeting the owner's requirements. The evaluation is done according to set criteria as objectively as possible. Therefore, this procedure is widely used by public bodies while the qualifications-based selection is favored more by private owners. The steps of a typical two-stage competitive design-build process are described in broad terms below:[28]

1. *Strategic Facility Planning. (See equivalent phase no. 1 on page 44.)*

2. *Program Definition.* The owner establishes the project requirements in terms of facility size and performance criteria, finish requirements, quality standards, applicable codes, regulatory standards, occupants/capacities, equipment requirements, etc. These requirements are defined and articulated either by in-house professional staff or by an outside consultant.

3. *Request for Qualifications (RFQ).* Professional, financial and experiential requirements for offerors as well as general project parameters are articulated in an RFQ (see Table 10), either by in-house staff or by an outside professional consultant.

4. *Qualifications Statements.* The project is advertised, RFQ's are supplied to interested design-builders, and qualification statements are received in response to RFQ's. Generally three, never more than five, of the most qualified firms are shortlisted for the second stage.

5. *Request for Proposals (RFP).* Design and cost proposals are solicited from the shortlisted design-build teams in a Request for Proposal (RFP). Among the items found in a typical RFP are project design criteria, site information, contract requirements, selection procedure and proposal requirements (see Table 11).

6. *Pre-Proposal Conference.* This meeting of all shortlisted proposers early in the proposal preparation period is held by many owners to allow proposers to ask questions and request clarifications. Outside the meeting, only written questions and answers are allowed in order to treat all competitors equally.

7. *Proposal Submission and Evaluation.* Once received, proposals are evaluated on the basis of quality of design, price and other predetermined factors related to definition of best value. Before the final award is made, proposers may be asked to make in-person presentations to the owner's selection panel.

8. *Contract Award.* The selected proposer enters into contract with the owner, which incorporates both the owner's requirements and the design-builder's proposal.

9. *Construction Documents and Construction. (See equivalent phase no. 6 on page 44.)*

[28] Modified from: Design-Build Manual of Practice (2000), Document Number 201, p. 1–2

Table 10. Nutshell: Framework for an RFQ in the two-stage selection mode.[29]

The Request for Qualifications (RFQ) is a document issued by the owner intended to procure Qualification Statements from potential design-builder offerors that are then evaluated and ranked based on the qualifications. The RFQ potentially includes the following:

Owner Introduction

- Identification of the owner, senior officials and responsible project staff
- Introduction of the owner's consultant
- Owner's authorization to request design-build proposals
- Description or assurances of funding; financing authority

Project Overview

- Description of the purpose of facility
- Project size and other key measures
- Summary of facility requirements and owner's objectives for the design
- Approximate (or fixed) budget and anticipated (or fixed) schedule
- Extraordinary terms and conditions of the general conditions of the design-build contract, such as liquidated damages, role of the design-builder's architect, etc.

Selection Process Overview

- Introduction of the selection process and competition schedule
- Schedule of pre-submittal and pre-proposal meetings and other communications (questions and answers) and due dates
- Description of submittal requirements in each stage, and required or allowed alternatives for proposed solution
- An honorarium or stipend paid to unsuccessful finalists
- Requirements for an agreement to prepare a design-build proposal, like required bid bonds and their retaining
- Owner's right to publish and display the design-build proposals
- Additional conditions of the design-build competition

General Qualifications for Prospective Proposers

- Appropriate general experience
- Team member companies' experience with design-build
- Organizational resources and depth
- Licensing requirements
- Financial strength, stability and bonding capacity
- Minority/disadvantaged business history
- Litigation/disputes history

Project-Specific Qualifications for Proposers

- Specific experience of the team members in the subject facility or building type
- Performance records of design-builder and design team, including fees, recent comparable costs, value engineering savings, change order record and on-time performance
- Proposed team composition, its comprehension in disciplines and past experience working together on the same project
- Degree of local professional participation including DBE (disadvantaged business enterprise), MBE (minority business enterprise), and/or WBE (woman business enterprise) requirements
- Current capacity to manage the project, availability of staff, labor and equipment
- Quality of technical and managerial organization proposed, quality of individuals proposed for key positions
- Construction management plan, including time, cost and quality control systems
- Design and construction excellence in terms of client and industry references

Qualification Statement Evaluation

- Basis for selection, including pre-established rating system, i.e. criteria and their weighting
- Names of jurors and short biography of each, identity of design-build consultant or competition advisor and his or her authority

[29] Modified from: Design-Build Manual of Practice (2000), Design-Build RFQ/RFP Guide, pp. 20, 22–25 AND Design-Build Manual of Practice (2000), Document Number 201, Appendix A

Table 11. Nutshell: Framework for an RFP in the two-stage selection mode.[30,31]

The Request for Proposal (RFP) is a document issued by the owner intended to procure project proposals from qualified design-builders that are then evaluated and ranked, and the party making the best proposal is selected for the project. The RFP potentially includes the following:

General Information

- Introduction, i.e. Project Scope
- Proposal Schedule
- Budget (cost limitations or fixed sum)
- Project Schedule
- Proposal and Bond Forms
- Selection Procedure
- Selection Criteria (and weighting)
- Selection Panel

Site Information
(data relating to existing site conditions)

- Site Location and Description
- Topographical and Boundary Survey
- Geotechnical Investigation Data
- Utility Information
- Covenants and Restrictions on Property
- Applicable zoning requirements or codes

Project Requirements (design criteria)

- Program Summary and Functional Requirements (goals and objectives)
- Occupants of the facility, by type, workstation or functional units to be housed
- Functional Relationship Diagrams or Conceptual Building Layout (may be replaced by a narrative program document)
- Site Layout, General Layout or Space Plans
- Outline specifications establishing levels of quality, finish, performance, etc., including Warranties
- Performance requirements in such areas as floor loading (p.s.f.), HVAC performance (temperature and humidity) lighting levels (footcandles maintained), etc.
- Owner's expectations as to exterior appearance and finishes (may be graphic but preferably narrative).
- Identification of special requirements such as historical or environmental issues.
- Other pertinent criteria, such as energy use, maintenance needs or accommodation for future expansion or adaptation.
- Reference to applicable codes, industry standards or specifications.

Design-Build Contract Requirements
(may be a summary of contract terms or a copy of an actual contract)

- Design Responsibilities
- Construction Responsibilities
- Responsibilities of the Owner
- General Conditions
- Minority Enterprise Participation

Requirements for Proposal
(the material to be provided by proposers; i.e. "deliverables")

- Company Data like Financial Statement, and Banking and Bonding and Insurance Letters
- Project Organization and Staffing Plan, e.g Organization Chart, Staff Time Allocation and Resumes, Consultants and Subcontractors, Licenses and Registrations, Minority Business Enterprise Participation
- Project Approach concerning Quality Assurance Program, Safety Plan, Cost Control and Value Engineering
- Schedule and Phasing Plans, Resources, Manpower and Equipment, Approach and Methods
- Design documents like Renderings, Design Narrative, Disabled Provisions, Code Provisions, Area Analysis, Drawings and Outline Specifications, and possible Model
- Pricing, including Schedule of Values and Bid Bond
- Proposal Forms required

[30] Modified from: Design-Build Manual of Practice (2000), Document Number 201, p. 3, Appendix B AND Design-Build Manual of Practice (2000), Document Number 301, p. 12
[31] Practical examples of RFP are given in Table 21 (p. 73) and Table 23 (p. 77).

An example schedule for the entire process in case of a jumbo project is given in Table 12. Besides, concerning the argumentation of the presented general practice, a few issues deserve to be commented per stage as follows accompanied with a note on the honorarium for unsuccessful proposers.

First stage. Prequalification and/or shortlisting of design-builders will generally eliminate those unfamiliar with the process, unqualified by reputation or experience, and lacking in quality control and methodology (see also Table 27 on page 84).[32] Such elimination is not, however, the only reason for this stage. The cost of preparing design-build proposals is considerable.[33] To request full proposals from offerors who have little chance of winning the award is costly and counterproductive. In other words, shortlisting is needed:

- to make all offerors feel that they have a realistic chance of being successful if they just do their very best in proposal compilation, which, of course, motivates them to do so and give their best effort;

- to avoid unnecessary costs of unsuccessful proposals and payment of too many honorariums, which would make the delivery system expensive and decrease its popularity and, moreover, eliminate the benefits from its use; and

- to decrease the amount of the owner's resources required to meaningfully evaluate a large number of proposals, which would be laborious and delay the process, and be a special problem in public decision-making based on rigorous assessments.

In order to land on the shortlist, design-builders who are compiling their qualification statements attempt to present the best possible evidence in support of their case and, therefore, likely want more information. Especially in the second stage, they wish to test their ideas, which means that they should be allowed to pose questions to the owner.

Questions, beyond a request for the RFQ document, must however be limited to written questions from registered RFQ holders. Answers must be published in addenda to the RFQ and supplied to all proposers. This way, the information can be made binding on both the owner and proposers, and all proposers are treated as equals. In addition, it is recommended that in the case of a significant project, for which there is considerable interest or whose submission requirements are complicated, the owner organizes one or two pre-submission meetings followed-up by written agenda.[34] Subsequently, selection is made among those submitting the best qualification statements. Generally three, but no more than five, offerors should be invited to make final proposals.[35,36]

[32] Design-Build Manual of Practice (2000), Document Number 101, p. 5
[33] Generally, the price of making a proposal is, maybe, from two to four times that of making an offer for a traditional design-bid-build project. Thus, for a bigger building, the cost can be huge.
[34] Design-Build Manual of Practice (2000), Design-Build RFQ/RFP Guide, pp. 19–20
[35] Design-Build Manual of Practice (2000), Document Number 201, p. 4
[36] If a security deposit or a bid bond is required of the finalists to ensure that a valid proposal is submitted, three finalist teams can be adequate. If security is not required, additional design-builders may have to be pre-qualified as "insurance" that a suitable number of responsive design-build proposals are received by the owner (Design-Build

Table 12. Mini-case: Qualification and proposal schedule and procedures.[37]

The Convention Center Authority, State of Hawaii, launched an RFP in 1994 in order to enter into a design-build contract for the implementation of a world class convention center facility located in Honolulu, Hawaii.

Two hundred million dollars was budgeted for the design and construction of the project consisting of a minumum of 675,000 gross square feet. The facility was to involve exhibit halls, meeting rooms, a ballroom area, and support spaces.

The qualification and proposal schedule for the project – as presented in the RFP – was as follows:

Announcement and Qualification

A. First publication of Notice of Request for Proposals to Design/Build a Convention Center facility.……...26 FEB
B. Authority approves RFP and authorizes distribution of RFP……....1 MAR
C. RFP Documents available …….4 MAR
D. Pre-Qualification Conference [...venue…] …….……....9:00 am, 15 MAR
E. Last date for submission of written questions prior to the Qualification Submittal Deadline…….16 MAR
F. Last date for the publication of addenda by the Authority prior to the Qualification Submittal Deadline..……21 MAR
G. Qualification Submittal Deadline; 3 sets to: Convention Center Authority..... […address, tel.…]……2:00 pm, 28 MAR
H. Deadline for notification to all applicants ……..….8 APR
I. Deadline for submittal of Notice of Intent to submit proposal and Security Deposit/ Bond..…….....…..13 APR
J. Authority publishes list of qualified Design/Builders.……15 APR

Proposal Compilation and Presentations

K. Pre-Proposal Conference […venue…] Attendance by at least one representative of each qualified Design/Builder is mandatory…….……..9:00 am, 5 MAY
L. Other Pre-Proposal meetings may be scheduled by the Authority. All RFP holders will be notified of time and place at least 14 days in advance...…….Varies
M. Last date for submission of written questions by Design/Builders…... 15 JUL
N. Last date for the publication of addenda by the Authority……22 JUL
O. Proposal submittal deadline including Proposal Guaranty Bond……....5 AUG
P. Deadline for Authority to issue requests for clarifications to respective Design-Builders, (if necessary).....15 AUG
Q. Date scheduled for clarification conferences, (if necessary)..….....….17 AUG
R. Deadline for Design/Builder to return written responses to Authority's requests for clarifications.……..22 AUG
S. Schedule for Evaluation of in-person presentations to Design Evaluation Board and Authority (3 hours each).
   - Design/Builder A.…8:30 am, 22 AUG
   - Design/Builder B.…1:30 pm, 22 AUG
   - Design/Builder C.…8:30 pm, 23 AUG
   - Design/Builder D.....1:30 pm, 23 AUG
   - Design/Builder E.…8:30 am, 24 AUG

Evaluation, Selection and Contracting

T. Technical Evaluation Board (TEB) completes review and awards quality points..……..26 AUG
U. Design Evaluation Board (DEB) hears TEB's report and completes its review and awards additional quality points …….....29 AUG
V. Authority receives combined TEB and DEB recommendation..……30 AUG
W. Authority selects and/or rejects Design/Build Proposals, not later than……..…16 SEP
X. Authority executes contract with Design/Builder and issues Notice-to-Proceed.....……...T.B.A.
Y. Scheduled Date of Project Acceptance occurs 650 working days after Date of Notice to Proceed, unless extended by approved change order.

Manual of Practice (2000), Design-Build RFQ/RFP Guide, pp. 21–22). In practice, such security deposits are used rather seldom.

[37] Notice for Request for Proposals to Design/Build a Convention Center Facility, Honolulu, Oahu, Hawaii. (1994) AND Hawaii Convention Center - Design/Build RFP, Volume I. (1994) The Convention Center Authority, State of Hawaii.

Second stage. An RFP is prepared for the shortlisted teams which represent the owner's last convenient opportunity to broadly define his needs, requirements and limitations before engaging in the competitive process. Alternatively, an owner may publish both the RFQ and the RFP simultaneously as a single, comprehensive document.

Communication in this stage follows the principles established in the first stage. The organized meetings are aimed to decrease confusion, and respectively minimize the costs of proposal compilation, as well as to accentuate the owner's will. Design-build entities strive for proposals[38] and, thereafter, the design-build contractor is selected. A jury is typically established to make the selection on the basis of evaluations that in many cases are contributions from technical and other committees considered appropriate.[39]

Honorarium. An honorarium or a stipend is a certain sum sometimes paid to offerors in consideration for the cost of preparing a design-build proposal. When should an honorarium be paid, how much should it be, and what else should be taken into account when contemplating honorariums in a project? These issues are discussed in Table 13.[40]

The payment of an honorarium is, however, up to the owner and in many cases no stipend is paid to unsuccessful teams. In such situations the construction firm, operating in accordance with a design-build teaming agreement, may pay its design team partner for preparing most of the proposal, thus partially compensating the A/E partner for its considerable effort in preparing the design-build proposal. Moreover, winning design teams of design-build projects should demand and expect a higher than normal fee for the balance of its services on the project in the proposal phase.

4.2.2 Pros & cons

Compared to the other options, *two-stage selection* is a process, which successfully combines the owner's control over the project and diversified means of competition thereby making it possible to seek and utilize innovative solutions developed by competing design-builders.

The component of innovation and consideration of constructibility in design exists, in principle, in *qualifications-based selection* as well, but extended means of competition make the most out of it here. In *bridging-type selection* – to be discussed next – there is no real leeway for innovation by design-builders and competition works only partially. On the other hand, in bridging, the owner controls the design development beyond dispute, which, again, is sometimes threatened when the design-builder is selected in an early phase.

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[38] Detailed guidelines are given in Design-Build Manual of Practice (2000), Document Number 301

[39] Selection criteria and methods, and the role of the jury and technical committee are dealt with in more detail in Chapter 6 (Evaluation systematics).

[40] Another suggestion is an honorarium of about 5 ‰ of the estimated construction costs. It is based on the costs required to reach similar design preparedness in the traditional process, and on the fact that the sum is shared by three offerors after the owner's other expenses have been deducted. [Stastny, D. (1995) Presentation to 1995 Design/Build Conference. In: Professional Design-Build: A National Conference for Owners and Practitioners, October 5–6, 1995. Stanford University & Design-Build Institute of America, San Francisco, CA.

Table 13. Nutshell: Honoraria in two-stage selection.[41]

An honorarium is a certain amount paid to unsuccessful offerors in consideration for the cost of preparing a design-build proposal. The practice is not, however, customary.

Some design professionals feel that the payment from the owner should reflect the costs of providing the services. On the other hand, some owners think that since contractors have traditionally offered "free" proposals, there is no need to change the practice. Thus, while there is no absolute solution, it is useful to take the following facts into account when the owner considers whether it should pay for design proposals:

- Designers argue that an honorarium or stipend is almost imperative if the owner wants to attract highly qualified design-build teams and to encourage them for quality submittals to the project.
- Compilation of a full design proposal can be extremely expensive, and the absence of stipends (or professional development fees) may be a major obstacle to participating in competitive design-build procurement.
- Independent A/Es often point out that their design proposal contains design ideas, solutions to technical problems and other intellectual property that has been developed specifically for the owner and the project.
- Due to the nature of the design development of a certain proposal, it is unlikely that ideas derived from the deliverables of unsuccessful offerors will be incorporated into the final design and construction.
- The unsuccessful proposers provide, however, an invaluable service to the owner by offering a choice of designs, and most importantly, by providing peer level design, value engineering and cost competition for the successful proposer.

Acknowledgement of the last point, especially, makes payment of an honorarium recommendable, and also, frequently justified. Owners are willing to pay for value received but are not willing to pay for the expense of developing design proposals. Is there a good compromise?

The honorarium should be proportional to the complexity of the facility, the submission requirements, the time allowed to prepare the proposal and other considerations. Owners who are inclined to pay honoraria should consider two things:

- What is a reasonable price to pay for the minimum work that a well qualified team of designers and builders would have to do to satisfy the minimum submittal requirements?
- What is the market (including teams or firms sought by the owner) willing to invest in the possibility of winning a significant design-build project? Stated another way, what size honorarium would it take to attract and motivate the best teams of designers and constructors compete for this particular project? If the project is a high visibility landmark, the answer may be different than, for example, a bulk mail distribution facility.

There are no general rules for the amount of an honorarium since it is, of course, up to the owner to decide what he wants to pay. For bigger buildings, with a project value of a few hundred million dollars, something like 0.01% of the project value is usually appropriate. For projects worth $25 million or less the amount could be increased to 0.03%. Interpolation could be used to compute values of projects in between.

The difference between the value added to the owner by a proposer, and the corresponding honorarium, and costs of compiling a proposal will vary over time according to the developments in the competitive marketplace. For the same reason, they will never meet. Neither is it appropriate to aim to cover more than a part of the costs of compiling a proposal.

[41] Modified from: Wundram, E. (1996) Honoraria or Stipends for unsuccessful offerors. When and How Much? Design-Build Dateline, vol. 3, no 4 (July–August 1996), pp. 7, 11.

The process of *two-stage selection* may be slower than the alternatives presented. Another disadvantage is the laborious compilation and evaluation of proposals. These and some other features are summarized in Table 14.

Table 14. Advantages and drawbacks of the two-stage selection mode.

Advantages	Drawbacks
• Subletting the design solution to competition generates variations, which results in thorough analysis of alternative design options and is likely to lead to innovative, new and efficient design solutions. • The design-builder's relatively early involvement integrates design and construction know-how and guarantees the existence of cost and constructibility expertise in the critical design process and diminishes the risks of the subsequent process. • Quality and cost, etc. can be optimized as an entity while the typically applied multi-criteria bidding is likely to result in a best value solution to the owner. • The approach presupposes distinct needs' definition, which makes the owner focus on operations and the functioning of the facility probably more carefully than otherwise.	• The owner has to know his needs and requirements and, even though ordinarily aided by a design criteria consultant, has to be able to think in terms of performance • This process may not be appropriate for projects of a unique or one-time character where the owner wants to influence all design solutions as the process proceeds. • Preparation of qualification statements and, especially, technical proposals is costly while the comparison of manifold proposals can be laborious as well.

4.2.3 Applicability

Appropriateness. The two-staged competitive selection process is ideally suited to projects of a familiar type, defined scope and ones similar to those the owner may have previously constructed. Projects of a unique or one-time character generally require more extensive project definition, programming or preliminary design (e.g. research facilities, specialized manufacturing plants, and remodeling of historic structures). In such cases, it may be more difficult to separate the preparation of the criteria package from the development of detailed construction documents because project definition can

overlap with the detailed design process. These are situations in which the multi-proposal competitive design-build delivery method should be replaced by another type of procurement and/or selection process.[42]

Compatibility. In *two-stage selection*, design responsibility ideally resembles that of the *design criteria method* but may also adhere to the *preliminary engineering method*. Naturally, the *value-oriented approach* is typically applied to proposal evaluation and as a basis of selection. Sometimes the price may be set by the owner – then the *quality-oriented approach* alone may be used in proposal ranking, i.e. in addition to first stage shortlisting.

[42] Design-Build Manual of Practice (2000), Document Number 201, p. 2

4.3 Bridging-type selection

4.3.1 Description

Bridging-type selection refers to a process where a firm price contract is made based on the owner's preliminary design and candidates' price offers, followed by the design-builder's completion of design including possible modifications on design and price, their review and acceptation, and subsequently construction.

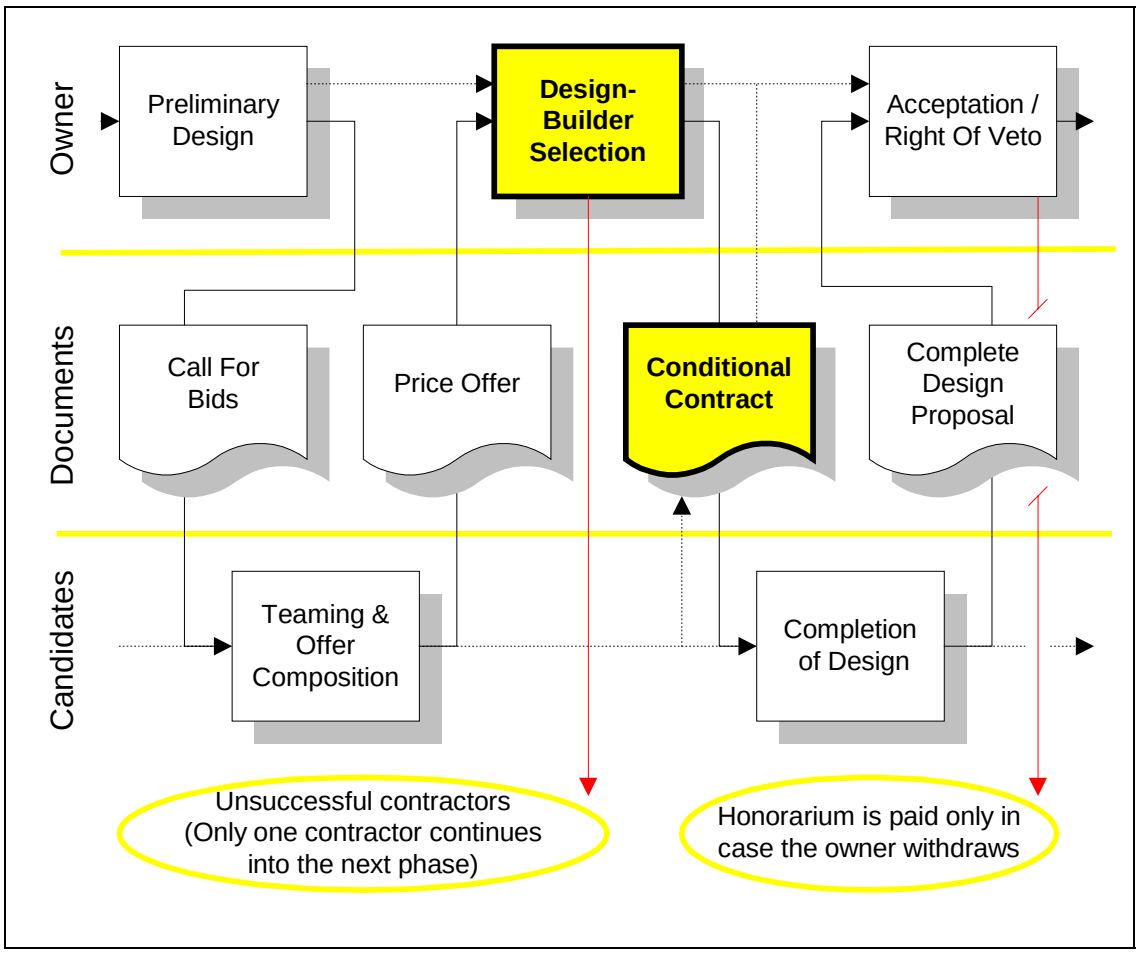

Figure 3. The main features and phases of the bridging-type selection process.

Bridging-type project delivery is actually a hybrid of the traditional method of design and construction (design-bid-build) and pure design-build. While the selection process first imitates that of the design-bid-build method, the contractor's involvement in design and the aimed one-point-responsibility make the approach relevant in the design-build

context. The contractor selection process in the case of the bridging method is basically as follows:[43]

1. *Strategic Facility Planning. (See equivalent phase no. 1 on page 44.)*

2. *Involvement of an Architect*. The owner hires an architect to complete preliminary design of the project. These "scope-of-work" documents define the functional and aesthetic aspects of the project, while the details of construction technology are left for the design-build team to define. The owner's architect remains a consultant to the owner throughout the design and construction.

3. *Selection of Design-Builder*. The owner's consultant prepares an extensive Request for Proposal and, subsequently, bids are solicited from (or negotiations are initiated with) design-build entities. The design-builder is usually selected on the basis of a price offer, possibly supplemented by qualification criteria. No technical proposal is needed in this stage.

4. *Conclusion of Contract*. Typically, a firm price contract is completed. While the price covers all design and construction, the contract commonly authorizes the design-build entity to complete the design and construction documents only, so that thereafter the parties have a check point on the modifications.

5. *Completion of the Project Documents*. The design-build entity executes design sufficient to define the project, describe the performance of the intended building, and price the possible changes. The owner and his consultant review the construction documents for compliance with the design intent and conducts a price review with the contractor. Normally, notice to proceed with construction is given.

6. *Construction. (See equivalent phase no. 6 on page 44.)*

A few issues concerning the specific features of a bridging-type selection process deserve to be emphasized. Firstly, when competition concerns price instead of technical solution, etc., shortlisting may not be needed (despite the likely involvement of prequalification) since it is supposed that only moderate efforts are required to complete a proposal by a contractor and to compare proposals by the owner.[44] Thus, the selection procedure resembles that of traditional design-bid-build while, on the other hand, the same is true with the design, which is largely carried out by the owner.

Secondly, in the bridging context, it has been frequently noted that the owner has the right to terminate the contract if the design-builder's design does not satisfy him. In other words, subsequent to selection and contract, the design-build entity executes design sufficient to define the project, describes it in more detail, and prices possible changes. Then the owner and his consultant review the construction documents for

[43] Modified from: Heery, G. The Bridging Method. In: Master Builder. Integrator of the 21st Century (1996) AND Handbook on project delivery (1996)

[44] An alternative is to select a single design-build entity directly. In such cases negotiations with an emphasis on price are held with the design-builder only.

compliance with the design intent and conduct a price review with the contractor. All changes by then must be approved by the owner and they are acceptable priced. Normally, the notice to proceed with construction is given but the client may also procure construction services elsewhere – it is supposed that by paying a previously stipulated sum for the documents, the owner then owns the documents.

Basically, the possibility for contract termination in this review phase is just a contract clause not unique to this selection process. It could be incorporated in any contract despite the selection process. The bridging method represents, however, a guarded and conservative approach to facility acquisition, also aimed to attract owners holding onto traditional methods of design and construction, and therefore the idea of a check point and similar phasing have been made an integral part of the bridging philosophy.

4.3.2 Pros & cons

Those who favor bridging-type selection, emphasize that this mode combines the strengths of design-bid-build and design-build: it gives the owner full control over design while offering a single point of liability. Correspondingly, those who oppose the mode, say that it is a misuse of design-build to use it just as a risk transfer method which could obscure the responsibility for design. The method may also involve the disadvantages of design-bid-build due to a juxtaposition of the design and construction entities which are intensified by price-oriented competition. On this basis, the pros and cons are summarized in Table 15.

4.3.3 Applicability

Appropriateness. The bridging process may be preferable when the owner wants, or is obliged, to have an easy and strict selection criterion, the price, as is the case with some public bodies. Another reason to use bridging type selection might be that the owner has relatively little experience from the building industry and/or is not familiar enough with the building type in order to complete accurate predesign documents such as an RFQ and an RFP. Therefore, the exceptional nature of the project and difficulty of scope definition well justify design development and searching for a solution in the conventional way.

Compatibility. The bridging method, understood as a contractor selection process[45], is usually combined with the *preliminary engineering method* or, especially, *design-draw-build*[46] type division of labor in design. No other limitations exist but, in practice, the *fixed price* system is popular as a pricing arrangement as is the *contractor-led entity* as an organizational solution.

[45] In colloquial language the term bridging is used in two meanings. Besides the approach presented here, it is used to depict the division of labor in design referred as “design-bid-draw”. Quite often these two practices are tied together.
[46] Design-draw-build is dealt with shortly on page 79.

Table 15. Advantages and drawbacks of the bridging-type selection mode.

Advantages	Drawbacks
• If the owner is not able to speak in terms of performance, the process enables traditional-like approach when a solution is sought with a separate architect/engineer as the owner's "trustee". • Some owners may feel more confident about the qualitative issues concerning the project, when there is a separate architect working for the client's best and doubts about design decisions dominated by the contractor are dispelled. • The competing contractors avoid the costly preparation of technical proposals while the process simplifies the owner's scheme of evaluation. • The emphasis on design and construction costs as a selection criterion simplifies comparison and minimizes the risk of a contested selection, which in the worst case, may result in a lawsuit by the public owners.	• The bridging method is a lengthy process due to no overlapping between design and construction just as in traditional contracting. • The method eliminates multiple design proposals, which is the key to innovative, new and efficient solutions while competition is limited due to the use of design and construction costs as the main selection criteria. • The lack of construction cost information from the early design phase may cause costly solutions or the need for reworked design with disruptive consequences in case bids come in higher than expected. • The likelihood of change order invoices and delay claims may grow in later project stages due to adopted "predescriptive" design, low-bid selection and similar bidding strategies and related business culture. • Despite the apparent clear scope of responsibility, highly detailed design by the owner may diffuse responsibility if problems arise – the owner is responsible for his design errors and omissions.

4.4 Summary

Three approaches to design-builder selection were presented in this chapter. In addition to timing and phasing, one main difference between the various approaches is the means and scope of competition. A design proposal may or may not be included. The aspect of qualification, again, should always be present in design-builder selection. It may be implicit as in the case of sole source selection, although it is the main criterion. On the other hand, in some price-oriented extreme applications qualitative issues may also carry no practical weight.

In principle, the earlier the design-builder is selected, the more dominant the qualifications are, and – correspondingly – the later the selection is made, the more emphasis is put on the price offer. The widest scope of competition takes place between these extreme ends. There, the means of competition typically involve technical solution and related production plans, besides price and qualifications. This requires, in practice, the use of the two-stage selection. The method has become very popular, especially in the public sector along with the renewal of the federal acquisition regulations in 1996. [47]

Restrictions for the use of different design-builder selection processes and various criteria may still be set by other regulations and set practices of public purchasing.[48] Conventional wisdom concerning the prudent expenditure of tax revenue calls for open, advertised competitive public bidding on identified product, services, and real property improvements.[49] The preference for separate design and construction and cost-based selection is decades old and is based on concerns over fraud, waste, corruption and favoritism. Therefore, in some cases, it may still be impossible to depart from the set procedures and the price criterion although the newer models of competition have proved their functioning and even superiority in many respects.

[47] For more information, e.g: Federal Acquisition Regulation (1997), Part 15: Contracting by Negotiation.
[48] For more information: Survey of State Procurement... 1996, p. 11
[49] Hawkins, J. Contract award and eligibility issues. In: Cushman & Taub (1992)

5. DESIGN RESPONSIBILITY

In terms of design errors and omissions, the design-builder is always liable for the design in the final end which is set out in the definition of design-build. Yet, there are many ways to allocate the design tasks between the owner and the design-build entity. The owner or his design-build consultant[50] may carry out a varying amount of design before the contractor's involvement, or the owner may just provide rough design criteria and ask the contractor to start the design. The less detailed the criteria, the more innovative the proposers can be. And vice versa, the more detailed the criteria, the more certain and uniform the proposals will be. Striking the proper balance is one of the most challenging aspects of design criteria development.

This chapter focuses on just this question, the division of labor in design between the owner and the design-builder. The classification into three types gives just a suggestive framework since the owner may involve the design-builder at any time during the design process. The types to be introduced are direct design-build, the design criteria method and the preliminary engineering method. In the first alternative, the design-builder is involved in the project already at the pre-design stage while the other two options defer its involvement varyingly as regards the design process.

As to the design process in general, the early development of the idea of a new design-build project, and its planning and program definition, follow the same conceptual steps as any other facility development project resulting in the establishment of overall project objectives. Thereafter, in design-build the owner's requirements are pronouncedly expressed in performance terms identifying those objectives which are of greatest importance in the areas of budget and cost, time schedule, and performance and appearance of the facility and/or its subsystems when completed.[51] This approach permits innovation and creativity on the part of proposers, which is one of the paramount objectives and advantages of design-build.

While the basic idea of performance-based approach was explained already in the introductory chapter (Table 7, p. 35), Table 16 and Table 17 focus on the development of performance specifications, and later Table 25 (p. 80) presents the related substantiation plan, as they are issues characteristic of design-build projects. All in all, the matters dealt with in this chapter are closely related to design-builder selection and what was presented in the previous chapter, but they emphasize the critical role of appropriate design documents in this area of client-contractor interaction.

[50] On behalf of the actual owner, the possible design tasks are usually carried out by the (design) criteria professional, which may also be a separate firm. This issue is dealt with in Chapter 8 focussing on organizational questions of design-build arrangements.
[51] Design-Build Manual of Practice (2000), Document Number 201, p. 2

Table 16. Nutshell: Towards performance specification-type design.[52]

In case the owner is willing to specify the performance of a facility, the pure performance approach may not be practical or even desirable for an entire building. It may be too laborious, or it may be too difficult to think in terms of performance. For an ordinary building an experienced design professional could, however, easily make a list of products that have a proven track record under ordinary exposures. Under this premise, we can list the acceptable products in an "inclusive multiple-choice" specification for, for instance, external wall surfaces exposed to weather :

A. Use one of the following:

1. *Face brick or concrete.*
2. *Granite, slate, marble, or filled travertine.*
3. *Ceramic, quarry, or porcelain tile.*
4. *Stainless steel, lead, copper, or anodized aluminum.*
5. *Glass.*

Because such a specification allows the design-builder to choose, it is an implicit performance specification stated prescriptively: only products that perform as required are listed. Minimum quality for each product can be defined using conventional prescriptive or reference standard specifications, most likely extremely "short-form" or "outline" specifications.

By pre-evaluating products, the owner can forestall mistaken interpretations and save the design-builder's time. Requirements' definition is rather simple since the above expression includes the idea of "do not use any other product". If we want to be more permissive without listing everything in the world, we can add "do not use" lists, as follows:

B. Do not use any of the following:

1. *Wood or wood-based products, unless specifically mentioned.*
2. *Uncoated steel.*
3. *Foam, fiber, or glass board.*

At this point, the design-builder should be able to deduce the general criteria for each application from the lists of acceptable and unacceptable products.

If the owner wishes to increase the design-builder's options even more, substitute products may be allowed and substantiation submittals defined so that the owner and consultant have enough information to evaluate them. If performance criteria are also definable, all the better – both the design-builder and the owner will have more information to work from:

6. *Other product not damaged by moisture, freeze/thaw, ultraviolet light, or ozone, with minimum 25-year expected life span.*

When this definition is used, it is likely combined with the following:

C. Substantiation for Products Not Listed:

1. *At Proposal Stage: Identify generic products proposed with suitable information showing that they meet the performance requirements specified and have been used successfully in similar applications.*
2. *During Design Phase: Identify test methods appropriate for materials.*
3. *During Construction Phase: Submit test reports on actual products to be used.*

When using this kind of a specification, the owner must be prepared to evaluate and accept or reject all substitute products listed at the proposal stage. This is reasonable, since the owner has not provided the design-builder with complete design criteria or even specific substantiation requirements.

Whether or not the owner makes a judgment at the proposal stage, the contract must have provisions that allow the owner to require the design-builder to use one of the products originally listed if the proposed substitution does not meet the owner's requirements. To that end, there must be specific substantiation requirements to determine whether the substitute product is acceptable.

[52] Summarized from: McClendon (1997)

Table 17. Nutshell: Striving for pure performance specifications.[53]

How do you specify design and construction criteria for an entire building? This is the challenge presented to the specifier by the design-build method of contracting for construction. The first rule is to state the requirements in terms that can be measured since that enables verification of that design and construction meet requirements.

A systematic approach

The following is a process for identifying requirements that can be applied to any building or building product. It does not only identify critical requirements that otherwise may be overlooked but also clarifies fundamental requirements usually taken for granted. The functions of the building elements must be the first consideration, not the function of the building, or its layout, etc.

The process is as follows:

1. Identification of basic types of building elements by function – usually by using standard classifications / nomenclatures.
2. Identification of factors that affect performance of building elements – e.g. durability-related factors: resistance to the effects of impact, moisture, corrosion, chemical reactions, aging, etc.
3. Classification of performance factors – categories are amenity and comfort, health and safety, structure, durability, and operation and maintenance.
4. Evaluation or ranking of performance factors by building element – to show which factors are relevant to which elements and their relative importance.
5. Writing of performance statements – for each factor identified as important to an element.

The statement should involve the requirement itself, the criteria of verification and one or more methods of substantiation (see Table 25), possibly to be used in different phases of the project. A requirement usually has both a qualitative and a quantitative component, that is, at least one statement of need and one of number.

Example

As a result of the above procedure, the performance specification for an Exterior Wall may look as follows as concerns amenity and comfort, and durability:

Amenity and comfort

- *Factor:* Water intrusion
- *Requirement:* "Keep water out of interior of building under conditions of rain driven by 40 km/h (25 mph) wind."
- *Criterion:* "Water Penetration Resistance: No leakage to interior when tested in accordance with ASTM E 330, at 300 Pa (6.24 psf) differential pressure with 205 l/m2/h (5 gal/ft2/h) water."
- *Substantiation:* "Mock-up test report on assembly identical to that to be used in project."

Durability

- *Factor:* Water intrusion
- *Requirement:* "Prevent water intrusion into interior of wall under conditions of rain driven by 40 km/h (25 mph) wind; with the exception that controlled water penetration is allowed if materials will not be damaged by presence of water, if continuous drainage paths to the exterior are provided, and if water passage to the building interior is prevented."
- *Criteria:* "Water Penetration Resistance: Either no leakage to interior when tested in accordance with ASTM E 330, at 300 Pa (6.24 psf) differential pressure with 205 l/m2/h (5 gal/ft2/h) water" or "Water Absorption of All Materials in Contact with Moisture: 0.3 percent change in volume, maximum, when tested in accordance with ASTM C 272 by total immersion."
- *Substantiation:* "Mock-up testing specified above" and "Construction drawings showing paths of water movement, with particular attention to changes in direction or orientation and joints between different assemblies" and "Test reports for all materials in contact with moisture."

[53] Summarized from: McClendon (1998)

5.1 Direct design-build

5.1.1 Description

Direct design-build refers to the practice, where the design-builder becomes involved in the project prior to the start of the actual design phase on the basis of the owner's predesign information such as feasibility studies or maybe a project program.

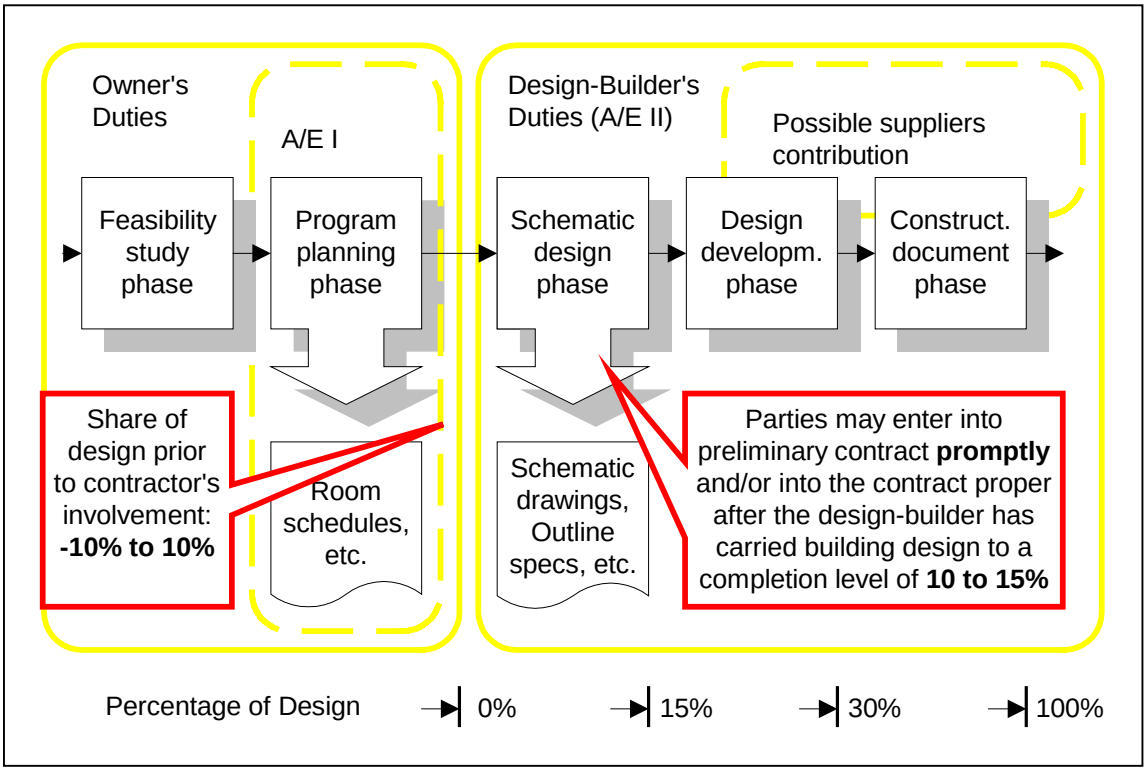

Figure 4. Division of labor in design in direct design-build.

A building project can be considered to have begun when the owner realizes the idea or need for a facility. Financial feasibility studies, budgeting and other possible pre-design activities follow next. Thereafter, the design criteria consultant may continue the planning or, alternatively, the owner may instantly employ the design-builder to carry out programming and/or schematic design activities which is the theme of this chapter.

The information given to the design-builder is still very general in most cases: the purpose and special characteristics of the building, extent and number of various spaces, type of amenities, desired quality, budget and other goals pertinent to the project. The subsequent programming and design is actually made by the design-builder despite the interaction and the owner's review and approval procedures involved.

Under a direct design-build arrangement, there are two typical ways to proceed:

- Firstly, it is not unusual for the initial program definition services to be performed on the basis of an oral understanding or a simple letter of agreement—a more complete contract is developed once the project is better defined. Thus, after the first contact and discussions on the project, the design-builder works for project planning with the understanding that if the owner is happy with the design-builder's proposal, the design-builder will be engaged to do subsequent design and construction. The proposal work is generally part of the marketing of the design-builder which is not properly compensated for by the owner.
- Alternatively, the owner may enter into contract with the design-builder relatively promptly instead of negotiating about the design-builder's evolving proposal. Typically the agreement authorizes the design-build entity to do preliminary design and outline specifications only to provide the owner a checkpoint before committing himself to completing the project. New negotiations are then needed on the basis of the design-builder's proposal. Since the work is based on a contract, the deliverable by the design-builder in the initial phase may be considered to be more complete than that made on the basis of the negotiated approach.

This approach, where the design-builder produces nearly all the design, brings up the question of ownership in case the parties are not able to conclude a final contract on the completion of a project. Although this is not a dilemma specific only to the direct design-build practice, it is dealt with here in Table 18.

5.1.2 Pros & cons

Early involvement of the design-builder does not promote project-specific extensive competition. Instead, the competition occurs more on the market level: the design-builder needs satisfied customers and successfully implemented projects in order to have a good enough reputation to win new ones. The consequences of this fact and the mode itself are dealt with in Table 19.

Table 18. Nutshell: Ownership of the design.[54]

Due to the numerous different operational modes and contracting options used in design-build projects, it is not self-evident who owns the design. Yet, ownership can have broad-ranging implications for members of the project team.

Motives for design ownership

It is obvious that all parties want their ownership rights. The reasons are the following:

- A project owner may want ownership rights for two reasons. Firstly, it wants to protect itself in the unlikely event that the design-builder is terminated. Secondly, the owner may feel that it has paid for the rights by commissioning the design-builder and by paying the resulting fee.
- A design-builder seeks design ownership as well. Congruently with the thinking of the owner, the design-builder aims to prevent the owner from terminating it after design completion simply to save money during the construction phase. Another important reason for seeking ownership is that the design-builder wants to preserve its ability to use the design concept in other projects.
- An architect/engineer, which subcontracts to the design-builder, can make a compelling case that it should own the design. This concerns particularly cases where its team was unsuccessful in a design-build competition and the A/E was not compensated for its services. Besides, in case the design-build team is successful, the architect naturally wants to protect itself from the event that the contractor changes the subcontracting architect after the schematic phase.

All the above arguments are reasonable. For instance, it makes sense for a design-builder to retain its rights to use the design in other projects. The major benefit of design-build is the integration of design and construction which also results in a learning effect, better constructibility, and moreover, should spur design-builders and their subs to product development and productification in order to improve their competitiveness in the market. This will also benefit the entire property sector. Thus, denying the design ownership right to the design-builder would, possibly, also eliminate some of the long-term benefits design-build offers.

Correspondingly, in case of a design competition, it would be unreasonable for an unsuccessful design-builder or the architect/ engineer to lose its ownership of design. Firms also tend to expend considerable efforts already in project preparation and marketing phase. On the other hand, some jurisdictions have upheld the client's right to use the design he has paid for.

Contract clauses

While the standard forms of contract published by the AGC, AIA, DBIA and EJCDC (see Table 54, p. 140) address the issue of design ownership, each takes a slightly different view of ownership. AGC confers ownership to the design-builder, while AIA confers it to the architect of record. EJCDC confers ownership rights onto both the design-builder and owner, although there are caveats on liability should the owner use the design in another project. DBIA, again, addresses, the ownership to the design-builder while in the case of termination the owner gets a limited license to use the documents to complete the project in question by paying a stipulated sum. Then, the original design-builder is relieved of all liability.

Anyway, the contract should focus on the question of ownership and, moreover, it should be integrated with the clause of termination for convenience. In that case, the design-builder should be paid: the more, the further the project has progressed. Compensating the design-builder for its costs in the preparation phase of the work is hardly adequate. It should not be possible for the owner to obtain the design-builder's valuable design concepts and management approaches, terminate for convenience, and then invite bids for the construction.

[54] Partial sources: Loulakis, M. (1997) Who Owns the Design? Design-Build Dateline, vol. 4, no 2 (March–April 1997), pp. 14 - 15 AND Design-Build Manual of Practice (2000), Document Number 510, p. 29

Table 19. Advantages and drawbacks of the direct design-build mode.

Advantages	Drawbacks
• Direct design-build offers a quick and easy start when fast completion is of primary importance, or no significant benefits could be derived from the use of the competitive process, i.e. due to building type, market situation, etc. • The mode involves the actors of the construction side in the process so early that constructibility issues should be taken into account in the best possible way. • The mode offers a good basis for strategic project-to-project alliances, which enable the accumulation of knowledge and increasing understanding of the owner's needs on the design-builder's side and may be very fruitful for both parties.	• Competition concerns the fee and preconditions for efficient production at the most, which means that competition on project- specific terms is somehow limited if compared to some other procedures. • The survey and definition of the owner's needs and requirements are dependent upon the design-builder's ability and activity, which may, in some cases, pose a risk to the owner or require certain incentive mechanisms to assure a successful outcome. • An analysis of alternatives is likely to be more restricted than in those modes that subject the generation of various design, product and productional solutions to competition.

5.1.3 Applicability

Appropriateness. Owners that use direct design-build often rely upon the design-builder's expertise to actually develop the overall program and scope of work. This may be due to earlier cooperation or the design-builder's products and references especially in the case of special purpose buildings. Another reason for the use of direct design-build may be that the owner wants to complete the project fast.

Compatibility. As concerns the design-builder selection process, involvement of the design-builder prior to the actual design phase typically leads to *qualifications-based selection* where the design-builder's fee and other services are subject to negotiation/competition. In very simple projects, where the owner's requirements can be defined accurately enough just by a project program, competition based on a technical proposal and firm price might be used. Thus, *two-stage selection* may be of relevance here as well. On the other hand, the early selection of a design-builder hardly enables a *fixed price* contract but requires some other arrangements as explained earlier.

5.2 Design criteria method

5.2.1 Description

Design criteria-type design-build refers to the practice, where the design-builder becomes involved in the project on the basis of the owner's design criteria that define the owner's requirements and wishes and direct the subsequent design process, but do not dictate the architectural and technical solutions.

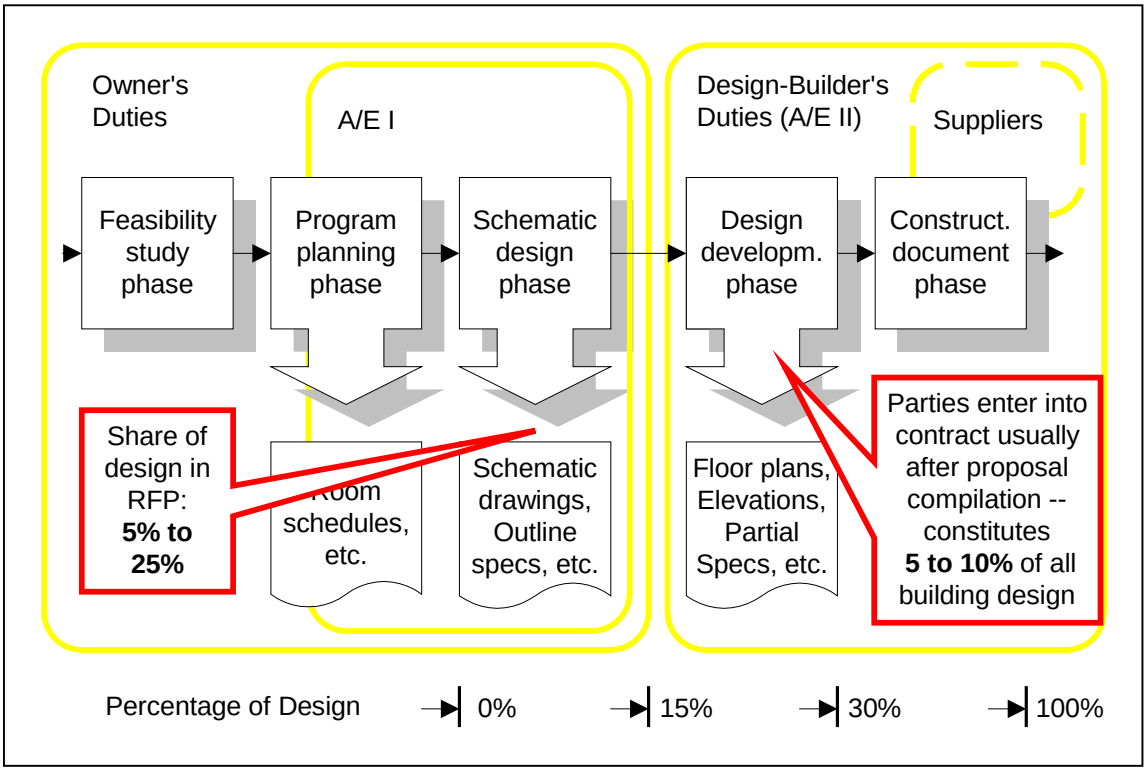

Figure 5. Division of labor in design in design criteria-type design-build.

In a design-build project according to the design criteria method, the owner prepares a statement of facility requirements that directs the design-builders' subsequent proposal design and is comprehensive enough to assure compliance by the offerors, but avoids restrictive details that would inhibit creative solutions. This means that the owner's design professional improves the general project scope definitions and space itemization from the programming phase which results in the owner's design criteria package.

The design criteria package consists typically of:

- site plan and information
- space program including a schedule of rooms with their type/use, number and area

- room-specific criteria for finishes, fixtures and fittings, services and environment
- outline specification for components to be used
- diagrammatic floor or space plans, or schematic design, and
- other pertinent criteria.

The extent and format of the criteria package may also vary considerably. Table 20 presents a practical example.

The completed criteria package is incorporated into the owner's business elements as regards the project. In competitive design-builder selection the combination forms the Request for Proposals (RFP). Correspondingly, business elements include contractual terms and conditions, time and place for receipt of proposals, schedule requirements, bid and contract bond requirements, and basis for evaluation and selection.[55] A framework for an entire RFP was given above in Table 11 (p. 51) in the context of competitive two-stage design-builder selection. Table 21, again, details an actual RFP which includes the design criteria of Table 20 referred to earlier.

5.2.2 Pros & cons

When facility requirements and quality standards are stated in performance terms and related to recognized industry standards, the approach not only makes owners consider their needs carefully, but avoids restrictive details that would inhibit creative solutions. Thus, the mode represents design-build at its best as can be judged from Table 22. Besides, design criteria-type design-build tends to promote the development of the building industry in the long run.

5.2.3 Applicability

Appropriateness. Design criteria-type design-build is appropriate whenever the owner has certain requirements and is able to define them unambiguously enough. However, it is not always easy to define the owner’s needs and wants, especially when the concept of quality is subjective or experience-related as in the case of special architectural projects. Accordingly, the design criteria method has traditionally been used especially in power plant and industrial plant projects. Recently, the method has been used for various building types successfully, and major efforts have also been taken to develop the practice.[56] Thus, the method will obviously increase in popularity in the future.

Compatibility. The mode is typically used in combination with the competitive selection process, which takes the form of *two-stage selection* and includes design-builders' design proposals that meet design criteria. Then the selection is generally based on the best value (*value-oriented approach*) and results in a *guaranteed maximum price* or *fixed price* contract.

[55] Design-Build Manual of Practice (2000), Document Number 201, p. 3
[56] See e.g: Smith (1999)

Table 20. Mini-case: Design requirements in a design criteria type project.[57]

The City of Falls Church, Virginia, issued a Request for Proposal for a new fire station and multi-purpose center as introduced in Table 21.

The most extensive part of the RFP are the Design Requirements. The following sheds light on the part's elements and format – all documents of letter size.

Space Program (2 p.)

Schedule of rooms, their description, quantity, net square footage per each, subtotal for all similar rooms, and total gross square footage (calculated from the above using a factor of 1.25).

Building and Site Concept diagrams (2 p.)

"Bubble diagrams" that roughly describe the mutual location of various space groups (e.g. rounded rectangles for Administration, Residential, Support, Operations, and Staff Parking, Practice Area, etc.). The diagrams do not, for instance, picture individual rooms but bigger functional type entities of the building—less than ten entities while there are about 40 room types defined.

Site Design Criteria (4 p.)

Design narrative for the site organization, functions, equipment, etc.

General Building Design Criteria (5 + 1 p.)

Design narrative on the building level describing the functions in the prospective building: staff and equipment, operations and their interrelations, etc. (5 p.)

A matrix presenting the individual rooms and their finishes (base, walls, ceiling and floor materials, e.g. concrete, carpet, tile, etc.; 1 p.)

Outline Specifications (62 p.)

Specification of products and execution following a standard classification, e.g.:

08520 ALUMINUM WINDOWS

General: • Windows in all station areas should have operable sections with screens. • Provide drip caps at all sills. • Do not use steel sash or wood windows. • All windows to be thermally broken. • Windows will be opened on a regular basis. All operators must be attached and easily accessible.

Products/Materials and Fabrication: • Thermally broken system. • Window operation should be by crank or under screen push bar. Do not use operators through the screen or ones that require screen to be removed. • Use casement or awning type windows. Do not use sliding type windows.

Execution: • Verify clearance of window operator with blinds.

Individual Room Criteria (48 p.)

Requirements listed per room type, e.g.:

STUDY LIBRARY/CONFERENCE

Floor Area: See program area.
Function: Library space for administrative functions.
Adjacency: Locate adjacent to general office.
Finishes: See Program Finishes.
Windows: Not required.
Room Design: Controlled access door lock. • Library shelving (N.I.C.). • Provide four (4) study desk/cubicles user friendly type (N.I.C.). • Noise control through STC-rated wall and floor ceiling designs.
Mechanical Design/HVAC: 68° – 78°. Zoned with offices.
Electrical Outlets: Four 125 volt, 20 amp duplex outlets.
Lighting Design: 60 foot candles, recess mount fluorescent fixtures with switch at entrance.
Telephone Outlets: Two.
Other/Electrical: Cable and pull wires for potential computer links (2).
Notification Speaker: Ceiling type with adjustable volume control wall switch.

Sustainable Building Practices (2 p.)

General guidelines.

[57] Presentation is based on: City of Falls Church in cooperation with Falls Church Volunteer Fire Department, Arlington County Fire Department and Dewberry & Davis (1997) Develop-Design-Build, City of Falls Church Virginia Fire Station.

Table 21. Mini-case: RFP in a design criteria-type project.[58]

The City of Falls Church (Virginia) intended to issue a GMP contract for the design and construction of a new fire station and multi-purpose center, app. 22,500 square feet in size. The estimated budget of the project was $4.2 to 4.8 million and the develop-design-build entity was expected to provide an adequate parcel of land for the project.

The owner hired a Design-Build Consultant, Fairfax (Virginia) based Dewberry & Davis, to work for the project and, for instance, contemplate the RFP for the project.

Request for Proposal (RFP)

The contents of the RFP issued for the project are roughly the following:

1. Invitation to proposers. (½ p.)
2. Identification of Owner, Consultants, Evaluation Committee, and (the concept of) Proposers, and Contractor. (½ p.)
3. Instructions to Proposers: Proposal process, Bonds, Construction time, Provision of land, Licensing, Insurance, Regulations. (7 p.)
4. Submission requirements (1 p.); *see the corresponding section below.*
5. Conditions. (½ p.)
6. Method of Award (½ p.); *see the corresponding section below.*
7. Agreement and Bond Forms. (16 p.)
8. Facility Design Requirements (126 p.): *see* Table 20 *for more information.*
9. A/E Project Procedures Requirements: services, specifications, drawings, cost estimates, and submission to be provided by the design-build contractor. (23 p.)

Submission requirements

In addition to technical part, a proposal was supposed to consist of a management plan and specified forms. These were to include the following items:

1. Proposal Form
2. AIA form A3 10, Bid Bond
3. Bonding Company Letter
4. Copy of Proposer's Virginia License
5. List of the names accompanied with the previous experience of the overall Project Manager, Architect, and Construction Manager […]. A description of the project management methodology to be applied by the teams is to be included.
6. Appraisal, phase I environmental site analysis, and land title documents […].

The technical part – the proposer's concept in relation to the requirements, schematic concept, etc.—had to be demonstrated clearly. The format was free but, at a minimum, the proposal should have contained the following:

1. Conceptual Site Plans (to scale)
2. Conceptual Landscape Plans (to scale)
3. Conceptual Building Floor Plans
4. Conceptual Building Elevations (≥ 3)
5. Mechanical System Narrative
6. Electrical System Narrative
7. Plumbing System Narrative
8. Structural System Narrative
9. Utility Systems Narrative
10. Flow Diagrams – Site & Building

Method of Award

The contract was to be awarded in consideration of the following:

1. Proposals will be reviewed for completeness and adherence to mandatory submission requirements
2. Complete submittals will be rated by the Evaluation Committee based on the following criteria:
   - Proposed cost (30 points maximum)
   - Proposer's Management/Supervisory Personnel (30 points maximum)
   - Analysis of site and site design (20 points maximum)
   - Analysis of building and systems design (20 points maximum)
3. All Proposers will give a brief presentation (20-30 minutes) to the Evaluation Committee […].
4. Notice of Award will be made to the highest rated Proposer […]. If the parties are not able to enter into contract, attempts will be made to negotiate with the second-highest rated Proposer.

Actualized scoring is presented in Table 33.

[58] Presentation is based on: City of Falls Church in cooperation with Falls Church Volunteer Fire Department, Arlington County Fire Department and Dewberry & Davis (1997) Develop-Design-Build, City of Falls Church Virginia Fire Station.

Table 22. Advantages and drawbacks of the design criteria method mode.

Advantages	Drawbacks
• The mode combines the owner's possibility to strictly define what he wants and the leeway needed for the constructor to optimize the design and construction part of the building efficiently. • Multi-criteria-based competition becomes possible and is a powerful tool ensuring both the effectiveness of the to-be-selected design solution and the efficiency of the delivery due to comparable solutions offered in competing proposals. • Focussing on actual performance of the intended building in design enables the use of performance-based guarantee clauses whenever appropriate, which again decrease the owner's risks considerably.	• Customers and designers are used to thinking in terms of materials and solutions, not in terms of performance, which may confuse and complicate the use of the design criteria method.

5.3 Preliminary engineering method

5.3.1 Description

Preliminary engineering-type design-build refers to the practice, where the design-builder becomes involved in the project on the basis of a preliminary design solution, which defines the shape, massing and layout of the prospective building, and may give strict guidelines or solutions for many technical components of the project.

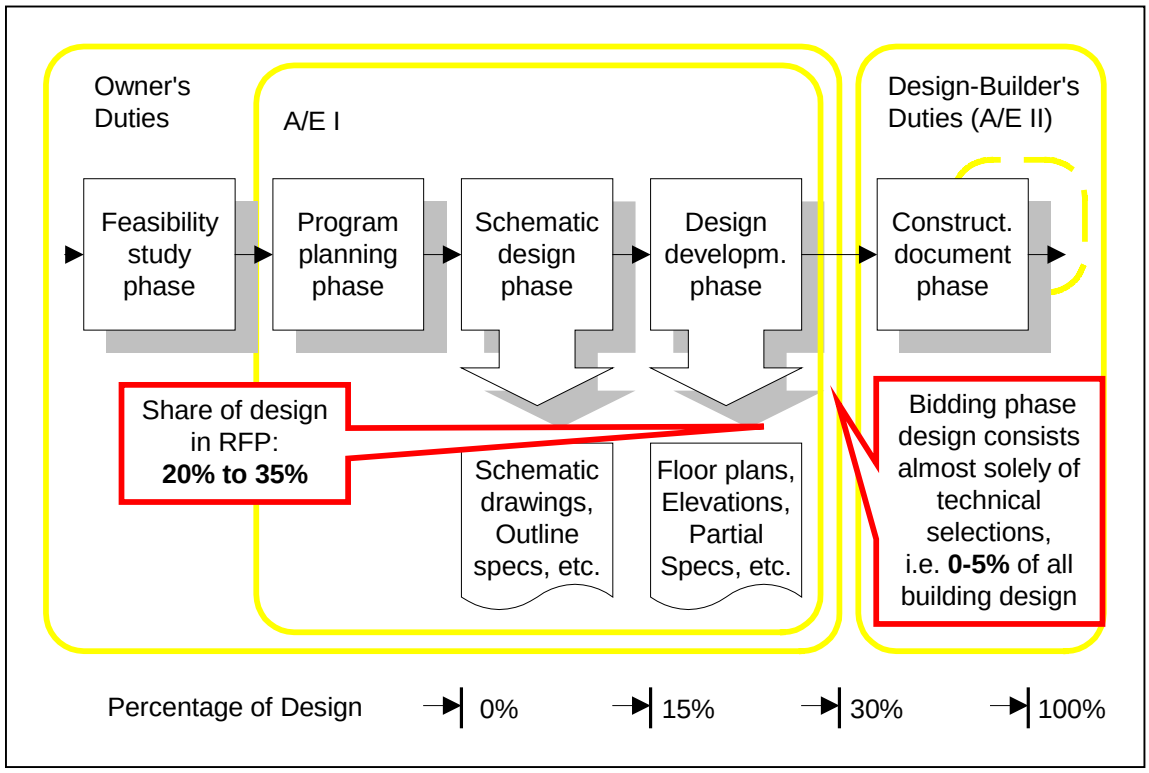

Figure 6. Division of labor in design in preliminary engineering-type design-build.

The design-build RFP specifications often combine elements of design and performance while the owner's consultants often carry out the schematic design phase and continue into the design development phase, and maybe even partially into the construction document phase. Design development as a phase refers, again, to evolution of design that defines the functional and aesthetic aspects of the project and the building systems that satisfy them. Therefore, in addition to documents of earlier design phases, also the following elements are often completed before the design-builder's involvement:

- architectural drawings that include floor plans, elevations and sections, and

- technical design where the structural, mechanical, and electrical systems are developed by selecting the type of systems, etc.

Additionally, many details can be designed and many materials specified (cf. Table 23). Naturally, the primary aim is still that the building is defined in terms of performance specifications that merely set forth the operational characteristics or end result desired, without saying how that result has to be achieved or the product constructed. It may be, however, that the owner designs the systems and components that are critical to him but leaves the others alone. Thus, the preliminary engineering method does not mean that the owner would progress in all design areas and disciplines equally although some of the design aspects of the building were closed.

5.3.2 Pros & cons

The preliminary engineering method also has some benefits and drawbacks compared to the other options as presented in *Table 24*. The method, however, covers a wide design continuum, and therefore the table has been completed in relation to the above-presented alternatives. In other words, the table reminds the reader about the possible consequences of extensive design prior to the design-builder's involvement (cf. especially design-draw-build in Section 5.4 below).

5.3.3 Applicability

Appropriateness. The mode is appropriate, especially, when the owner has a continuous construction agenda for the construction of special-purpose buildings and, due to his experience, is the best expert on such special projects or certain parts of them. The reason for using the preliminary engineering method may, however, be the opposite as well: if the owner is not able to define certain requirements for the project, it may be reasonable to iterate the design with a consultant until the owner feels confident. For this reason, the preliminary engineering method has been used a lot. Also, buildings of a monumental nature may be a good enough reason for the owner to select the described approach.

Compatibility. The larger the owner's share of design, the more likely the design-builder is selected by means of *bridging-type selection* while *two-stage selection* would also be highly relevant. Correspondingly, the weight of the price offer is likely to increase as a selection criterion as the design proceeds (cf. *price-oriented approach*) although the *value-oriented approach* should still be the basic solution.

Table 23. Mini-case: RFP in a preliminary engineering-type project.[59]

In summer 1998, The U. S. Postal Service issued a cost reimbursable design-build contract to design and construct a new 352,000 gross square foot Processing and Distribution Center in Spokane, WA.

Completion time for the entire project was defined as 450 calendar days, i.e. from notice to proceed until completion of construction. The estimated cost range was between $28,000,000 and $35,000,000. Material handling equipment was provided under separate contracts but coordinated with the project by the design-build firm.

Request for Proposal

Five firms were prequalified for the second phase of the two-stage selection, where the solicitation package included the following volumes and items:

1. *Proposal development documents*. Consists of contract conditions and requirements for project procedures. ~180 p.
2. *Master plan report; Ground lease Agreement; Phase 1 environmental site assessment; Geotechnical report*. ~180 p.
3. *Facility planning data and functional design narrative.* Data used to calculate the needed space and project-specific design narrative. ~100 p.
4. *Standard design criteria and criteria investigative systems.* Corporate level design narrative to be followed in all projects. ~230 p.
5. *Standard detail library.* Collection of about 340 detailed drawings. ~360 p.
6. *Business mail entry unit documents.* Detailed design for a 2000 square foot compartment of the building, i.e. module for a standardized function. ~230 p.
7. *Standards for facility accessibility by the physically handicapped; Building and site security requirements; Signage: graphic guidelines; Universal wiring standards; Standard wiring specification; interior finishes and colors; and Food service.* Most of these documents are corporate level standards to be followed in all projects. ~310 p.
8. *Projects drawings.* Includes architectural drawings like floor plan, elevations, sections and safety plan, and a few civil and security plans. 13 pieces of 30"×45" drawings (& schedules) were presented.

Transcript of the pre-proposal conference (45p.), replacement documents and answers to questions in writing, etc. (~190 p.) were naturally also available to candidates well before the proposal's due date.

Rationality of the approach

The abundance of corporate standards used is the ruling character of this design-build process. The development of those standards was reasonable considering the corporation's extensive annual construction volume and the resulting repetitive use of reference design.

The USPS also wants to have a say in design despite its preference for design-build. The reason is that the function of the building type in question is specific to the USPS and it believes it has already invented the best solutions as regards its operations.

Moreover, most of the standards adhere to the performance principle and the standard detail library includes mainly details that are more closely related to operations and equipment while there is more leeway left for the constructor in structural details. For instance, many materials can be selected or substituted by the design-builder.

In practice, the design-builder is likely to use maybe half of the detailed solutions given in the standards – since there are some alternatives included – and to design plenty of them by itself. In the proposal phase, however, the USPS is not actually demanding technical proposals due to the quite detailed RFP. The selection is primarily made on the basis of management proposal and price, etc. See Table 8 for more information on competitive design-builder selection within the USPS.

[59] Presentation is based on: Solicitation for New Construction Owned Design/Build, Spokane, Washington, Processing and Distribution Center. United States Postal Service, Major Facilities purchasing. Vol 1-9 & Project Drawings, etc.

Table 24. Advantages and drawbacks of the preliminary engineering method mode.

Advantages	Drawbacks
• The owner has time to consider his needs and wishes with his consultant and to iterate the solution until fully confident since in a sequential process, changes do not cause disturbances in production. • Due to the relatively predescriptive nature of design at the time of bidding, the final result and quality are well predictable and the price can be estimated quite reliably as well. • Relatively predescriptive design by the owner may decrease the work required of design-builders in the proposal phase, which, moreover, is likely to increase the willingness of the parties to bid.	• The process may be quite sluggish so that the owner gets a reliable cost estimate or price relatively late in the process, and project completion takes time due to the sequential nature of design and construction. • In the case of far-reaching design by the owner, competition may be limited and is likely to exclude some innovative and efficient solutions produced only through performance specification-based solicitation of multiple design proposals. • Design cannot draw on construction expertise which may result in poor constructibility and quality while, in some cases, it may be difficult for the design-builder to utilize its regular, most efficient technology and suppliers in the project.

5.4 Summary

In this chapter, three different approaches to the division of labor in building design were presented. There is also another well-known approach, *design-draw-build,* in use. There, the design-builder becomes involved in the project, in practice, on the basis of a complete design solution, which describes the appearance and functioning of the prospective building in detail, but does not cover the details of assembly and construction technology.

The design-draw-build process adheres to the traditional design-bid-build process insofar as the owner's consultants carry out all the crucial parts of design while the call-for-bid documents are practically as advanced in both cases. The difference is, however, that in design-draw-build the owner leaves subsequent construction and/or shop drawings to the contractor to complete. Moreover, the contractor assumes liability for design and construction as an entity, and therefore, besides the term "draw-build", design-build is also commonly used in reference to this practice. According to case law, the liability has not, however been clear since the owner does all crucial design. Similarly there are many actors who do not regard design-draw-build as design-build; neither is it considered a main alternative here. It can also be stated that most of the problems of design-bid-build are inherent in the design-draw-build process while there are also some benefits.

The other presented design practices are more relevant as regards pure design-build. Regardless of the design approach used, it is recommended[60] that the owner's program should take precedence over the design-builder's proposal, unless the proposal calls attention to deviations from the program. However, as detailed design evolves and is ratified by the owner, the documents developed by the design-builder and approved by the owner should supersede both the proposal and the owner's program. This is made possible by the fact the owner and design-builder work together closely as the design is developed, and the review and approval process is structured typically at 30-60-90-100% design complete to ensure that the parties remain in agreement as the design progresses through its final stage. This reflects the reality that design-build is a dynamic process, with each party making design decisions and programmatic adjustments to reflect the evolution of the project. The owner of a project should have the right to make reasonable changes to the scope of the work to ensure that his needs are being met.

In the final end, the ultimate set of construction documents for a design-build project will, usually, be largely the same as that for a conventional design-bid-build project. However, there are exceptions and in some instances some standard designs need not be made. The dilemma of redesign can also be more easily avoided in design-build, which diminishes the amount of document versions and rationalizes the design work. During the design and construction processes conformity of the solution with the requirements is checked according to the agreed substantiation plan (Table 25).

[60] Design-Build Manual of Practice (2000), Document Number 510, p. 15

Table 25. Nutshell: The substantiation plan.[61]

In design-build, where design criteria are used instead of predescriptive specification, it is often difficult to prove that the final design and construction comply with the owner's criteria.

In such cases, substantiation requirements are principally intended to predict/ensure the result. Defining the substantiation required is as important as specifying the design/ construction criteria.

Substantiation, as such, should be included in the Request for Proposals (RFP). There any requirement on the functioning of the project element should be followed by the criteria for verification and one or more methods for substantiation as illustrated also in Table 17.

Phasing of substantiation

When the design-builder is allowed certain alternative solutions and, moreover, the criteria specification disallows any substitutions, verification of compliance is relatively easy: the design-builder has either used one of the acceptable products or not (cf. approaches presented in Table 16, p. 64).

If substitutions are allowed or, especially, if performance specifications are included, a series of submittals will probably be necessary, in increasingly more detail as design and construction progress.

The appropriate type of substantiation depends on:

1. what the requirement is
2. how difficult it will be to verify, and
3. when the owner wants to know.

All three factors combine in many different ways. A substantiation plan should be carefully developed in order to identify project stages at which information is required for decisions and what kind of submittals should be available. This means that the congruence of the intended systems with the owner's criteria has to be proven, maybe a couple of times, in a project with methods increasing in certainty.

Degree of certainty

All substantiations can be placed on a scale that rates the degree of certainty of ultimate compliance from lowest to highest:

1. A simple statement by the design-builder that the design will comply (e.g. incorporated into a contract as a promise).
2. Manufacturer's product literature stating compliance.
3. Manufacturer's warranty.
4. Testing of similar products with certification that products of the same type will be used on the project (design "proven" by testing a mock-up).
5. Documentation of performance of products installed in actual projects and use of the same products in the project (design "proven" by the use).
6. The design engineer's stamp or seal on design (when engineering principles are well accepted).
7. The engineer's design calculations (usually submitted for the project record).
8. Field testing of actual construction ranging from testing of samples taken from construction to testing in place.
9. Obvious compliance (if obvious by visual inspection or comparison, no substantiation is necessary).

Conclusions

If performance is critical to the success of the project, more substantiation of certain types would be recommended earlier in the project and multiple types of substantiation would be used. The cost of preparing substantiation should, however, be considered while over-substantiation is an efficient means to mess up the process. Typically, performance specifications make reference to industry standards, which is helpful by enabling inclusion of standard test methods to ensure that performance requirements are met objectively.

[61] Summarized from: McClendon (1997)

6. EVALUATION SYSTEMATICS

The objective of the evaluation and selection procedure is to determine the most advantageous alternative which is likely to provide the best value for the owner. In the shortlisting phase a few, usually from three to five[62], best design-build teams are selected to prepare a proposal. In the final selection, which in some cases may be carried out without a separate shortlisting phase, the best one is sought.

The evaluation may focus only on the competence and earlier performance of the candidates. It may also examine the planned deliverables, product and process properties of the prospective building in case some design has been done as a part of the offer. Thus, the range of factors for evaluation covers the candidate companies, the design-build team as an entity, and properties of the intended building and its delivery. In most cases, all these features are considered in the selection process, more or less, and they form the qualitative component to be evaluated.

Besides the qualitative part, there is also a quantitative component, which refers to the price proposal which can sometimes be a fee or a unit price instead of the more customary fixed or guaranteed maximum price. In the traditional design-bid-build process, this challenge of multiple criteria optimization is simplified by focusing on the price proposal only (while quality of all the parallel proposals is supposed to be equal since it is defined by the owner's design). In design-build the challenge is more complicated when both the qualitative and quantitative measures should be evaluated together. In an ideal situation the life cycle costs of the building and the design solution's impact on operational costs should also be subject to evaluation besides the mere purchase price.

For public agencies, especially, a strict selection method is a must and usually a prerequisite for the use of design-build due to the attention paid to public decision making under the fear of negligence and abuse. The same concerns the private sector although it is usually free to enter into contract with any of the candidates without any further ado. Usually a selection panel or "jury" is established to perform qualitative rankings in order to ensure that sufficiently versatile expertise is used in selection and all possible factors are taken into account (see Table 26).

The following examination in this chapter sheds light on a few basic selection systematics that can be used in ranking alternatives after a deep going analysis of various qualifications and proposals. They are alternatives to each other, to some degree – each has its merits and is appropriate in certain situations. Quite often they, however, complement each other due to, for instance, the two-stage selection typically used. Besides, issues related to the organization of a selection panel and its duties are also dealt with in the Nutshell boxes as a related issue.

[62] Design-Build Manual of Practice (2000), Document Number 103, p. 2 - 3

Table 26. Nutshell: Role of a selection panel and technical evaluation committee.[63]

The owner must assign to the selection panel the sole responsibility for evaluating the eligible proposals (with the possible assistance of a technical evaluation committee) and selecting the proposal which best meets the owner's announced objectives.

Selection Panel

As to the selection panel, or "jury", the following issues are relevant:

- The owner must provide a jury that is knowledgeable of the needs of the owner and able to understand the nuances and complexities of the design solutions to be submitted.
- The owner must limit his authority to accepting or rejecting the jury's recommendation. The owner may not select any proposal other than that recommended by the jury, but may reject the recommendation and start over with any other legal selection process.
- Potential design-build applicants should be notified in advance that the jury alone will make the recommendation to the owner of the winning design-build proposal. This fact, plus the identification of the jurors, will greatly influence the composition of the design-build team.

In due course, the final report of the jury, including the complete technical evaluation, will be available to the finalists after the owner executes a contract with the successful proposer, not before.

Technical Evaluation Committee.

In large and complex projects, the jury can benefit from the utilization of a technical evaluation committee or panel. This group of technical and functional “experts” is normally composed of those responsible for the compilation of the facility requirements and performance specifications in the RFP.

They may be employees of the owner, representatives of the facility users, or the owner's technical and building type consultants. The role of a technical evaluation committee is as follows:

- Their responsibility is to evaluate each proposal in the area of their expertise and experience. They may score or rank those portions of the proposal relative to the same area of competing proposals, and relative to the minimum requirements of the RFP.
- They are not expected to evaluate the broader, subjective areas of the design proposals, such as building image or impression. They may not provide the jury any overall ranking or scoring of the proposals, only sectional evaluations.

The committee's reports to the jury should be presented both in writing and orally. Technical evaluation committees function as technical staffs of the selection panels. The evaluation reports serve as supplementary documents in the jury's final report to the owner, and can assist the owner in briefing the competing design-build teams, after the selection process has been concluded.

In less complicated projects, the role of the technical evaluation committee can be assumed by one or more of the jury members.

Interviews and presentations

Besides the mere evaluation of deliverables, the jury is the party responsible for evaluating oral presentations by proposers as part of the selection process. There are a few issues that support making presentations:

- Oral presentation gives a team the possibility to summarize its unique strengths and clearly demonstrate why its proposal should be selected. It might be that these issues would not get the same emphasis otherwise.
- Oral presentation demonstrates how the team members work together under competitive pressure, and even more, how well they would cooperate with the supposed client. Sometimes the jury even allocates a few points on the basis of the oral presentation.

[63] Modified from: Design-Build Manual of Practice (2000), Design-build RFQ/RFP guide, pp. 16–17, 23, 26.

6.1 Quality-oriented approach

6.1.1 Description

Quality-oriented evaluation systematics refers to evaluation methods and processes which focus only on qualitatively defined factors while excluding the final costs of the contract, or consider them much the same.

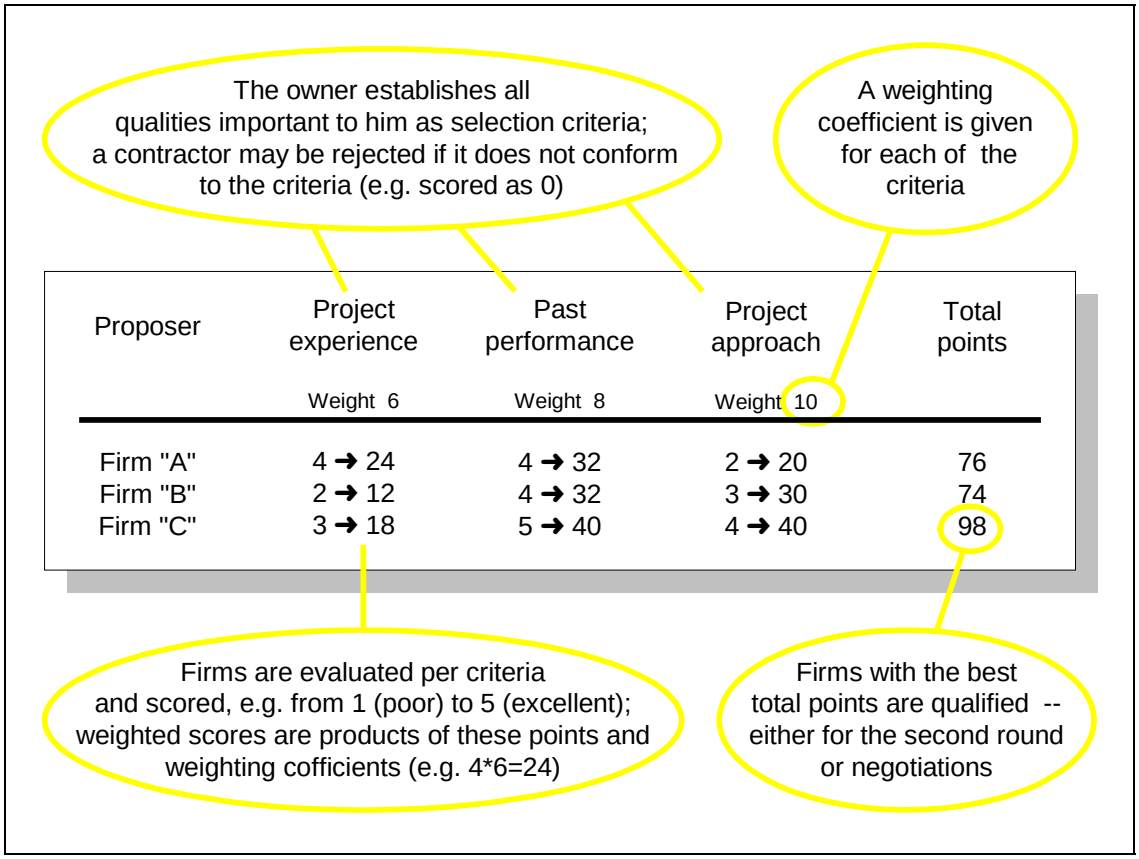

Figure 7. Quality-oriented evaluation using weighting coefficients.

In design-build team selection there are numerous qualitative factors to consider when figuring out the owner's diverse interests, weighting the importance of corresponding subjective requirements, and evaluating qualification statements and proposals as regards requirements. Such multivariate qualitative evaluation is used in qualifications-based final selection and as a partial solution in any value-oriented selection. It is also used in narrowing down the field of competitors in the early phases of a project as described in Table 27. Table 28 gives a practical example.

Table 27. Nutshell: Narrowing down the field of competitors based on qualification.[64,65]

Prequalification and *shortlisting* are terms related to the selection and narrowing down of design-build teams to compete or negotiate for a project:

- *Prequalification* refers to the procedure where by many owners and agencies establish minimum qualifications with respect to all their projects or evaluate and classify the contractor's general suitability for various projects or as a partner. The prequalification process focuses on separating qualified constructors from unqualified ones, not on rank-ordering them.
- *Shortlisting* refers to the narrowing down of the field of offerors through the selection of the most qualified proposers on the basis of qualification, i.e. rank-ordering the candidate teams so that the best qualified companies can be determined. The number of shortlisted proposers invited to submit final proposals is most frequently between three and five.

Philosophically, prequalification is a little bit more history-oriented while shortlisting always considers the project at hand – and its future. Thus, we could say that prequalification aims more "to avoid constructor failure" while shortlisting aims "to ensure project success".

These two functions can be emphasized at different stages. However, quite often the first stage of the two-stage design-builder selection process involves both the described objectives and the handling of data from both viewpoints. In that case no separate prequalification is done.

The meaning of shortlisting

Shortlisting has several meanings. Above, it was noted that it is needed to find the most capable contractors available for the project. But that is not the only reason.

Shortlisting is also needed, firstly, to narrow down the number of candidates since the cost of preparing full design-build proposals is considerable. Thus, it doesn't make sense to request full proposals from too many offerors who, thus, have little chance of winning the award. The proposers must be able to assume that they have a realistic chance of being successful in order to give their best and most competitive efforts.

The second reason is, in fact, to ensure offerors' serious interest towards the competition. This is likely to benefit the owner in the form of excellent proposals despite the perceived lack of competition. Moreover, the resources required of the owner to meaningfully evaluate a large number of proposals can be considerable and go to waste.

Breaking down the selection criteria

Selection criteria for shortlisting are issued in a Request for Qualification (RFQ, see Table 10, p. 50), or the owner may authorize negotiations with the most qualified design-build firm available by utilising references and/or previous owner experience with the firm as justification for the selection.

Selection criteria can be divided into minimum requirements and evaluation criteria proper. The minimum requirements for consideration for prequalification should be as objective as possible, while evaluation criteria are, by nature, a combination of subjective and objective factors. For instance, it may be required that the companies, separately or as a team, have gained experience from a certain number of design-build projects. However, the owner may be more subjective when he values and scores the different types of experiences of different candidates that exceed the minimum required.

Another example of minimum requirements are minimum insurance, minimum bonding capacity (and proof thereof), required licensing or registration and tax status, and limitations on the geographical location of the team members. The owner may also require certain specialty consultants to be involved in the team.

[64] Partial sources: Design-Build Manual of Practice (2000), Design-build RFQ/RFP guide, p 20; Document Number 201, p. 4

[65] For more information on prequalification methods in general: Russell (1996)

Table 28. Mini-case: Evaluation criteria for the qualification phase.[66]

The City of Falls Church aimed to negotiate a contract for the develop-design-build (DDB) services concerning a fire station and multi-purpose center in 1997.

A two-phase selection process was used. The scoring criteria for the evaluation of qualification in the first phase are listed below as condensed from RFQ. The top qualifiers were those submitters who scored the highest number of total points (max. total points: 100).

1. Experience: 25 points maximum

Primary consideration will be given to comparable projects that the entire develop-design-build entity has successfully completed as a team within the last five years. "Comparable projects" are defined as […]. Other projects which would receive favorable consideration are: design-build projects that establish contractor's past relationships; comparable design-build projects as part of another design-build entity; and separate design or construction contracts for comparable facilities. […]

2. Past Performance: 25 points maximum

Past performance will be based on evaluation of responses to reference checks for listed projects. As to the design/construction stage, the primary areas of concern will be performance of design-build entity with regard to costs, schedule and quality during design and construction stages. Particular attention will be given to performance in fire station projects […]. Operations/maintenance checks will be primarily concerned with owning and operating costs, maintenance experience, systems' reliability, energy efficiency, and repair requirements for listed projects.

3. Proposed Site: 25 points maximum

The proposed site will be evaluated on the basis of proximity to the existing fire station, overall size of the site, buildable site area, site access, location relative to street system, and other site features […].

4. Organization: 20 points maximum

Total expertise, capability, structure, and resources of the design-build entity to adequately handle building construction and systems installation where required. […] Only data relevant to the offices that will actually be responsible for the execution of this work will be considered. Identify specific participating organizational elements; location of units; reporting relationships and functions to be performed by each unit; successful past working relationships; key executive who will have overall responsibility; key management personnel to be assigned to the project; resumes of key personnel; and professional staffing levels.

5. Backlog: 5 points maximum

Demonstration that resources necessary to maintain backlog at a satisfactory level are available.

6. Financial Capability: Pass/Fail

Inclusion of audited and/or interim financial statements; completion of Income Statement Evaluation Form; total bonding capacity; written and/or verbal bank references; and determination that the develop-design-build entity possesses sufficient resources to successfully complete project.

7. Responsibility Verification: Pass/Fail

No pending claims or lawsuits that could prevent successful completion of project. No debarment or other adverse legal action.

Data collection

A questionnaire was used to collect much of the needed information in order to assure its comparability and comprehensiveness. For the parts, which the teams had to arrange by themselves, more detailed guidelines were given. A reference to those questions and guide items was made in the context of evaluation criteria in order to clearly understand the contents and meaning of each item.

[66] See page 73 (Table 21) for further information on the project. Presentation is based on: City of Falls Church in cooperation with Falls Church Volunteer Fire Department, Arlington County Fire Department and Dewberry & Davis (1997) Develop-Design-Build, City of Falls Church Virginia Fire Station.

On the other hand, Table 29 sheds light on how to develop corresponding evaluation methodology, and it also gives an example of the qualitative selection criteria and their relative weighting in the RFP stage. In both cases, the presented elements may and should be reduced or omitted by project.

There are various alternative approaches[67] besides numerical scores for evaluating and ranking various alternatives by criteria, that will be discussed later on:

- **Adjective rating system**: means of describing verbally the qualities of an object. They may be rated using different levels of descriptors. For instance, one may use a three-descriptor system including the terms *Acceptable*, *Marginally acceptable* and *Unacceptable*, or a six-descriptor system including the terms *Outstanding*, *Highly Acceptable*, *Excellent*, *Good*, *Fair* and *Poor*. Criteria for all descriptors also have to be defined (cf. example from the practice in Table 30).
- **Color coding system**: means of describing the qualities of any object by different colors. System is very similar to adjective rating and, in fact, the correspondence of the colors to be used in an evaluation with different adjectives and their definitions has to be defined prior to evaluation, e.g. *Green*/*Acceptable*, *Yellow*/*Marginally acceptable* and *Red*/*Unacceptable.* The main benefit of the use of colors is that they visualize the differences and the comparable situation in general.
- **Notational coding system**: means, in general, of using marks or labels in the ranking. These can be visual symbols or, for instance, a plus (+) may be used for qualities which exceed minimum requirements, a pellet (○) for those properties, which meet the requirements but do not note worthily exceed them, and a minus (-) sign for proposals which don't meet the requirements. Also, more than one symbol can be used at time, which makes the system more like numerical scoring systems.

These methods give a clear understanding of the relative merits of each proposal. Yet, they can only work as a guide to best value selection since the methods do not actually support the methodological summing up of the ratings and ranking of proposals. Instead, they recognize evaluation as disparate, subjective judgements of the evaluators.

Numerical methods, again, are based on the assumption that a more methodological approach can offer a useful guide to intelligent decision making although they may not be aimed to control the granting of the award by themselves. In these methods evaluators score various properties with numbers from a predefined scale, e.g. from one to five – a zero can be assigned if the property is unacceptable. The main motivation for this is that, besides the possibility of straightforward calculation, weighting coefficients can be used to take the relative importance of various criteria and properties into account. In this respect the following two approaches are the most relevant:

- **Property coefficient** method assigns weighting coefficients to each property that is to be assessed. These coefficients depict the relative importance of each property so that the same intelligible scoring scale can be used for all properties of different

[67] These approaches have been largely discussed by Nash & Cibinic (1993)

Table 29. Nutshell: Setting the selection criteria and weighting.[68]

In design-builder selection involving qualitative issues, the selection criteria are typically numerous and partially subjective. Thus, it is helpful to apply an analytical methodology to the evaluation process.

Systematics approach

Development of a selection methodology and implementation of selection may then take the following form:

1. Establish the set of criteria against which each firm being considered will be evaluated.
2. Define the minimum requirement per criterion that determines the minimum acceptable level of satisfaction.
3. Develop a scoring system and scale per criterion.
4. Place a value against each criterion which reflects its relative importance in the evaluation.
5. Draw up a system indicating how the best value is concluded as a sum of criterion-based evaluations.
6. Evaluate each design-build firm against the criteria and rank each according to total value.
7. Evaluate which proposals, that would fall in the competitive range but are unacceptable according to some criterion, could be fixed and take the needed measures.
8. Finalize evaluation considering the changes.
9. Conduct negotiations for fees and contract terms with the highest-ranked firm. If agreement cannot be reached, negotiate with the next-ranked firm.

While this process may result in detailed and systematic evaluation systematics, like the numerical method with weight coefficients, etc., it is only a tool for the owner to use in comparison. This means that decisions need not be strictly based on the methodology unless so indicated to competitors.

Presenting selection criteria in RFP

It is highly important to inform proposers of the owner's values so that they can optimize their proposals to meet the values as well as possible. While taking the above-presented freedom needed by the owner into account, the following could be a good compromise for presenting qualitative selection criteria and their scoring in the RFP.

Selection criteria	Maximum Score
Technical Criteria	65
• Structural system, Exterior Finish Materials, Roofing systems, Site Layout and features, Landscape provisions, Mechanical system, Plumbing system materials, Interior finish materials, Interior hardware and fixtures, Interior door units/Wall systems, Floor and ceiling systems, Power systems, Data systems	
Project-Specific Management Plan	20
• Management plan and organization, Resumes of key personnel and managerial personnel, Quality assurance plan, Safety plan, Minority and disadvantaged business participation plan	
Project Schedule	15
• Construction schedule and ability to meet schedule, Architectural/ engineering design schedule and ability to meet schedule, Length of construction and design schedule	
Total Maximum Points	∑100

All the criteria and points assigned to them should be adjusted or refined to correspond to project types and owner's experience; the above list is only an example. However, the criteria have to be made known to offerors in the RFP in at least this much detail.

[68] Example list of selection criteria from Design-Build Manual of Practice (2000), Document Number 402, p. 4

Table 30. Mini-case: Rating procedures and scales for proposal evaluation.[69]

In the Naval Sea Systems Command Headquarters project, which is introduced in more detail in Table 35 (p. 96), the following procedures and rating scales were used.

Technical proposals

Evaluation of the Technical/Management Factors was made on a subjective basis. The offerors' proposals were independently evaluated against the evaluation criteria set forth in the RFP and each factor received an adjectival rating. Then, an overall rating for the proposal was defined based on the evaluation of all the factors.

The technical/management worksheets provided by the Chairperson with the evaluation factors to the panel were utilized to record strengths, deficiencies, risk assessment and an adjectival rating with a reference to the RFP and appropriate area in the offeror's proposal. An explanation was provided for any specific evaluation criteria noted as a deficiency or strength.

The following descriptive adjectival ratings were used when evaluating the technical proposals:

- *Exceptional*: The Offeror has demonstrated an approach, which significantly exceeds stated requirements in a beneficial way. There is little or no risk that this offeror would fail […]
- *Acceptable*: The Offeror has demonstrated an approach, which is considered to meet the stated requirements and demonstrates a good probability of success. There is an average risk […]
- *Marginal*: The Offeror has demonstrated an approach, which fails to meet the stated requirements. The response is considered unacceptable but susceptible to being made acceptable. […] There is a low probability of success […]
- *Unacceptable*: The Offeror has demonstrated an approach, which significantly fails to meet the stated requirements. […] The risk that the offeror would fail […] is high.

A rating of Unacceptable or Marginal for any factor deems the overall technical proposal Unacceptable or Marginal.

Past-performance

Past-performance was a subjective evaluation and was not based on absolute standards of acceptable performance. Information was attained from offerors by questionnaires. Besides, the RFP alerted offerors that past-performance information might be gained also from other sources.

The following rating scale was used and each offeror assigned a past performance rating as follows:

- *Excellent*: A significant majority of the sources of information are consistently firm in stating that the offeror's performance was superior and that they would unhesitatingly do business with the offeror again. […]
- *Good*: Most sources of information state the offeror's performance was good, better than average, etc. and that they would willingly do business with the offeror again. […]
- *None or Neutral*: No record exists; or the firm has never performed under this name; or newly established firm.
- *Marginal*: Many sources of information make unfavorable reports about the offeror's performance and either express serious doubts about doing business with the offeror again or state that they would refuse to do so. However, there are some sources of information indicating that they would do business with the offeror again. […]
- *Unsatisfactory*: A significant majority of sources of information are consistently firm in stating that the offeror's performance was entirely unsatisfactory and that they would not do business with the offeror again under any circumstances. […]

Past performances were evaluated prior to receipt of technical and price proposals.

[69] Source: Source Selection Plan for Solicitation N62477-94-R-0024, United States Naval Academy, Naval Sea Systems (NAVSEA) Command Headquarters, Washington Navy Yard, Washington, D.C.

importance. The overall precedence of each comparable alternative is calculated by multiplying each property-specific score with its weight factor and summing up the resulting products.

- **Confidence coefficients**[70] method segregates the evaluation of nominal promises (e.g. design) and the evaluators confidence in these being realizable by the corresponding actor (based on e.g. past performance). Both issues are evaluated separately and the overall precedence of each comparable alternative is calculated by multiplying the scores of the promises with the confidence factor. The property coefficient system may be used for each partial evaluation.

While all the above methods as such are more or less related only to the prequalification and shortlisting—or the qualitative part of the overall proposal evaluation—this approach may be also applied in the comparison of final proposals and selecting the design-builder in the following special cases:

- **Fixed Price and Best Design**.[71] Contract price is established by the owner and is stated in the RFP. Only qualitative or technical proposals are received since all price offers are identical. Following oral presentations (optional), the owner uses his evaluation criteria to score the proposals. The award goes to the firm whose proposal gets the highest score at the stipulated price.

Whatever the method is, it should involve narrative statements about the decision and scoring arguments: they should describe the relative differences among proposals and their strengths and weaknesses in terms of evaluation factors.

6.1.2 Pros & cons

Naturally, the advantages and drawbacks of quality-oriented decision making depend on the context of its use. Therefore, Table 31 provides just a few general remarks. There are however, no real alternatives for this approach in, for instance, the shortlisting stage which makes this approach necessary and, in a way, irreplaceable in the design-build context.

6.1.3 Applicability

Appropriateness. The *quality-oriented approach* in design-builder selection is appropriate, especially, in the early stages of the building process. This means, firstly, the narrowing down of the field of potential competitors by prequalification and shortlisting. Secondly, design-builder selection early in the process, when no design is done, has to be based on the *quality-oriented approach*, more or less (cf. *direct design-build* in Section 5.1).

[70] Presented under the name Level of Confidence Assessment Rating by Edwards (1995)
[71] Design-Build Manual of Practice (2000), Document Number 201, p. 6

Table 31. Advantages and drawbacks of the quality-oriented approach.

Advantages	Drawbacks
• The mode establishes organized, professional conduct as the basis of the climate of building project execution. • The mode compels to focus on issues that minimize the probability of constructor default and maximize the likelihood of meeting even undefined requirements. • Depending on the case in question, the mode may spare bidders the expense of preparing a detailed design proposal and cost estimate.	• The cost and laboriousness of developing, implementing and evaluating qualitative criteria and assessing alternatives. • The difficulty of formalizing the decision-developing process to make objective and sound decisions, without introducing subjective judgment and biases. • The non-consideration of price factors may involve a price risk, or alternatively, a wrongly fixed price by the owner may lead proposers to offer inappropriate quality.

Furthermore, the quality-oriented methodology is used as a permanent component in any evaluation based on the *value-oriented approach*. Besides, it can play a meaningful role also in the preliminary phase of any *price-oriented approach* selection methodology as becomes evident later.

Compatibility. The *quality-oriented approach* is a selection mode, or at least a component of one, used in most design-build projects.

6.2 Value-oriented approach

6.2.1 Description

Value-oriented evaluation systematics refers to evaluation methods and processes which focus on both qualitative and cost/economic issues and aim to find the solutions that provide the best overall value for the owner.

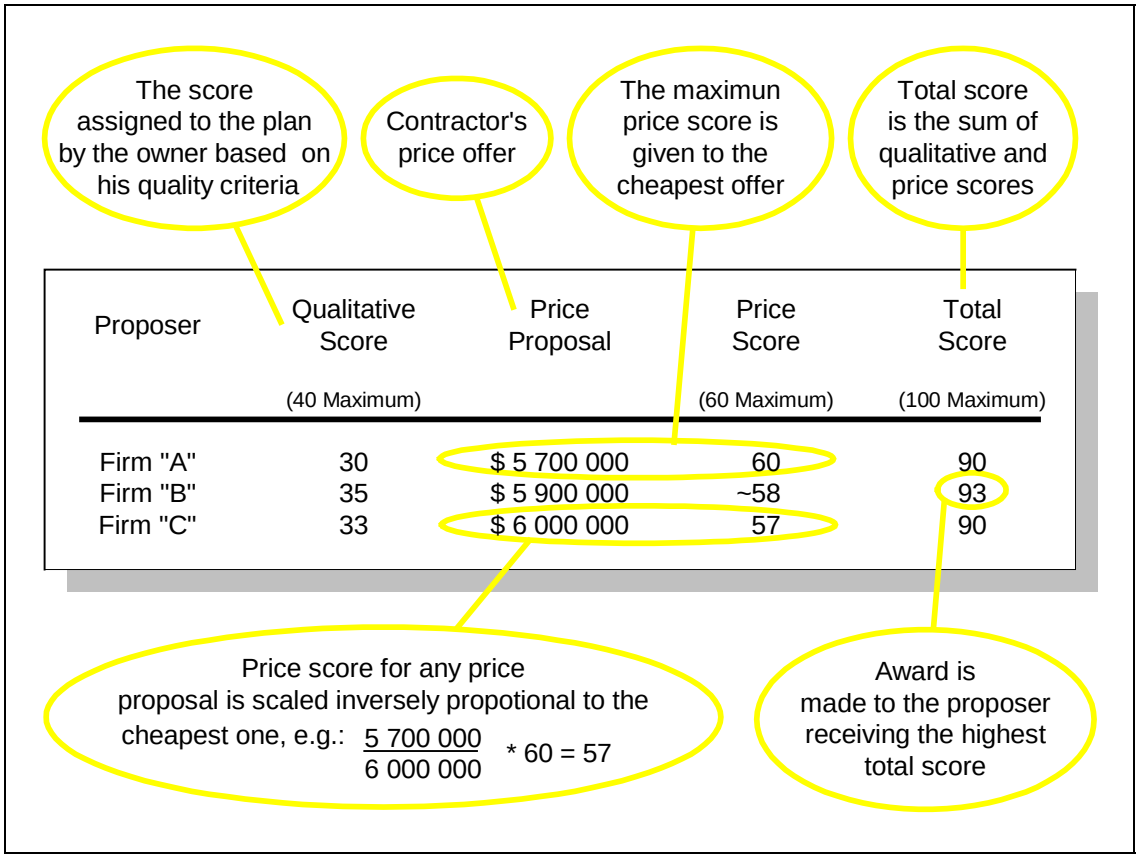

Figure 8. Value-oriented evaluation by the Weighted Criteria method.

In value-oriented selection best value is determined by considering both the qualitative and cost/economic sides of a proposal. A “two envelope system” is used meaning that a price offer is submitted simultaneously with the qualitative proposal (design, project approach, etc.) but in a separate envelope. However, the price envelopes are not opened until the qualitative issues are evaluated and scored. This way, it is possible to ensure that price offers do not influence the scoring of qualitative issues – neither consciously nor subconsciously. Further information on good evaluation process practices and examples of final deliverables are given in Table 32 and Table 33. An evaluation organization needed to do the work is, again, dealt with in Table 34 and Table 35.

Table 32. Mini-case: A company guideline for proposals evaluation process.[72]

The jury's actual evaluation procedure comprises the evaluation of proposals in accordance with the preset minimum requirements, evaluation factors and weights assigned to them. A possible process is presented below in broad terms. It is supported by a contracting officer or the owner's consultant.

First, each of the evaluators individually goes through the following stages:

1. **Identification of unclear or ambiguous provisions**. Sometimes, the language of a proposal is ambiguous, and the proposal's technical merit will differ depending upon the meaning given to the language. *(can be clarified)*
2. **Identification of poor and inadequate provisions**. An offeror may describe some parts in general terms and not provide enough detailed information about its approach or the product, etc. to allow an evaluation of its feasibility or merit. *(can be supplemented)*
3. **Identification of deficient and unacceptable proposals**. Each instance where an offeror does not meet the minimum qualification requirements clearly stated in the RFP or standards, etc. has to be identified and evaluated as to whether the deficiency can be reasonably remedied by the offeror. *(may be remedied or rejected)*
4. **Evaluation of technical proposals**. Technical proposals must be evaluated and rated against the evaluation factors listed in the solicitation and the related standards—not compared to each other. The evaluation sheets will form the basis for the work.
5. **Scoring of proposals**. After scoring proposals using the "raw score" per feature, the relative preset weight for a factor is applied to determine the "weighted" scores, and moreover, the overall score for the technical part of the proposal.

It may truly be that the identification of any unclear issues or deficiencies, presented in writing, leads to a request for clarification to the offerors before the evaluation and scoring can be finished. The rest of the process is a joint effort involving:

6. **Striving for consensus**. The final score assigned to each technical proposal will be based on a consensus of the jury. Simple averaging of individual evaluation results does not constitute consensus but requires that the jury goes through the proposals in detail. *(cf. items 1 – 5)*
7. **Consideration of technical evaluation results and price**. Cost or price will not be assigned a numerical weight or point score. Instead, cost or price will be used by the jury to judge the additional value of the services offered.
8. **Determination of competitive range**. The competitive range shall be determined on the basis of the combined technical and price evaluation by comparing the proposals with each other. The final report covers all the jury's work including all recommendations and argumentation.

The evaluation report forms the basis for selection and offers advise to the offerors. The score assigned to each proposal by the jury as a unit will be accompanied by a narrative justification, so that the owner agency can demonstrate that selection is based on:

- the strengths and weaknesses of the proposals
- the existence and seriousness of deficiencies in proposals, and
- other matters on which the jury is to provide advice.

In exceptional cases, where the jury is unable to reach agreement without unreasonably delaying the acquisition process, the evaluation report will include a majority conclusion and a dissenting view, each with supporting rationale.

[72] Summarized from: Guide for Source Selection Evaluation Board members (1992), pp. 7–12

Table 33. Mini-case: Evaluation and scoring of proposals.[73]

In the first round of a two-stage proposal process concerning the Falls Church Fire Station, three firms were prequalified on the basis of RFQ submission (including nomination for site, cf. Table 28, p. 85) and two of them actually submitted responses to the RFP. The scoring criteria were (cf. Table 21):

1. Proposed cost (30 points maximum)
2. Proposer's Management/Supervisory Personnel (30 points maximum)
3. Analysis of site and site design (20 points maximum)
4. Analysis of building and systems design (20 points maximum)
5. Schedule (Pass/Fail) -Proposers had to state that they would complete the project within the prescribed 330 days from notice to proceed as stipulated in the RFP.

The pricing information was excluded from each proposal and not looked at until after the other technical materials were evaluated. Obviously, since this was a develop-design-build proposal, the sites and building designs of each proposer were different but were scored according to as many co-relevant elements as possible, e.g., cost per square foot, adherence to owner's design criteria, etc.

The jury for this procurement consisted of city authorities, fire officers and members of the owner's design-build consultant, Fairfax (VA) based Dewberry & Davis. The jury's scoring and remarks on the two proposals received can be summarized as follows:

Criteria	**Firm "A"**	**Firm "B"**
Schedule	*Pass*	*Pass*
Site & Site Design	*19*	*17*

Firm "A" provided more specific details with various development options (especially parking options). With a frontage on Washington St., they met the redevelopment goals of the City more visibly. The large paved area along the street frontage is a detriment. Firm "B's" site is on the same side of the nearby stream as the existing facility, which provides for a direct link without crossing the stream. Parking for the meeting hall was generally and vaguely addressed as "off-site".

Management/Supervisory Personnel	*24*	*30*

Firm "A" 's proven public sector design-build expertise is lacking. Firm "B" shows considerable design-build experience, including public sector work. Their single-point-of-responsibility integrated design and construction services plus previous design-build work in Virginia are a plus.

Building & Systems	*8*	*20*

Firm "A" has flaws in the functionality of the layout and overall workability of the design. The 3-floor scheme is problematic with regard to personnel management and response time issues. Toilets/Shower/Bunk Room on separate floors is not flexible for changing male/female populations. Circulation flow design has problems, particularly with Kitchens/Day Room on second and third floors. Room locations have relationship and adjacency problems. Exterior building design lacks texture and looks institutional. Firm "B" displays clear circulation and easy room access. The interior layout is well thought-out and more fully addresses the fire department's workability and interior design issues. Exterior building design is judged to be more attractive and would be an asset to the community.

Proposed Cost	*28*	*28*

Base building costs of each proposer, with all deletions, were reviewed and deemed to be equally acceptable.

Totals	*79*	*95*

Contract award was recommended to Firm "B" by the Jury on the basis of evaluation of scoring criteria.

Result

Subsequently, firm "B", Jacksonville (FL) based The Haskell Company (see Table 52, p. 135) was also contracted and the company executed the work into completion in 1999.

[73] See page 73 for further information and the source document.

In qualitative evaluation the methods presented in the previous chapter should be used. Moreover, there are various alternative approaches for combining qualitative and cost issues for the consideration of the best value:[74]

- **Weighted Criteria.** The owner establishes a point rating for all qualitative factors and price. Maximum price points are assigned to the lowest dollar bid, and all others are scaled inversely proportional to that amount. Quality and price points are then summed up and highest total points then determine the award (see Figure 8).
- **Adjusted Low Bid.** A point rating is established for all qualitative factors and proposals are evaluated. Then total quality points are expressed as a percentage of the maximum and price is divided by this percentage in order to yield an "adjusted (or imputed) bid" and the lowest adjusted bid is recommended for contract award.[75]
- **Dollars per Point**. A point rating is established for all qualitative factors and proposals are evaluated. The best value solution can be determined by dividing the price of the proposal by the total unweighted raw score for all qualitative factors.

Of these methods, "Adjusted Low Bid" and "Dollars per Point" work, in principle, the same way. "Dollars per Point" just produces a key ratio while adjusted low price projects this ratio into the actual price level by estimating what each alternative would cost if the quality were improved until it deserves the maximum points. The methods also value the relation of price and quality alike.

The "Weighted Criteria" method, on the other hand, allows valuing the mutual emphasis of price and quality variedly (this can also be done with other methods by using adjustment factors). By doing so, it offers good possibilities take project and owner specific appreciation into account. Correspondingly, it also makes it more important to the decision-makers to understand their wants and the functioning of a selected evaluation systematics, that is, its sensitivity. We can say that the Weighted Criteria method uses a comparative base that includes the price of the lowest offer submitted but represents the best quality on the owner's scale.

Naturally, there are some other approaches as well. The owner may also, in some cases, strive to determine the relative value of all evaluation factors according to their expected impact on the life cycle cost (LCC) of the building being procured. Moreover, in the weighted method, for instance, the term cost can have the meaning of total discounted life cycle cost or it may be the evaluated probable cost to the owner – the fixed price offer may not be decisive although it is in a key position in defining the cost.

[74] Design-Build Manual of Practice (2000), Document Number 201, p.5 AND Nash & Cibinic (1993), pp. 162–166.
[75] For instance, the qualitative aspects are scored and totaled on a scale of 0 to 100 but expressed as hundredths. Thus, a comparative adjusted low price for proposals earning 70 or 80 points is defined by dividing their price offers by 0.7 or 0.8, respectively. If the price offers are $700 000 and $760 000, the corresponding adjusted low prices are $1 000 000 (=$700 000/0.7) and $950 000 (=$760 000/0.8). The latter seems to be more advantageous due to better quality-price-ratio although the price is higher.

Table 34. Nutshell: Jury composition in the best value selection process.[76]

There are various issues that should be considered when setting up a jury (i.e. a selection panel) for a design-build competition in order to create preconditions for its operability and a successful selection in general:

Number of jurors. The number of jurors on a design-build selection panel is most often determined by the number of different competing interests that have to be addressed by the proposals. The dynamics of such groups suggests that five to seven members works very well:

- With that number of people on a panel, it is difficult for any one individual to get enough support to argue against the will of the majority.
- On larger panels, jurors with divergent opinions can often find enough support to make a unanimous recommendation difficult. In larger discussion groups, individuals are less inclined to seek accommodation with the majority's opinions.
- Most jurors on small panels will try to find and support a common ground.

Jurors' background. Owners should consider the following categories of juror types when organizing a selection panel:

- Owner or representatives familiar with the owner's operations and objectives.
- Individuals in similar business or operations, but not direct competitors.
- Employees or facility user representatives.
- Two or three design professionals, e.g. architects, engineers or landscape architects. At least one of them should be from outside the immediate area, but well known and respected within his or her profession.
- Non-competing builder or other individual familiar with the construction industry in the region.
- Community representatives.

Chairmanship. The following instructions can be given for bestowing of the chairmanship of a jury:

- If the owner intends to serve on the jury, he should serve as the jury's chair.
- The chair should normally be a voting member of the panel.
- If a jury consists of a broad spectrum of community, employee and other interests and there is a danger of conflict of interest or domination of one member or special interest group on the final selection recommendation over another, the owner should appoint the competition's design-build consultant as the non-voting chair to facilitate a fair and even discussion of the merits of each of the proposals, and to arrive at a recommendation that the entire panel will support.

Other concerns. Some other rules to be considered in the selection of jurors are:

- For a public facility, half or more of the jury members should be financially independent of the owner's organization. That is, a majority of the panel should not be employees, nor should they be officers or members of the organization's board of directors or other ruling body.
- The owner's professional consultants are generally considered to be capable of expressing independent opinions, and may serve on a jury. However, technical and operational consultants may best be utilized on the technical evaluation committee.
- To the extent practical, design evaluation jurors should be selected from among leaders in their respective professions, businesses and/or communities, national, regional or local, as appropriate.
- The ability to read and understand architects' and engineers' models, drawings and other documents is essential for fair and equitable selection.

[76] Design-Build Manual of Practice (2000), Design-build RFQ/RFP guide, pp. 17-18

Table 35. Mini-case: Jury composition and technical evaluation panels.[77]

This review introduces procedures applied in the evaluation of proposals in response to the Request for Proposals (RFP) for Naval Sea Systems (Navsea) Command Headquarters, Washington, D.C. Corresponding rating scales are presented in Table 30.

The project includes 900,000 sq.ft. of office and support space for a personnel of 4,100, and a parking structure accommodating more than 1,500 vehicles. It requires the demolition and renovation of, and addition to, existing buildings, new construction, waterfront development and site infrastructure. A $125 million contract was made with The Turner Construction Company in order to carry out this design-draw-build type project.

Acquisition Strategy

The award was supposed to be made to the offeror whose proposal is most advantageous to the Government in terms of cost, quality, performance and other factors. This Best Value approach did not require the Government to award to the lowest priced technically acceptable offeror.

There were three basic categories of evaluation factors:

- Technical factors including such items as work plan (execution plan, organizational structure), relevant experience, staffing, contract administration, and management of subcontracting opportunities.
- Past performance referring to earlier projects and related customer satisfaction and timely delivery at a fair and reasonable price.
- Price including the price schedules and modification/change order percentage rate for computing an evaluated price.

Technical factors and past performance were equal in importance. All technical factors, again, were of equal value with each other with the exception of management of subcontracting opportunities bearing less weight.

An overall rating was given to the combined categories of technical factors and past performance and that rating was used to establish the best value to the Government compared to price which carried as much weight as the other two factors.

Evaluation Organization

The selection organization consisted initially of:

- The Source Selection Authority (SSA) responsible for all aspects of the selection and with the final say.
- The Contracting Officer responsible for the management of the procurement.

Besides, for purposes of procurement, a board was established:

- The Source Selection Advisory Board (SSAB) was responsible for ranking the offerors and making recommendations to the SSA—after reviewing the results of the specific evaluation panels. The board consisted of 11 members of which 6 were voting members.

The three specific panels were:

- The Technical Evaluation Panel (TEP) consisting of seven members in charge of the evaluation of technical proposals.
- The Technical/Management Evaluation Panel (TMEP) consisting of three members in charge of the evaluation of the offerors past performance.
- The Cost Evaluation Panel (CEP) consisting of two members in charge of all cost evaluation and computing of evaluated price.

The evaluation within all panels was supposed to be done in accordance with the established evaluation criteria. The panels were also responsible for the preparation of a formal written evaluation report, which addresses the individual offerors ratings with related risk assessment and identifies both specific strong and weak points.

Based on the ratings and reports of various panels from their respective standpoints, the SSAB evaluated all the information and made its suggestion about the competitive order and award to the SSA.

[77] See page 88 for further information and the source document.

6.2.2 Pros & cons

The approach focussing on both quality and costs produces, supposedly, the most advantageous solution for the owner – not the one with the best quality or the lowest price but the one optimizing the overall solution (cf. *Table 36*).

Table 36. Advantages and drawbacks of the value-oriented approach.

Advantages	Drawbacks
• The mode establishes organized, professional conduct as a prerequisite for the climate of building project's execution. • The mode compels to focus on issues that minimize the probability of constructor default and maximize the likelihood of meeting even undefined requirements. • The mode aims towards best value and optimal solution—not to suboptimize some parts while compromising others—and spurs the players of the industry to innovation.	• The cost and laboriousness of developing, implementing and evaluating qualitative criteria and assessing alternatives. • The difficulty of formalizing the decision-developing process to make objective and sound decisions, without introducing subjective judgment and biases. • The difficulty of balancing values and costs: how are different properties weighted and how can qualitative issues be made commensurable with cost factors.

6.2.3 Applicability

Appropriateness. The *value-oriented approach* represents design-build at its best. The approach is typically used in the second phase of *two-stage selection* where competitors complete a proposal including both a qualitative and a price component. With regards to design, enough leeway has to be left for a technical proposal in order to factor qualitative issues properly into the evaluation. On the other hand, the approach may not be usable in the early stages of design, since it may not be possible to define the price.

Compatibility. When best value selection is used, single part *fixed-price* contracts are most commonly utilized because price and scope are established during the competition process.[78]

[78] Design-Build Manual of Practice (2000), Document Number 101, p.4

6.3 Price-oriented approach

6.3.1 Description

Price-oriented evaluation systematics refers to evaluation methods and processes which focus only on cost/economic issues supposing that the qualities of competing proposals are much the same or of no significance.

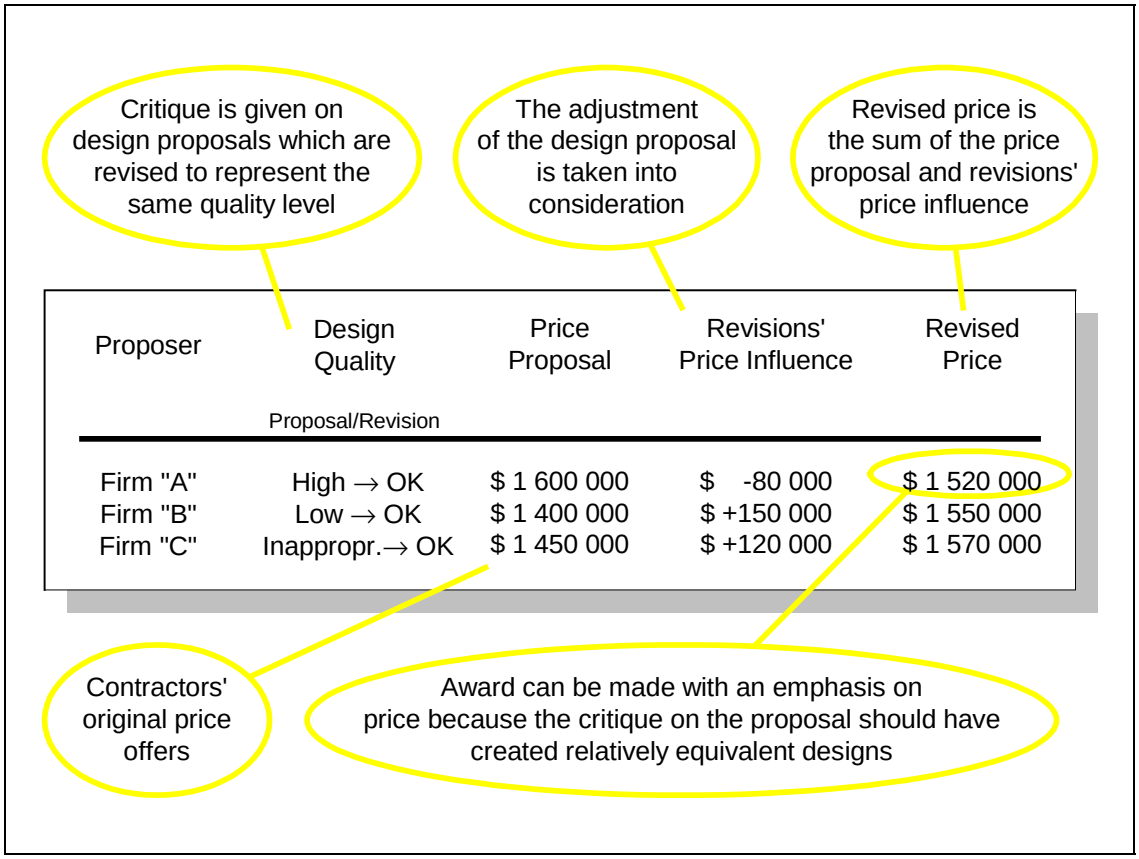

Figure 9. Price-oriented evaluation by using Equivalent Design Low-Bid method.

Design-build is supposed to be a method with more provisions for innovative and efficient solutions than traditional design-bid-build. A key means is the integration of design and construction and competition based on both quality and costs. Thus, it is not self evident that evaluation methods which emphasize price as a selection criterion are the most appropriate in design-build. There are, however, some approaches that suit some cases reasonably well:[79]

[79] Design-Build Manual of Practice (2000), Document Number 201, pp. 5–6.

- **Equivalent Design Low-Bid**. After receiving the usual qualitative and price proposals, technical proposals are analyzed and subjected to critique and each proposer is given a deadline to respond with specified design changes and a corresponding price adjustment (increase or decrease) in order to make all proposals technically equivalent[80]. Appropriateness of revised designs is evaluated by the owner and price envelopes containing both the base price and the adjustment amount are opened and the prices are summed up. The award can be made with heavy or sole emphasis on price because the critique on proposals should have created equivalent designs (see Figure 9).
- **Meets Criteria Low-Bid**. This method of evaluation resembles most closely the traditional bid process. Typically, the owner's RFP provides highly specific requirements which fall short of final construction documents. The proposals are evaluated, deemed to meet the base criteria, and award is made to the low bidder. The selected firm's role is to complete construction documents in a reasonable manner rather than to develop a unique design for the project.

The advantage of the "Equivalent Design Low-Bid" method is that the quality level of all the proposals should match the client's needs relatively well. Correspondingly, a drawback may be that more efforts are required from the owner and the proposer. Another threat is that an innovative solution suggested by one contractor may sometimes be copied into other proposals signifying an improper use of the adjustment procedure.

The "Meets Criteria Low Bid" method, on the other hand, is likely to eliminate the creativity of competing design-build teams and the examination of multiple options, if the owner carries out the design up to a highly specified level as he probably has to do. The process is to be used in cases where the performance measures can be defined accurately enough and there are no subjective (e.g. aesthetic) values that would be of relevance in the evaluation. This would likely apply to the most utilitarian facilities like storage sheds, etc.

Another likely area of application for both the "Equivalent Design Low-Bid" and "Meets Criteria Low Bid" methods is in buildings or building parts where system building technology can be used based on existing product systems developed by firms so that design can be relatively easily generated for the project at hand. As to the "Equivalent Design Low-Bid" method, it reduces the threat of laborious design and transfer of ideas into competing proposals. As concerns the "Meets Criteria Low Bid" method, the point is that product systems, due to their tested solutions, normally meet the usual performance requirements and the owner does not have worry about requirements considered self-evident.

When the RFP calls for the selection of an acceptable source with the lowest price, the scoring system need only provide information on which offerors are acceptable and/or which proposals are technically acceptable.

[80] This process is sometimes referred to as "technical leveling".

6.3.2 Pros & cons

The price-oriented evaluation method can be used in different ways as described above. Thus, the advantages and drawbacks depend largely on the used evaluation and selection process and can be very different in different cases. Some general points are nevertheless made in Table 37.

If price-oriented evaluation methods are combined with the design-draw-build method (see p. 79) the drawbacks and possible benefits are largely parallel to those of traditional design-bid-build process.

Table 37. Advantages and drawbacks of the price-oriented approach.

Advantages	Drawbacks
• Emphasis on price is a rather unambiguous selection criterion which is easy to evaluate and compare. • The method guarantees the most cost-efficient procurement in the short term in cases where there are strong limitations on investment. • The mode may be superior when the owner's requirements are simple and strictly stated, and free from subjective values—and no different grades of quality exist.	• The use of price as the only, or a too dominant, selection criterion may result in neglect of quality and long-term issues in the procurement phase. • The method may cause confusion since alternative proposals are seldom of the same quality, or the lowest acceptable quality unambiguously definable. • In the case of quite detailed design by the owner, the mode is likely to result in poor constructability and standard solutions since it does not exploit the innovation potential of the market.

6.3.3 Applicability

Appropriateness. Various selection processes and evaluation systematics adhering to the *price-oriented approach* are applicable in different situations; see Section 6.3.1 above for more information.

Compatibility. The *price-oriented approach* to proposal evaluation is typically used in cases where the owner has done most of the design as in the *preliminary engineering method* and, especially, the *design-draw-build method* (cf. Section 5.4).

6.4 Summary

The methods presented in this chapter can well be considered alternatives, but may be more than that: methods that accompany and complement each other. Value- and price-oriented selection schemes usually need quality-oriented methods as a partial solution. On the other hand, the idea of cost can be included in a quality-oriented early selection in the form of a design-builder's fee, for instance.

In fact, the methods are typically used for different situations as regards overall selection strategy and process phase. The earlier in the building design process the selection is made, the more qualitative its nature. And vice versa, the later the decision is made, the higher is the likelihood that it is based more on cost issues. This can be seen clearly by comparing the different stages of two-stage selection – especially in a design-draw-build project.

In the case of two-stage selection, it may be feasible to omit any consideration of qualitative managerial factors in the second stage of the best value selection that should rely solely upon technical and price considerations. Since the management-related factors presented in qualification statements have already weighed heavily in the determination of the most qualified proposers, it is debatable whether any further benefits could be obtained by repeating this evaluation during the final selection process.[81] A drawback, on the other hand, could be a more complicated decision-making situation involving a myriad of qualities that are difficult to value and compare appropriately.

[81] Design-Build Manual of Practice (2000), Document Number 201, p. 6

7. PRICING ARRANGEMENTS

One of the most important distinctions between design-build and other methods of contracting is that in the former the contractor and architect (and maybe the developer and some other major players) form a contracting team instead of having parallel contracts with the owner. The generated single point of responsibility also allows new bases of payment, and incentives and risk sharing become, in fact, a fundamental part of the team approach. On the other hand, innovative strategies for compensation are also needed since the parties to design-build often enter into contract so early as regards design that they are not able to define the exact amount of money needed to compensate the design-builder's costs and efforts in relation to the project.

This chapter discusses possible pricing arrangements by introducing three primary systems.[82] It starts with the fixed price contract, which is – although basically simple and well-known – also presented as a baseline alternative since it is often used also in the design-build context. The next one to be presented is the cost-plus-fee system where the design-builder is compensated on the basis of its actualized costs and preagreed fee.

The last one, the guaranteed maximum price system, combines the former two by adhering to the cost-plus system as long as the price remains below the guaranteed maximum price, but when it is exceeded, the design-builder absorbs all the costs as in the fixed price system. Moreover, the difference between the guaranteed maximum price and the actual cost of the work plus the fee is deemed "savings" and is usually divided between the owner and the design-builder to serve as an incentive. Due to the team approach, these savings and overruns may also be divided between the parties to the design-build team.

Another compensation-related issue is raised by the fact that the compilation of a proposal is usually much more expensive in design-build than in other forms of contract. For that reason, the owner may pay a stipend to all selected teams that submit a proposal but are not awarded a contract.[83] However, a stipend, if paid, typically covers only a part of the proposal costs and, thus, as a rule, preaward expenses are borne by the team members. In some cases, the team may determine that its chances of selection would improve if it were to provide more detailed schematic drawings, site surveying, etc. In such cases, the team members might agree, prior to incurring such extraordinary costs, to compensate another team member for a portion of the preaward costs.[84] Usually, it is the contractor who sponsors the architect or at least transfers the stipend paid by the owner to the architect.

[82] For more ideas and variation, see e.g.: Federal Acquisition Regulation (1997), Part 16: Types of Contract AND Howard & Bell (1998).
[83] See p. 55 for more information on stipends/honorariums.
[84] Taub, K. The teaming agreement. In: Cushman & Taub (1997), p. 18.

7.1 Fixed price

7.1.1 Description

Fixed price refers to a system of payment where the party, who performs a specified scope of work, is paid an agreed fixed price regardless of the actual costs – the price is only changed if the scope of work changes.

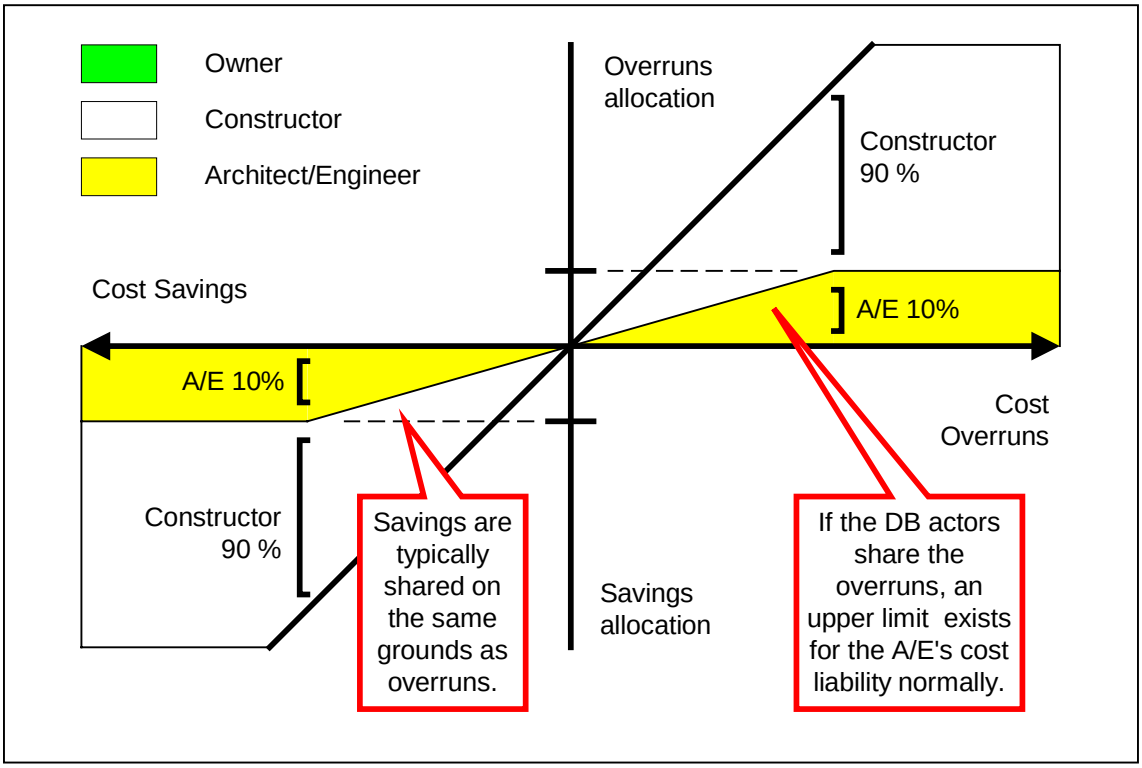

Figure 10. Possible sharing of cost savings and overruns in the fixed-price system.[85]

In a fixed price[86] contract, the design-builder is responsible for delivering the project to the owner at an agreed-upon price, regardless of the cost to the supplier, and will receive that price regardless of the actual costs. In other words, the price is fixed before the work starts and the price is not adjusted to the actual cost. It should be noted, however, that all change orders that have a cost effect have a price effect as well (like in any other pricing system). A change order may result from a change in the owner's needs or from the increasing ability to convert needs into requirements as the process goes on and

[85] The idea about shared savings and overruns may be relevant in a context of a joint company arrangement, although the architect/engineer's actual design subcontract is typically a fixed price contract while the constructor usually carries the entire risk for a design-build contract.
[86] *Lump sum* and *stipulated sum* are synonyms for *fixed price*.

design becomes more detailed. The introduction of reimbursement is based on predefined unit prices or negotiations.

With regard to the initial fixed price contract, there are two ways to find an appropriate price:

- One or more design-builders can submit a price offer to the owner for the required services. The offer is based on the contractor's cost estimate that includes overheads and profits. The price of the selected offer becomes part of the contract.
- On the basis of his own program and its cost estimate, the owner defines the fixed price prior to (design) competition. The competition concerns the project's properties, that is, what is available for a certain amount of money. The best proposal is selected and the preset price becomes part of the contract.

In the fixed price system, the design-builder assumes the risk of cost increases, errors and omissions in cost estimation, changes in market prices and subcontractors offers, etc. while there is no price risk for the owner. The risk can be, however, divided between the team members also with the fixed price system (cf. Figure 10) although it is not common – these issues are discussed in more detail in Section 7.3.

7.1.2 Pros & cons

The fixed price system offers an unambiguous basis of payment while the design-builder carries the entire price risk. This results in a few drawbacks in addition to obvious advantages as outlined in Table 38.

7.1.3 Applicability

Appropriateness. In order to define an appropriate lump sum price for a contract, the parties have to have a clear understanding of the scope of what they are going to buy or sell. Therefore, design is typically carried out to a substantial extent or, alternatively, the performance of the project is of the most importance and it can be easily defined precisely enough to avoid issues related to whether the scope of work is unclear. In practice, this often applies to small projects or clearly defined portions of any bigger one. All in all, fixed price contracting is workable and widely used when the owner procures the design-build services through competitive means and the scope of the project is well defined.

Compatibility. Basically, the *fixed price* system can be applied together with any of the presented procedures as long as the scope of the project is well defined. In the case of *qualifications-based selection*, for instance, the mode usually requires that the selected design-builder first carries out preliminary design before the fixed price contract can be concluded.

Table 38. Advantages and drawbacks of the fixed price mode.

Advantages	Drawbacks
• The owner has an accurate understanding of the final costs of the project prior to launching construction, and there is no risk of cost overruns to the owner (besides usual change orders that tend to change the price a little). • By using this method, the parties avoid any extra administrative burden that may accompany other more complicated pricing systems, possibly in the form of special cost accounting required.	• The owner has no access to savings which may result, for instance, from contingencies factored into the price by the design-builder but which have not arisen. • The fixed price system does not actually encourage the parties to work together as partners and is often likely to contribute to compromises in quality of the implemented project. • The use of the fixed price system requires detailed scope definition prior to concluding the contract, which, in the event that the owner has assumed liability for design may disallow the benefits of design-build integration and slow down the project.

7.2 Cost-plus-fee

7.2.1 Description

Cost-plus-fee refers to a system of payment where the party who performs a specified scope of work is reimbursed for actualized work and material costs and paid an agreed fee for services rendered without any upper limit.

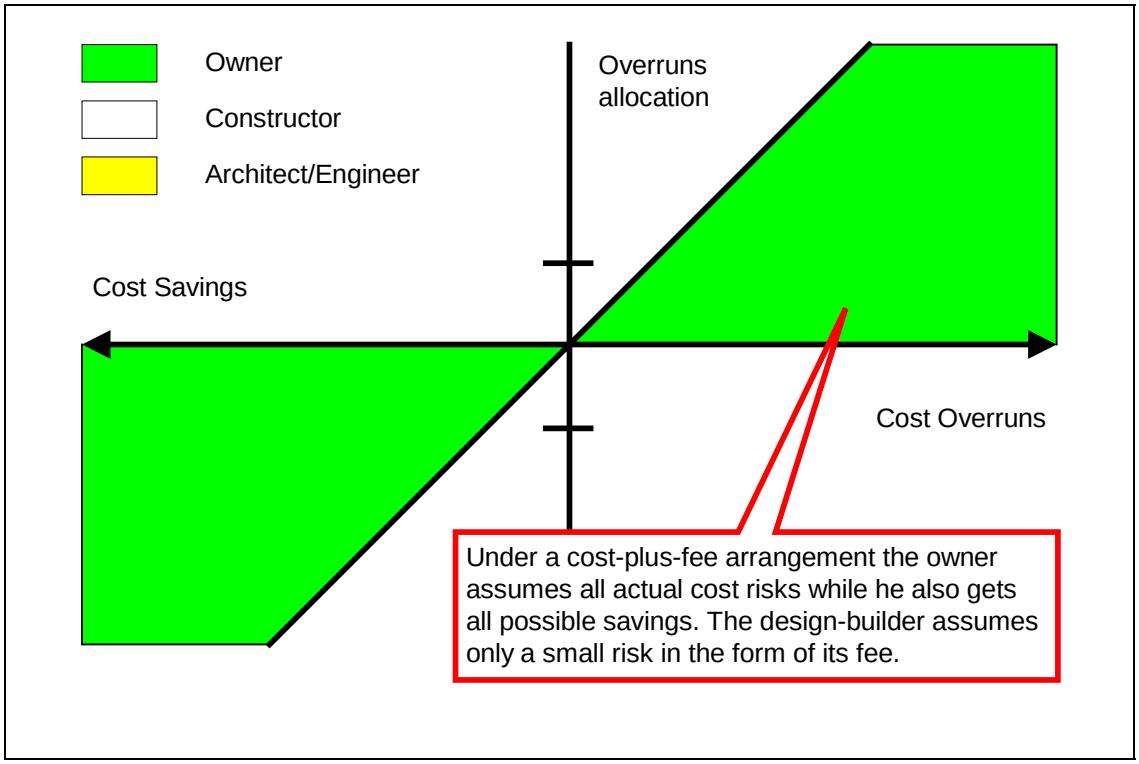

Figure 11. The sharing of cost savings and overruns in the cost-plus-fee system.

In the cost-plus-fee[87] system the design-builder is reimbursed for all its work and material costs as far as they are reasonably line-itemized in the design-builder's cost accounting system in a way acceptable to the owner and defined in the contract. Besides, the design-builder is compensated for its services by a fee paid by the owner. There are two different ways of defining the basis of the design-builder's fee:

- *The cost-plus-fixed-fee* method, where a fixed price is set for all the design-builder's services independent of its actual efforts and costs.
- *The cost-plus-percentage-fee* method, where the fee for all the design-builder's services is based on a certain agreed-upon share of realized work and material costs.

[87] *"Time and materials"* is sometimes used interchangeably with the cost-plus-fee definition.

Under this arrangement, the owner practically assumes risk for all the costs of the project while the design-builder risks only its fee and reputation as a cost efficient and professional constructor.

7.2.2 Pros & cons

The fact that the owner assumes risk for all project costs is naturally welcomed by many contractors. The owner typically tries to avoid such a situation since he cannot be sure that the design-builder will strive to work efficiently and avoid all unnecessary costs (cf. Table 39). This arrangement is, however, a workable solution when – at the time of concluding the contract – there is not yet clear understanding about the work to be done.

Table 39. Advantages and drawbacks of the cost-plus-fee mode.

Advantages	Drawbacks
• If a facility is needed urgently, the cost-plus-fee system enables quick launching of a project when there are not yet scope documents detailed enough for reliable cost estimation; the system may be used as an interim base for pricing. • Only actualized and reasonable project costs are to be paid to the design-builder – not unactualized contingencies – while reasonableness of the costs and efficiency in general still remain a problem.	• Final costs are not known until the project (or phase) has been completed. • Administration of a cost-plus contract can be time-consuming as it involves cost monitoring and auditing and requires that parties carefully consider which costs should be reimbursed. • The owner carries all risks alone, which does not offer an incentive to the design-builder.

7.2.3 Applicability

Appropriateness. Considering the properties of a cost-plus-fee arrangement, it is clear that it is not widely used for entire design-build contracts. The exemptions include small works and repair in general. There is, however, room for this system also in bigger projects and new construction. There, the contractor is compensated for its design efforts on a cost-plus-fee basis, with a lump sum, or a guaranteed maximum price established as soon as the design is sufficiently complete to allow a reliable estimate to be made.

Compatibility. In the design-build context, the *cost-plus-fee* pricing system may be used in the design phase as defined above. Thus, the arrangement is compatible as a temporary solution for *direct design-build*, a *guaranteed maximum price* (or *fixed price*) is defined once the project is more fully defined.

7.3 Guaranteed maximum price

7.3.1 Description

Guaranteed maximum price refers to a system of payment where the party who performs a specified scope of work is reimbursed for actualized work and material costs and paid an agreed fee for services rendered but only to a certain agreed limit.

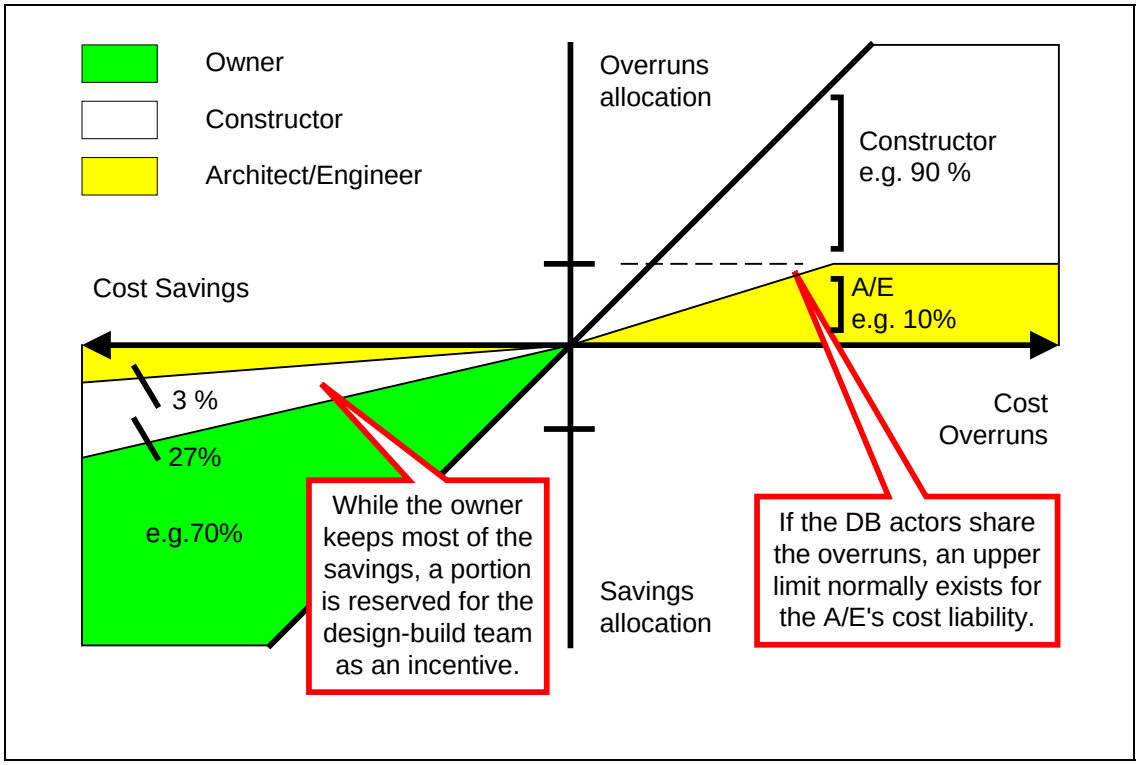

Figure 12. The sharing of cost savings and overruns in the GMP system.

Guaranteed maximum price (GMP)[88] refers to a contractual arrangement where the design-builder is reimbursed the full amount of the construction costs and services as agreed, supposing that the amount does not exceed the GMP. Thus, the design-builder guarantees that the costs will not exceed the GMP; should that happen, all costs above the GMP are borne by the design-builder – unless accepted as resulting from a modification of the scope of contract (i.e. change orders). Therefore, beyond the GMP, the mode works as in the case of equal fixed price.

[88] Sometimes the abbreviation GMAX is used to refer to *Guaranteed Maximum Price*.

When costs are less than the GMP, the arrangement is more diverse:

- The design-builder is reimbursed on the basis of the cost-plus-fee model that was presented in the previous section (p. 107). Both the fixed-fee and percentage-fee options are possible although, here, the percentage option tends to be more common.[89]

- Besides, the owner and the design-build entity usually agree that they share all the savings, meaning, that if the design-builder's actual reimbursement is less than the GMP, the difference benefits both parties. The percentage varies, but in practice, the design-builder's share is never bigger than that of the owner: the design-builder typically gets 25% of the savings while the owner gets 75%. The owner's bigger share is reasonable since the GMP is typically fixed in the early stages of the process, and it is supposed to include a contingency due to incomplete project documents.[90] Anyway, the arrangement offers a good incentive for both parties to cooperate and work efficiently.

Issues related to the setting of the basis of payment between the owner and the design-builder are dealt with in more detail in Table 40 considering also some other bases of payment besides project costs. Furthermore, a design-build project is a joint effort by various actors of the design-build entity. Thus, the savings and the risk of construction cost overruns normally borne solely by the contractor may now be more appropriately shared by the team members:[91]

- The contractor often prefers the architect to share in this risk because it obviously makes the architect more cognizant of cost issues as the design progresses. Similarly, if the developer has a stake in construction costs, it may create an incentive to suggest less costly alternatives in the design and development of the project.[92] Since the existence of cost overruns is, however, largely within the control of the contractor, it also bears the majority of the losses. For instance, in the case of an A/E-contractor team, the shares may be 10 and 90%, respectively; an upper limit is also usually set for the architect's and developer's, etc. responsibility.

[89] A design-builder's fee should not be equated to a fee paid under other project delivery systems due to a single point of responsibility offered and the corresponding risk assumed by the design-builder. For instance, although there are large variations, a fee for agency construction management, construction management at risk, and design-build with GMP might involve fees of 3%, 5% and 10%, respectively.

[90] When a GMP is given with incomplete documents, a contingency is essential to address the usual cost growth that occurs during the further development of drawings and specifications. A contingency should also be used during construction to cover cost growth, which is properly reimbursable as a cost of the work but not the basis for change orders. Contingency should not be confused with change orders, which are handled essentially as in lump sum contracting: additive change orders increase the GMP. [Dorsey (1997), p. 114]

[91] The risk and profit options may or may not be shared. That's largely up to the actors and organizational structure of the design-build entity. For instance, supposing that the actors establish a separate company for the project and all the tasks are to be subcontracted, architects and developers (that are part of a design-build team) are usually paid on a lump-sum basis. Correspondingly, whether the design-build agreement with the owner is a lump-sum contract or a guaranteed maximum price contract, most construction subcontracts are on a cost-plus-fee basis with a guaranteed maximum price. The risk and profit options are then related to the ownership of this ad hoc joint company – while options are also common. [Taub, K. The teaming agreement. In: Cushman & Taub (1997), pp. 13–16]

[92] Taub, K. The teaming agreement. In: Cushman & Taub (1997), p. 15

Table 40. Nutshell: Issues to consider when setting the basis of payment. [93]

The basic idea of design-build is cooperation for the best of the project. In terms of money, this usually means the use of GMP contracts with shared savings and early completion incentives. Related issues are to be discussed below.

Shared savings based on cost performance

Efficient implementation of a project, with good management by the design-builder and timely support from the owner, creates a savings pool as regards GMP that should benefit both the design-builder and the owner. Most GMP contracts address the issue of allowing shared savings to create an incentive for the design-builder to save costs. In fact, creativity in the savings clauses can enable the parties to have some flexibility in addressing the fees paid for services.

Although there are numerous ways to share savings between the owner and the design-builder, some of the more common elements are:

- Percentage split between the owner and design-builder, where the percentage is influenced by the point in time the GMP was set.
- Owner or design-builder having the first right to a portion of the savings, with the remainder of the savings being shared on a percentage basis.
- Variable percentages based upon levels of savings.

The latter two approaches are especially appropriate in the following cases:

- The owner accepts an early GMP that might be high to deal with contingencies that the parties will not be able to resolve until further design is developed.
- The design-builder's fee is artificially low.

Bonus based on time performance

Liquidated damages have traditionally been used by owners to create an incentive for contractors to meet contractual schedule obligations and to make good the anticipated losses to the owner for late project delivery. The amount should be reasonably large to compensate the owner for the delays – not simply to penalize the design-builder.

If the project economics justify contractual liquidated damages, earlier than scheduled delivery usually results in an economic benefit to the owner. In these cases, the benefit should be shared and it is appropriate to couple liquidated damages with an early completion bonus to the design-builder.

Such a bonus will create an incentive for the design-builder to manage the project differently – e.g. spending its own money to work overtime or add resources – to give it the best chance of achieving the bonus. This works in the best interest of the project, since it ensures that all project participants do all that is reasonably possible to achieve an expedited project delivery.

Other issues to consider

Several other issues with regard to savings should be addressed in addition to determining how to divide them in general.

First, if a design-builder's contingency pool exists and has not been depleted, the parties may decide how to share this money. It would certainly be appropriate for a contingency to be treated as any other line item for purposes of the savings clause and to simply be part of the overall pool. However, it may also be appropriate to give the design-builder a higher percentage as an incentive to reduce the amount of the contingency draws or for the owner to be given a higher percentage for establishing a contingency account.

Second, the parties should agree in advance when the savings are to be distributed. Given the purpose of a GMP contract, a design-builder should not be put in the position of having to credit savings to the owner prior to final completion. In addition, because costs incurred by the design-builder during the warranty period should be considered a cost of the work, the parties should address this when determining and timing savings distributions.

[93] Design-Build Manual of Practice (2000), Document Number 510, pp. 11–12, 19–20.

- Since the contractor is the party who usually assumes the most risk, the bigger part of the savings should and, in practice, is also allocated to it. On the other hand, it is important to get, for instance, the architect committed to economical design to make savings possible. For that reason, any possible savings are shared in the same proportion as possible cost overruns.

The arrangement illustrated in Figure 12 is based on the above conditions. It supposes that the owner keeps 70% of all the savings and the share of the design-build entity (30%) is redirected to the constructor and the architect; their mutual shares are 90 and 10%, respectively as concerns the first cost overruns.

All in all, Table 41 gives an actual example of the use of the GMP system in a design-build project. In that particular project early completion and user-satisfaction bonuses were also part of the compensation system; Table 42 sheds light on the latter.

7.3.2 Pros & cons

The guaranteed maximum price scheme strives for quality-oriented cooperative relationships between the owner and the design-builder (cf. Table 43). Besides, it includes incentives for efficient production. Thus, the GMP contract is essentially a hybrid combining the cost reimbursement features of a cost-plus contract and the cost certainty of a lump sum arrangement. The cost-plus basis may cause a minor additional administrative burden compared to the fixed price system.

7.3.3 Applicability

Appropriateness. The GMP pricing arrangement is typically used when the owner contracts with a design-builder before the program is fully developed and the owner and design-builder work together to define the program more completely.[94] Quite often the use of the GMP approach also means that the owner procures design-build services through negotiated selection. Moreover, the arrangement may also be well suited for projects that are difficult to define adequately, such as projects that (a) are intended to advance the state of the art and therefore do not have an effective design benchmark or (b) contain unusually high contingencies because of site conditions, locations or other unknowns. While lump sums can always be provided, the ultimate price to the owner for the contingencies associated with the uncertainty may not justify the certainty of up-front pricing.[95]

[94] In a typical design-build setting, the owner establishes certain broad performance specifications for the project and allows the design-builder some discretion in meeting these specifications. This can create misunderstanding between the owner and the design-builder as to whether a compensable change has occurred. Thus, it is in the best interest of both parties to tie the change clause to some specific benchmark so that compensable changes are easily recognizable. For instance, if the contracting parties intend to have schematic drawings converted into full-scale construction drawings, the point at which the owner approves full-scale construction drawings could serve as a convenient benchmark. After that point, it is reasonable for the design-builder to be compensated for any changes arising through no fault of its own. [Loulakis, M. Single point responsibility in design-build contracting, pp. 18–19. In: Cushman & Taub (1992), pp. 1–29]

[95] Design-Build Manual of Practice (2000), Document Number 510, p. 9.

Table 41. Mini-case: An incentive arrangement in design-build.[96]

Tarrytown, NY based Ciba Specialty Chemicals corporation intended to procure a new laboratory building. As a consequence of successful programming, scope design and preliminary engineering stages, the company entered into a guaranteed maximum price (GMP) design-build contract with a team formed by Skanska Sordoni as "contractor" and HWL International as "architect". At this stage, nearly 30% of design had been completed. (See Table 6 above on page 33 for more information on the cooperative process in general).

As usual, the shared savings option was included in the contract. The project completion incentive was also there in the form of an early completion bonus combined with a late completion penalty. The parties also wanted to make a commitment to quality and made the user-satisfaction incentive part of the overall compensation.

Shared savings

The Laboratory encompasses 168,000 square feet of laboratories and office areas. It consists of 20 lab modules on each of the building's five floors and 28,000 square feet of office space. The actualized project costs (including also preliminary engineering, etc. on cost reimbursement basis) were:

- Construction management services and direct construction costs…….*$36.5 million*
- Engineering costs……*$ 2.6 million*
- Total project costs…….. .*$39.2 million*

In the GMP contract, a shared savings ratio of 40:60 was agreed to between the design-builder and the owner, respectively. The actualized costs for this stage including design completion and construction were $3.3 millions lower than the GMP. This resulted in the following bonuses to the main parties of the design-build entity:

- Contractor ……*$ 1.3 million* (i.e. full capped amount)
- Architect……..*$ 0.3 million* (from the owners share)

Early completion bonus

The project was time-driven as well. Additional incentives were offered for completion ahead of schedule, offset by penalties if the project fell behind schedule.

Actualized schedule-related bonuses were:

- Contractor ……*$ 0.3 million* - bonus was to be $100 000 per month while the work was completed three months ahead of schedule
- Architect ……..*$ 0.1 million* - for meeting milestones for document delivery and for meeting cost verification goals at 50% of design completion

Measuring quality

While many of the issues related to user-satisfaction are rather “feel-good” type issues, it was decided to base the measurement on both objective and subjective issues. The solution was a questionnaire on which the grading was primarily based. In the case of dissatisfaction, some items were to be measured objectively.

The questionnaire, shown in its entirety in Table 42:

- was used as a Post Completion Occupant Quality Survey 90 days after occupation
- included 14 questions that could be answered with a simple “yes” or “no”, and
- was used by 150 employees to rate the quality of the process and the facility.

A minimum overall satisfaction score of 75% was needed to give the "all or nothing" quality bonus to the design-build team. The team scored 84%, which resulted in the following bonuses:

- Contractor ……*$ 205,000*
- Architect……*$ 90,000*

The incentive model resulted in direct communication between the design-builder and the end-user. Due to the establishment of a cooperative relationship and confidence, the parties ended up as partners in another building project where they scored 93% satisfaction in similar evaluation.

[96] For more information: e.g. Tanner, V. Quality Makes the Grade at Ciba. Design-Build, January 1998.

Table 42. Mini-case: Laboratory Facility Post Completion Occupant Quality Survey.

In Ciba Additives' project, the realization of a project's qualitative objectives was evaluated by the means of an employee questionnaire, and the result was tied to the design-builder's quality bonus (see Table 41 for more information on the arrangement).

The questionnaire encompassed the following 15 questions (of which the first 14 were conclusive as regards the quality bonus):

1. The final laboratory design and features were communicated to you before they were finalized and construction began.

   Yes No

2. The progress of construction of the new laboratory was communicated to you on a regular basis.

   Yes No

3. The level of vibration in the new building meets your expectations.

   Yes No

4. There is no evidence of fumes from neighboring laboratories being reintroduced into your work area. Your work area is free of offensive chemical odors from other areas. (If applicable)

   Yes No

5. Noise from other work areas or outside sources is not objectionable in your work area.

   Yes No

6. The room temperature in your work area is comfortable. The performance of the heating/air conditioning systems is acceptable.

   Yes No

7. The amount of direct lighting in your work area meets your needs and expectations.

   Yes No

8. The amount of outside natural light into your work area meets your expectations based on the design and location of your work area.

   Yes No

9. The performance of your laboratory fume hoods meets your expectations. The hoods are able to contain fumes during experiments when the doors are properly positioned. (If applicable)

   Yes No

10. The appearance of the building both inside and outside is professional and projects the appropriate image to the community and our customers.

    Yes No

11. The building has been designed to be user-friendly. Features have been placed where they are convenient and readily accessible. The needs you identified as important have been provided.

    Yes No

12. The quality of construction meets your expectations. Finishes, trim work and painting demonstrate an expected level of quality.

    Yes No

13. You were provided with an appropriate level of orientation regarding the features of the new laboratory before move-in.

    Yes No

14. The number of corrective repairs or warranty claims during the first 90 days of occupancy is less than you would have expected with a major new facility.

    Yes No

15. Overall, realizing that it would be impossible to totally please everyone, on a scale of 1 (lowest) to 10 (highest), how would you rate the quality of all aspects of the new laboratory?

    Score:

The quality satisfaction survey rated the overall satisfaction level at 84% and provided recommendations for future projects. The only ill-success was related to thermal comfort (question 6) while the question regarding the appearance and image presented by the new building (question 10) received a 100% positive response. Other items scored between 70 and 100%.

Table 43. Advantages and drawbacks of the guaranteed maximum price mode.

Advantages	Drawbacks
• The owner pays only the actualized project costs to the design-builder; the price does not embrace any unactualized contingencies. • The GMP offers a guarantee that the project will not exceed the pre-established price. • Both the owner and design-builder benefit from efficient and favorable implementation, which creates incentives for the parties to labor and cooperate for the project's best. • The GMP system offers a reasonable possibility for launching a project although there might not be detailed enough drawings and specifications available yet in order to make an accurate cost estimate for the project.	• The GMP based on performance requirements may cause a misunderstanding between the owner and the design-builder as to whether a compensable change in design has occurred. • Final costs are not known exactly until the project has been completed – although the owner knows certainly that the project will not exceed the pre-established price. • The mode may require additional efforts on cost monitoring and auditing; it also requires that the parties agree upon the formula and timing for sharing savings and contingencies.

Compatibility. As became evident above, the *guaranteed maximum price* system is most typically used with two of the presented process options, *direct design-build* or the *design criteria method*, while most of the other options may also be applicable.

7.4 Summary

The pricing arrangements presented in this chapter are, to some extent, alternatives to each other. In practice, fixed price contracting is widely used when the owner procures design-build services through competitive means. The GMP is often an outcome of a negotiated process. The cost-plus-fee option is, again, seldom used for the final contract except as part of the GMP arrangement.

Besides being alternatives, the pricing arrangements also complement each other. This can be seen firstly from the GMP system, which leans toward the cost-plus-fee approach. Moreover, the different systems can also be used even in the same project at different stages. It is rather normal that the owner and the (prospective) design-builder enter into a contract that is based on the pure cost-plus-fee arrangement in order to carry out the design needed to estimate the project costs. After this has been done and the design and estimate have been accepted by the owner, the parties agree upon a guaranteed maximum price for the design-builder's services and continue as partners to complete the project. Sometimes it even happens that when design has been completed and construction is proceeding at full speed and the costs of the project can be estimated accurately enough, the parties give up the GMP system and agree upon a fixed price in order to avoid some administrative burden.

The above example also demonstrates the meaning of a project phase as regards selecting the price arrangement. Setting a fixed price too early does not permit reasonable opportunity for scope definition and evaluation of project risks and may result in the owner receiving an unrealistic price due to a contingency. Alternatively, pursuit of a fixed price may lead to too detailed design by the owner and restrict the benefits of design-build. That's basically why alternative approaches are used more in the design-build context than with traditional project delivery systems.

8. ORGANIZING METHODS

In design-build the owner enters into a contract with one design-build organization, which is then liable for both design and construction of the intended building as a whole. Due to the resulting single point of responsibility, and subsequent absence of options, the owner-design-builder relationship is, however, of little interest here, while the relation is dealt with briefly in the Summary section below as concerns the agreement. Instead, there are many alternatives for the internal organization of a design-build entity which are the subject matter of this chapter.

Theoretically, it should be of little interest to the owner how the design-build organization is internally organized. There are, however, various issues that are worth consideration since they may influence the design-builder's ability to serve the owner under special circumstances. Moreover, from the viewpoint of the parties to the design-build organization, their mutual relations are, naturally, a key issue. Therefore, the focus of this chapter is on the mutual relationships – but adhering to the earlier scope definition – of the designer and the contractor only[97]. Other major partners to the design-build entity are dealt with in the Summary section (p. 138) and to some extent also in Table 44, which, moreover, sheds light on the mutual relation of the parties prior to forming the statutory arrangement and/or entering into a design-build contract with the owner.

Besides, design-build is accompanied by another important organizational question. The architect/engineer in a traditional construction project is responsible for the design and for providing advice to the owner as to contractor's work. In design-build, however, the architect/engineer is part of the contracting team which puts it in a different position. Without supervisory assistance, the owner may be unable to determine whether the constructor is delivering substandard work or if the constructor is requesting excessive payments, for instance. Therefore, the owner should consider hiring alternative, independent consultants when using the design-build project delivery system.[98] Such a consultant may also be required by the surety who furnishes the bond, or the lender.

This arrangement may be needed for other reasons as well. The management of the qualification and proposal processes, evaluation of proposals, etc. may require additional resources. The owner may not even have the expertise and experience needed for successful implementation of a design-build project and especially for the definition of design criteria. The possible duties and responsibilities of an owner's advisor or design criteria consultant in such cases are listed in Table 45. All in all, the type of design-build procedure to be used has a big influence on the need for an owner's consultant.

[97] In various States there may exist different restrictive rules against some of these organizational forms. Some States don't allow design and construction services to be offered in a single contract or allow that only for licensed architect/engineers. Besides, it might be required that the architect/engineer must also be licensed as a general contractor. For more information: Survey of State Procurement... (1996) AND Survey of State Engineering... (1997) and corresponding updates.

[98] Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), p. 119

Table 44. Nutshell: Teaming and team members.

In the design-build project delivery process, serious cooperation between the design and construction parts starts generally much earlier than the contracts proper for finalizing the design and construction are concluded. At first, the parties form a self-organized team for the qualification and proposal process, etc. Typically such an arrangement involves not only the architect/ engineer and the general contractor, but also some others as required by the project's features.

Team building principles

Due to the need of stable commitment and much labor prior to entering into the contract with the owner, there must be a clear understanding among the parties in the early stages of the process as to who has responsibility for various things and what the compensation should be. In fact, a rather formal agreement should be made, i.e. a *teaming agreement* (see Table 50, p. 131).

The teaming agreement describes how the team will prepare and deliver the proposal, negotiate and execute the design-build agreement, and thereafter perform the work. The teaming agreement is an essential means to ensure that team members are operating under the same premises with respect to their respective roles and responsibilities for various parts of the project, their participation in profits and losses, and other material terms and conditions before any team members expend a significant amount of money or effort. Another reason to make a formal agreement, also in long term partnering cases, is to show the owner that there is a relationship between the team members.

Primary team members

By definition, design-build means integrating design and construction services under a single agreement. Therefore the architect/ engineer and the general contractor can be considered the main parties to the design-build team. Besides, technical development created a long time ago the need for specialization in the building industry, which is apparent despite the project delivery system used. This means that it is very typical to involve at least a mechanical contractor and an electrical contractor in the nascent team in order to ensure the expertise needed in critical design phases (cf. Table 5, p. 31).

With regard to other possible members to the core team, their involvement depends on the project's features. For portions that are essential for the facility's functionality, new and innovative in nature, or that are critical as to the owner's criteria, a specialist may be involved.

Subcontractors

Another important point to recognize as regards the overall team composition and the division of labor between the actors is that design-build applies not only to entire projects but also to portions of projects.

Traditionally, subcontractors have specialized in various tasks and labor. Subsequently, the situation has changed and an ever-increasing part of subcontractors are working on design-build basis. For example, the following portions of projects are mostly realized as some sort of design-build subcontracts:

- structural steel
- curtain walls
- electrical works
- mechanical (HVAC) works
- plumbing works
- fire protection/sprinkler systems
- automated environmental controls
- equipment, and
- drywalls.

The work of these subcontractors is simply integrated into the overall project by the general contractor, with the design being reviewed by the architect/engineer and appropriate testing or government agencies.

Generally, the advantages of a design-build subcontract are the same as those of applying design-build to an entire project. In addition, the specialized focus of a design-build subcontractor offers design expertise needed in adapting design to various circumstances, knowledge of available equipment, price impacts and operation costs, and special skills of installation.

Table 45. Nutshell: Duties and responsibilities of client's design criteria consultant.[99]

The *(design) criteria professional*, also known as the *owner's design-build consultant,* usually carries out many project management tasks on behalf of the actual owner. This party is a design professional or firm either engaged by the owner or a member of the in-house staff. Involvement of a consultant is the more likely, the more design activities the owner assumes responsibility for before the design-builder's involvement. The tasks and duties that are to be adapted to the project in question, may consist of the following:

1. Participation in facility management

- to measure and define facility needs in response to the owners operational and other requirements,
- to identify and catalog resources available to the project (money, time, land and surrounding infrastructure, existing facilities and equipment, and management involvement),
- to identify and analyze project constraints and parameters (budgets, time, operation support, zoning restrictions, building codes, community concerns),

2. Development of procurement strategy

- to analyze the design and construction marketplace and identify target design and construction firms by type, location, size and pertinent experience,
- to measure relative attractiveness of project and to develop and recommend a design-build procurement strategy that takes advantage of the marketplace conditions and avoids its limitations,

3. Definition of requirements

- to position the owner's project and budget with respect to the representative state-of-the-art projects and to communicate the project's potential to the owner,
- to incorporate owner's responses into the design-build procurement strategy,
- to consult with owner to define owner's requirements for the project, to identify and obtain available data regarding owner's requirements and objectives,

4. Carrying out the selection process

- to prepare the project documents for the contractor selection process and contractor commissioning, respectively (design and selection criteria, RFQ, RFP, announcements, agreements, etc.),
- to distribute project documents and proposals to all candidates and owner's project staff and selection panel, i.e. to serve as an impartial administrator of the selection process,
- to hold pre-submittal meeting for proposers and communicate project needs to the proposers, and understand their concerns and respond appropriately,
- to request proposal clarifications, when necessary to protect the interests of either the owner or the proposers,
- to examine submittals for compliance with minimum requirements,
- to assist the selection panel in evaluation procedures, to summarize them in a written report and to notify all respondents accordingly,

5. Monitoring of design and construction

- to monitor design and construction to assure compliance with the project documents and to conduct quality assurance activities,
- to review submittals prepared by or for design-builder (drawings, specifications, samples, etc.),
- to respond to design-builder's requests for information and interpret the owner's contract documents, and recommend and negotiate change orders,
- to keep the owner informed of the progress of the work and to review and approve requests for payments,
- to advise the owner on the necessity of special inspections and regulation and to advise on claims between owner and design-builder, and
- to conduct pre-occupancy and final inspections, review maintenance and operating instructions, and to organize and monitor warranty claims.

[99] Task list summarized from: Wundram, E.C. The Role of the Design Criteria Professional. In: Master Builder. Integrator of the 21st Century (1996) AND Design-Build Manual of Practice (2000), Document Number 501

8.1 Contractor-led entity

8.1.1 Description

Contractor-led design-build means that the party who enters into contract with the owner for design-build services carries out most of the construction by itself, but involves a separate A/E to carry out the design as a subcontractor.

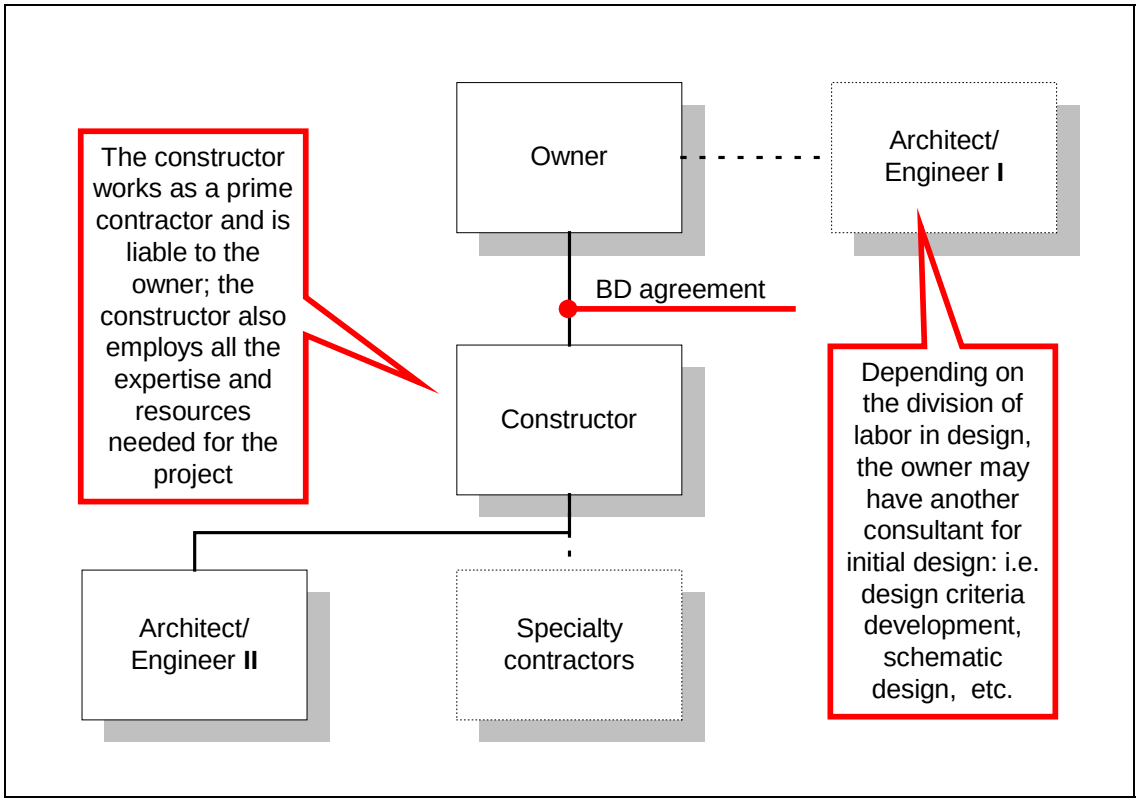

Figure 13. Contractor-led design-build with the A/E as a subcontractor.

In this option, the contractor who has a background in actual construction enters into contract with the owner for design-build services. Thus, the contractor is also responsible for all design and construction tasks and, moreover, liable to the owner for all problems associated with the project, including the design work by the architect/engineer (A/E) of records. The architect/engineer is, however, the party who actually prepares the design documents. A case introduction of a company operating under the contractor-led design-build mode is given in Table 46.

Table 46. Mini-case: Contractor-led design-build entity.

The Glen Construction Company, Inc. is a family-owned business with a current yearly volume of $60 million. The corporate headquarters are located in Gaithersburg, MD.

Glen started as a General Contractor but recently the share of traditional design-bid-build undertakings has been equal to that of negotiated projects on the one hand, and that of design-build on the other. Besides, every tenth project falls into the category of CM-Agent-type projects.

Transfer from traditional to design-build

The Glen Construction Co. has been increasingly involved in design-build. During the 90's the company has implemented more than 20 design-build projects falling in different categories by building type – the majority for public clients. The average size of these projects has been 80 000 square feet and over $5 million.

It took a long time to get to this point. The early evolution of design-build involved Glen's input into design decisions and Glen's active participation in design team meetings to assure constructability and budget adherence. Teams were selected at the time the architect was selected so that the owner gained the complete benefit of the future design-build contractor's know-how.

These early projects tied Glen contractually to the architect by having them commit to covering any possible gaps in scope, which were foreseeable due to their early involvement. As the process gained momentum in the marketplace, a trend evolved where Glen had direct contractual responsibility to the owner and contractual oversight of the design disciplines.

Design-build strategy

Glen's philosophy on design-build is to outsource design services to qualified architects/ engineers. This allows selection of designers who are specialists in the type of project to be built – since differences really exist.

As concerns construction, Glen performs work equal to 10–30% of the contract sum itself depending on project type while the rest is subcontracted.

Subcontractor procurement in the design-build context is a more selective process and is not based on the lowest bid submitted by a firm with little knowledge of the project but on bids by qualified firms which are involved in the design process and understand the cost, time and quality requirements of the project.

In other words, the project quality approach, appreciated by the owner and written into the design-build contract, is extended throughout project organization – meaning that there are also a few design-build subcontracts for key systems.

In contrast to traditional projects, where Glen also has to select among the many candidates mainly on the basis of price; design-build only involves a few subcontractors as more regular partners per trade. As is well known, in order to win a traditional design-bid-build competition, the contractor often has to select the one offering the lowest price although the party is not one of the firms to whom the contractor has sent a call-for-tenders.

Success of the strategy

As a result of the strategy described above and hard work, Glen has been successful in winning design-build competitions. The annual win ratio has been around 40 to 60%. While the proposal compilation is quite a job, less proposers, a better win ratio and final project success reward the effort.

The case certifies that by appropriate strategy and carefully selected partners as well as a good mix of competition and partnership, a small contractor can also be successful in the design-build market – it's not a field for giants only.

Glen's staff considers design-build's most advantageous feature the possibility it offers by giving them more control over subcontractor selection and project design.

All in all, design-build is considered an up and coming way of doing business.

Since the architect/engineer works as a subcontractor for the constructor, it is shielded from direct contractual responsibility to the owner for design defects.[100] Typically, however, the constructor aims to transfer many of these added liabilities associated with the design responsibility to the architect/engineer by means of various contract provisions. These clauses may require the architect/engineer to indemnify the contractor for any losses resulting from the architect/engineer's defective design, including the architect/engineer's failure to design the project in accordance with applicable codes and its failure to meet the schedule, budget and professional standards of conduct.[101]

8.1.2 Pros & cons

The advantages and drawbacks of the constructor-led design-build entity are presented in Table 47. Since these statements are rather general, and mainly represent the owner's viewpoint, an additional discussion follows to shed light on the architect's and contractor's positions.[102]

The contractor is likely to appreciate the following properties of this arrangement:

- The contractor may control significant design decisions, and thus, reduce project uncertainties and, subsequently, project delivery time and costs. The firm has relatively great control over cost-versus-quality issues.
- The contractor is able to take into consideration its own labor supply and fabrication requirements when controlling the project schedule instead of arranging the schedule around the needs of the others.
- The contractor is able to select the most qualified design professional to meet the design requirements of the project and does not have to have a fixed relationship with any given architect/engineer.
- The contractor may, depending on the firm's strategy, value the fact that it can avoid establishing or reducing the in-house design staff and, possibly, keep its overhead low and increase its market flexibility.

On the other hand, the contractor's enthusiasm may be restrained by the following facts:

- The contractor is liable for the acts and omissions of the architect/engineer, and besides, since there always will be changes to drawings and specifications, the contractor is likely to bear the economic consequences, at least initially.
- While the contractor cannot argue that the owner or architect has impliedly warranted the clarity and completeness of the drawings and specifications, the firm might be liable for all the costs resulting from items required by the code and missing from the design.

From the architect's viewpoint the situation is naturally different. The architect/engineer may consider the arrangement attractive since it involves only minimal risk for the A/E by limiting its responsibility to ensuring sufficient design services and advising on

[100] The A/E will, nevertheless, be liable to the owner and third parties for its negligence in design, which causes injury to person or property. [Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), pp. 125–129]
[101] Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), pp. 125, 127
[102] Presentation is largely based on: Twomey (1989), pp. 33–80

matters of the discipline. The architect/engineer may, however, be dissatisfied with the extent of its involvement in the project or, especially, its control over cost-versus-quality decisions made during the course of the project. Another concern may be that the A/E is isolated from the owner or that the communication between the owner and the architect is filtered through the contractor. The architect/engineer may also find the project more difficult when it has to try to resolve matters in the best interest of both the owner and the contractor.

Table 47. Advantages and drawbacks of the contractor-led entity mode.

Advantages	Drawbacks
• The owner obtains the services of the contractor as an advisor on project cost, schedule and other construction management issues while he can also be sure that the information stream between him and the contractor is not filtered by the organizational structure of the project. • The project is more likely to be influenced by the contractor, and the construction and management viewpoint, than by the A/E, which may be the owner's will when the project should be realized under special circumstances or, for instance, accelerated due to the prevailing market situation. • The start-up is relatively easy and management autonomy streamlines the operation compared to joint venture arrangements, and moreover, there is no additional administrative burden for the design-build actors.	• The organizational structure may, in some cases, be a hindrance to communication with the design-builder’s architect/engineer. • It is not absolutely clear that the architect/engineer has the “freedom” to work for the client’s best and that all the design-quality decisions are always made from that viewpoint.

8.1.3 Applicability

Appropriateness. The organizational form is generally appropriate in any design-build project. Contractor-led design-build is also by far the most used form for organizing a design-build project for facilities.

Compatibility. There are no major limitations as regards the various design-build procedures that can be used together with contractor-led realization.

8.2 Designer-led entity

8.2.1 Description

Designer-led design-build means that the party who enters into contract with the owner for design-build services carries out most of design by itself, but involves a separate contractor to carry out the construction as a subcontractor.

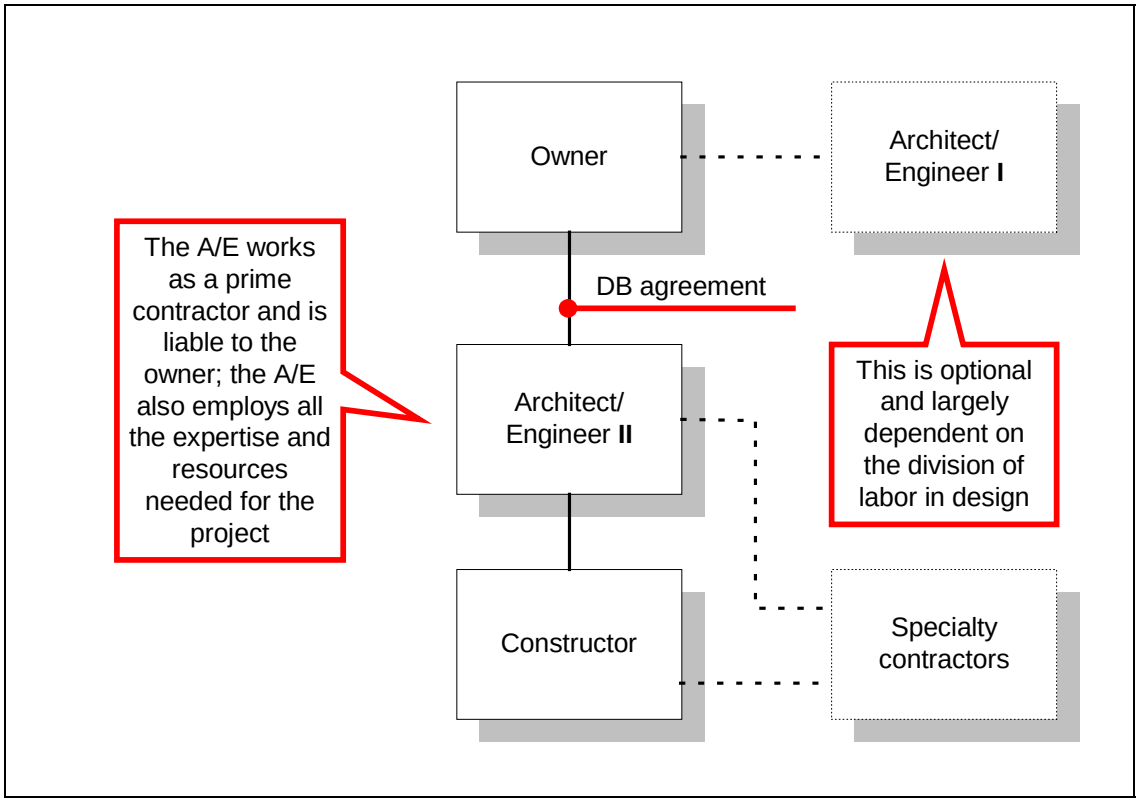

Figure 14. Designer-led design-build with the constructor as a subcontractor to A/E.

Here, the architect/engineer ("A/E II") enters into contract with the owner for design-build services. Thus, in addition to the A/E's typical responsibilities, the A/E is now directly responsible to the owner for the means and methods of the construction work. This means that the project has to be completed in time in accordance with the plan the A/E prepares and within the agreed price. The A/E is also responsible to the owner for job site safety and the project's compliance with safety regulations.[103]

[103] The contractor will, nevertheless, be liable to the owner and third parties for its negligent construction work, which causes injury to person or property [Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), pp. 118, 122].

The contractor is, however, the party who actually implements the construction work as a subcontractor for the A/E. The contractor has no direct contractual relationship with the owner and is, thus, insulated from contract claims made by the owner for defects in its construction performance. The contractor is, however, liable to the architect/engineer for these defects. Correspondingly, the A/E generally attempts to shift some of this additional liability to the contractor by including negotiated provisions in its subcontract with the contractor.[104]

8.2.2 Pros & cons

Advantages and drawbacks related to the designer-led design-build entity are presented in Table 48. As in the previous chapter, the text below supplements the issues presented in the table as to the architect's and contractor's interests.[105]

Like the contractor, the architect/engineer also may value the possibility of being in a dominant position, as in the examined case, for the following reasons:

- The architect has the most control over quality and the freedom to make the design and cost-versus-quality decisions. He may also find that comforting due to some semblance of the traditional fiduciary role between the architect and the owner—not forgetting his professional pride.
- The architect is able to select the most qualified contractor with the appropriate experience to meet the requirements of the project and need not have a permanent relationship with any given contractor.

The issues that tend to restrain the architect's enthusiasm might include the following:

- In addition to project design, the architect is liable for construction-related matters such as the contractor's failure to follow good building practices or to build in accordance with the information contained in the architect's design. Financial risks are often too large to be carried by A/Es working on modest capital.
- The architect serves also as a construction manager to the owner and is, thus, not only responsible for the outcome of the project but also for the scheduling, materials procurement, value engineering and labor relations, etc. These are tasks in which the A/E is not usually that experienced.

The contractor's position, again, starts to resemble that of traditional contracting but the level of communication with the architect is obviously better since the architect has a strong incentive to contribute to the contractor's success. Compared to the other options, there are, however, a few more advantages to the contractor. The contractor, again, may worry about the payment since the owner is now one step further from it, and the architect/engineer firms are very often only marginally capitalized. Another concern is that the architect is, unless the team work principles are applied properly, likely to wield considerable control over the flow of information between the owner and the contractor and thus, it may be difficult for the contractor to get acceptance for any improvements it has suggested.

[104] Baltz et al. Choice of form of organization. In: Cushman & Taub (1992), pp. 117–118
[105] Presentation is largely based on: Twomey (1989), pp. 33–80

Table 48. Advantages and drawbacks of the designer-led entity mode.

Advantages	Drawbacks
• The owner obtains the services of the designer as a more "independent" advisor on project design and quality than in some other organizational forms while he can also be sure that the information stream between him and the architect is not filtered by the organizational structure of the project. • The project is more likely to be influenced by the architect/ engineer, and the design/quality viewpoint, than the contractor, which may be the owner's will when the performance of the facility is critical or when it is of a "monumental nature", for instance. • The start-up is relatively easy and management autonomy streamlines the operation compared to joint venture arrangements, and moreover, there is no additional administrative burden for the design-build actors.	• The organizational structure may, in some cases, be a hindrance to communication with the constructor. • It is not absolutely clear that all the constructor's cost and constructability information as well information on long lead-time items are taken into account early enough and that such issues become fully considered in design decision making. • Construction management duties are sometime commissioned to the contractor, and thus, the mode moves the coordinating party one step further from the client's influence while confusing the overall arrangement.

8.2.3 Applicability

Appropriateness. As can be judged from the presented pros and cons, designer-led design-build is obviously used, although relatively seldom, and more appropriate for projects that are architectural or technical by nature. Engineering-type and/or environmental projects are, in fact, the major application area for designer-led design-build.

Compatibility. There are no strict limitations as to which design-build procedures can be used in combination with designer-led realization. However, the mode is not likely to be used when the owner does much of the design. Normally, the capitalization of an average architect/engineering office also limits its willingness to participate in the costly preparation of proposals for a design-build competition.

8.3 Joint venture arrangement

8.3.1 Description

Joint venture arrangement-type design-build refers to a practice where two or more unrelated business entities combine resources and form as co-owners a business alliance, which enters into a design-build contract with the owner.

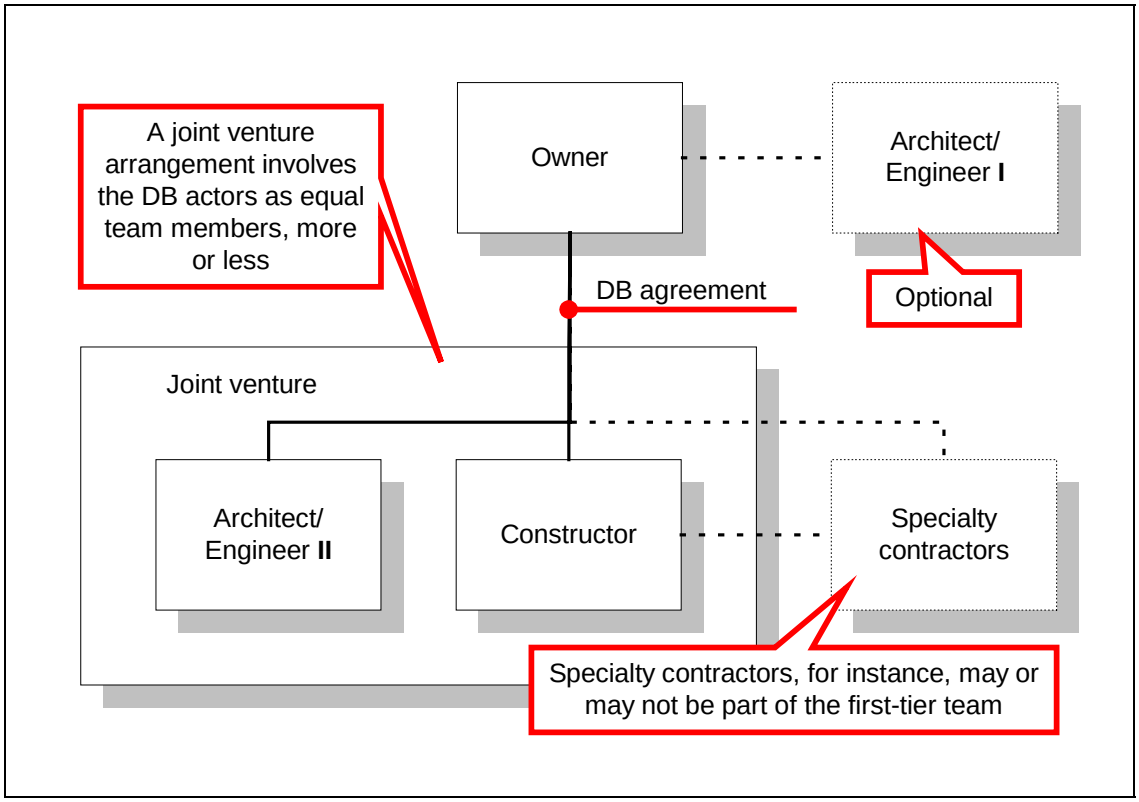

Figure 15. Design-build based on a joint venture arrangement.

As stated above, a joint venture (JV) arrangement refers generally to any practice where unrelated business entities form a business alliance as co-owners. This arrangement can be based on various alternative statutory solutions, which all set different provisions for the functioning of the entity. Firstly, there is the joint venture proper, which is based just on a mutual agreement between participating entities. It is a business alliance of limited duration usually created for the purpose of a particular project and dissolves upon project completion.[106] The key point here is that the parties are jointly and severally liable for each other's negligence or other wrongful acts committed in the scope of the joint venture.

[106] Werther, B. Necessary corporate documents. In: Cushman & Taub 1997, p. 32

As the law does not generally recognize joint venture as a unique legal entity, the courts treat joint ventures as "general partnerships".[107] Besides, there exist other types of partnerships, which bring some relief and options to the question of liability as described in Table 49. Unlike the first option presented, these other statutory alliances are formed by filing a certificate with the appropriate state authority.

The parties may also establish a separate company for the joint effort but, naturally, the provisions vary again.[108] The limited liability company (LLC) and the limited liability partnership (LLP) are relatively new arrivals in the spectrum of legally recognized business entities and have become a much used arrangement in the design-build context. Normally, allocation of ownership of the company is proportionate to the financial risks undertaken by the respective team members.[109]

In general, a firm can increase its competitiveness through a joint venture arrangement by joining with another firm that has the requisite experience and skill to perform the contract. Typically, the parties form a joint venture with the understanding that the design services portion of the project will be subcontracted out to the design partner and the construction portion will be subcontracted out to the construction partner. While some of the provisions are already set by the type of the selected joint venture arrangement, many of them can be agreed between the parties to the arrangement as shown in Table 50.

8.3.2 Pros & cons

A joint venture business structure has several features that make it more advantageous than merely subcontracting out portions of the project to independent contractors (cf. Table 51). Competing interests may arise between parties responsible for the design and construction aspects if a design-builder relies on extensive subcontracting. Instead, a joint venture arrangement involves risk sharing and resource-pooling and, thus there is shared mutual interest in the efficient management and completion of the project. In a joint venture, each party must take into account the others interests because the profits and losses are shared by the parties according to the joint venture agreement.[110]

A joint venture arrangement also brings both the design and the construction parties close to the owner. Correspondingly, the owner can be sure that both their viewpoints are taken into account for the owner's benefit, and that he may receive responses more quickly, regardless of the nature of the inquiries. The architect and the contractor also usually find the organizational balance offered by a business alliance more fascinating than being a subcontractor for the other. This is a result of their involvement in decision making and the freedom from the dominance of the other party.

[107] Loulakis, M. et al. The joint venture agreement. In: Cushman & Taub (1997), p. 143
[108] While a JV is often organized as a separate company, a BOT-type project, especially, requires such an arrangement in practice.
[109] Taub, K. The teaming agreement. In: Cushman & Taub (1997), p. 9
[110] Loulakis, M. et al. The Joint Venture Agreement. In: Cushman & Taub (1997), p. 142

Table 49. Nutshell: Arranging the business alliance within the design-build team.[111,112]

From the viewpoint of statutory creation, there are numerous ways to establish a joint venture arrangement. Possible arrangements with their main features, that are relevant when selecting an appropriate type of arrangement, are presented below.

Partnerships

The partnership can take the form of *general, limited*, or *limited liability* partnership:

- *General partnership* consists of partners having joint and several liability for the partnership's obligations who are presumed to share equally in the management and profits of the partnership. Thus, the constructor is, as a partner, liable to the owner also for all possible design defects and, on the other hand, the architect/ engineer is responsible also for job site safety, cost overruns and late delivery of the project.
- *Limited partnership* consists of partners of whom at least one is a general partner and at least one is limited partner. Limited partners have limited liability meaning that they are not liable for the acts and omissions of each of the other partners, e.g. the architect/engineer is not liable for site safety. A limited partner must not participate in day-to-day management.
- *Limited liability partnership (LLP)* is similar to general partnership but provides only limited protection against liability: the partners are liable for the LLP's business debts and their own actions or omissions, but not for the wrongful acts of their partners.

The other terms of the partnership agreement, like capital contribution and sharing of profit and losses, are, however, open to negotiation. Partnership offers the principal benefit of favorable tax status (compared to an incorporated company). They are not taxable entities separate and apart from their participants. Instead, they are flow through entities meaning that, profits, losses, deductions, special allocation items, credits and tax preferences are generally "passed through" to the individual partners, who report them for the assessment of their own income taxes. Thus, the possible second-tier taxation associated with an ad hoc corporation can be avoided.

Limited liability company

The limited liability company (LLC) is a hybrid of the partnership and the traditional corporation which combines the flexibility and favorable tax status of a partnership with the limited liability of a corporation. The members of an LLC are, thus, shielded from personal liability for the misdeeds of their partners, while maintaining responsibility for their personal negligence or misconduct. The LLC owners' assets are also shielded from the LLC's liabilities and obligations.

Like a corporation, a limited liability company offers more flexibility in ownership compared to a partnership arrangement. Normally, allocation of ownership of the company is proportionate to the financial risks undertaken by the respective team members.

Corporation

As stated above, a corporation is itself an entity and all legal matters affecting its activity are directed toward the corporation. Correspondingly, the other indices of a separate incorporated entity, like keeping separate books and records, maintaining separate governing boards, etc. are critical as regards corporations and limited liability companies.

On the other hand, corporation status exposes the entity to double taxation. The entity itself is taxed at one level, and the parties who receive dividends from the company are then taxed on their earnings. In practice, however, all the incomes are often passed through to contracting shareholders in order to avoid double taxation.

[111] Primary sources: Cushman & Taub (1992) & Cushman & Taub (1997)
[112] "The nutshell" presents only a broad overview of various arrangements while the provisions related to different statutory forms are, in practice, much more complicated, provisional and maybe even mutually exclusive.

Table 50. Nutshell: Items to be dealt with in a teaming agreement.[113]

When contractors and designers decide to compete for a design-build project together, they need to start by agreeing on the rules for the arrangement. Once negotiations between members of the team are completed and the terms of the teaming agreement put in writing, the parties should ensure that the following issues have been addressed.

General

- identification of the project: name of owner of project, nature and location of project
- identification of team members and their respective roles
- scope and aim of the agreement: proposal compilation and implementation of a design-build contract

Organization and operation of the company

- the form of the legal enterprise to be established
- applicable state laws governing the agreement
- the purpose of the company
- responsible party for forming company
- ownership of the company: shares of ownership
- company management structure, representatives of various team members
- management committee's decision- making procedures
- responsibility of members to provide personnel to the company and defray related costs

Proposal compilation phase

- members' contribution and duties with regard to proposal compilation
- team decision-making procedures regarding terms of proposal and termination of a team member
- withdrawal of any party in the proposal phase and possible penalty
- limitations on right of team members to join another team
- allocable costs and mutual reimbursement of costs of preparing a proposal and/or sharing an honorarium

Anticipated terms for the contract phase

- incorporation of prime contract terms
- subcontraction of various activities to team members and basis of payments
- sharing of construction cost overruns and limitations in members' liability
- allocation of savings among team members with possible limits
- requirements for and purchase of different types of insurance
- indemnities paid by team members to other parties based on failure, negligence or other wrongdoing

Other issues

- possible termination of agreement
- recruitment of employees of other team member
- protection of each other's proprietary or confidential information
- possibility for later amendments and modifications to the agreement
- possibility to assign obligations or benefits of the agreement to another party
- resolution of disputes
- date, witnesses, signatures

Postscript

Subsequently, if the team is awarded the project, an operating agreement between the team members prior to entering into the contract is often also needed depending on the legal form of the intended joint company.

[113] Examples and guides to operating, joint venture and teaming agreements, etc. can be found from: Cushman & Taub (1997); Design/Build. Teaming Checklists (1999) AND Design-Build Manual of Practice (2000), Document Number 308

A drawback may be, depending on the nature of the joint venture arrangement, that increased power means more duties and liabilities as well. The management of a joint venture is also more demanding than contracting out some tasks in a design-build context. It requires focusing on the formation, management, and tax issues associated with a separate entity. Without adequate efforts on the business issues, the association may end with a fractured management structure. For instance, unless the joint venture is structured internally to "speak with one voice" on administrative and management issues, the owner may end up interacting with one or the other of the parties, or perhaps with both parties on various design and construction issues like in a traditional project.[114]

After all, what the advantages or drawbacks finally will be depends on the used structure and the observer's standpoint. Joint and several liability of the partners in a pure joint venture is a likely concern for many parties while double taxation may be a problem in the case of a separate design-build corporation, for instance (cf. Table 49).

Table 51. Advantages and drawbacks of the joint venture mode.

Advantages	Drawbacks
• The mode promotes efficient management and problem solving since the partners are equal and have a mutual interest in a good performance – it also offers a good platform for incentive contract clauses for both actors which strengthen these features. • The owner enjoys direct communication with and control over both the design and construction components of the project – in other words, the information stream is not filtered by the organization structure of the project. • No viewpoint is likely to be too dominant, design's or construction's, while the project solution should be optimal as regards cost, design quality, constructability, schedule and other aspects of construction.	• The arrangement requires extra time and effort to establish all the management responsibility and practical procedures that have to be created for the separate entity and/or varying arrangement.

[114] Twomey (1989), p. 48

8.3.3 Applicability

Appropriateness. The joint venture arrangement offers the parties involved in a building project more flexibility in structuring the business arrangement than the alternatives. Therefore, it is also an applicable alternative for organizing a design-build project in most cases – especially since various ways of organizing the JV entity as a leagally recognized business unit differ greatly. Various joint venture arrangements also have a significant and apparently increasing share of the market.

Compatibility. There are no major limitations as regards the use of various design-build procedures in combination with a joint venture arrangement.

8.4 Integrated design-builder

8.4.1 Description

Integrated design-builder refers to a company that enters into contract with the owner for design-build services and, moreover, has in-house resources for both design and construction, and also carries out most of the activities by itself.

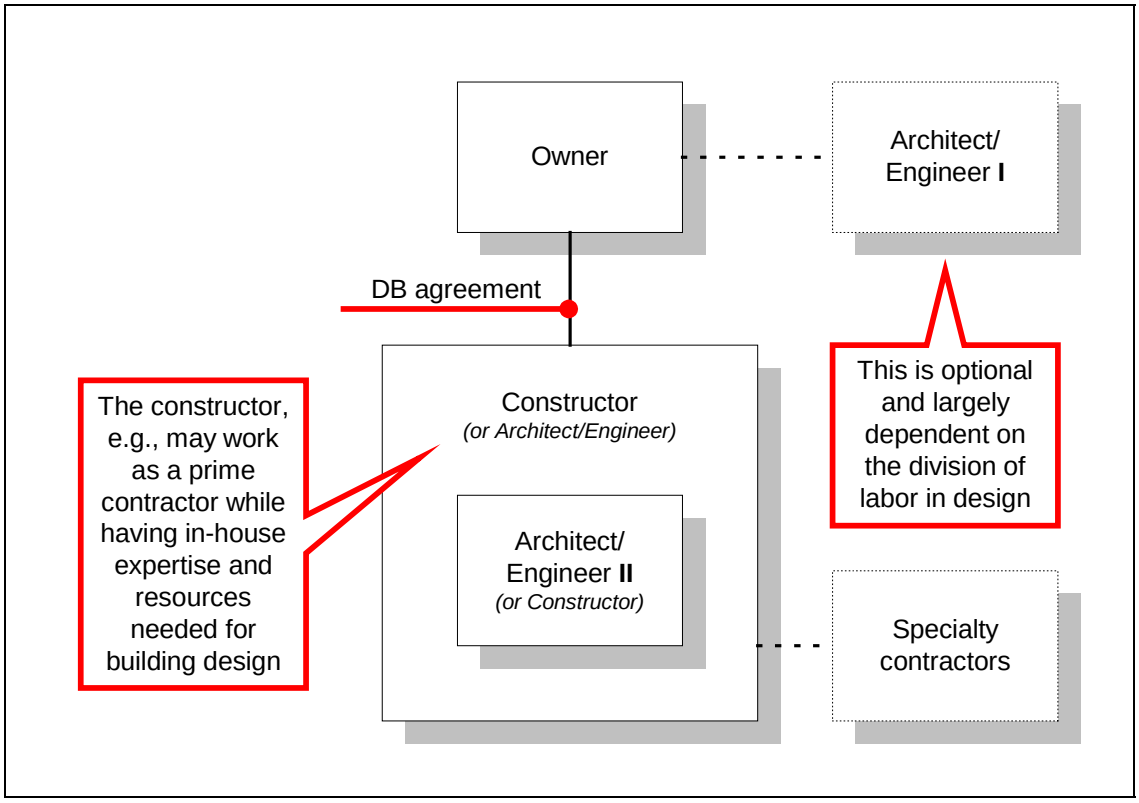

Figure 16. Design-build by an integrated design-builder.

Many contractors – or constructors – have in-house design departments that allow them to implement design-build projects without external design consultants. Correspondingly, a few enterprises with a design background have extended their know-how to construction and, therefore, they have the staff needed to manage design-build projects and construction activities. Thus, in both cases, the services traditionally associated with separate entities are now available from the one and same company (see an analogous company introduction in Table 52). Services may, of course, also cover some other related activities like development and facility management. On the other hand, separate subcontractors and possibly some specialty consultants are likely to be involved in projects of integrated design-builders as with all other organizational forms.

Table 52. Mini-case: An integrated design-builder.

The Haskell Company, headquartered in Jacksonville, Florida, was established in 1965 and has, thereafter, grown into one of the foremost design-build organizations in the United States. The company can be considered an "integrated design-builder" since it holds in-house resources for both design and construction. The staff includes over 800 employees of whom well over a hundred are in-house design professionals.

The company resume consists of over 800 completed projects and its annual volume exceeds $500 million. The company's projects include manufacturing plants, distribution centers, health care facilities, low-temperature structures, shopping centers, office buildings, hotel and resort buildings, parking structures and institutional facilities.

Integration of design and construction

The organization provides complete architectural, engineering and construction services of the following scopes:

- Architecture: Programming, Space Planning, Building Design, Interior Design, Furnishings Procurement
- Engineering: Civil Engineering, Structural Engineering, Mechanical Engineering, Refrigeration Engineering, Electrical Engineering
- Construction: Design-Build, CM or at-risk CM, Project Management, Precast Concrete, Poured-in-Place Concrete, Carpentry

In addition to actual design and construction activities, the company offers a variety of pre-design and post-occupancy services to its clients. The former include criteria definition and investigations. In the area of post-occupancy services landscaping, furniture procurement, and facility management are typical activities.

Moreover, many of the construction tasks are self-performed. The company has even in-house steel fabrication capabilities of its own.

The overall service portfolio

While the core of the services consists of architectural, engineering and construction services, another service entity consists of real estate activities like site acquisition and property management. Various financing, sales and leaseback arrangements are also part of the "design-build-plus" services offered by the company.

The company's aim is that an integrated in-house Haskell team manages the entire process, including up-front services, design, construction, and post-completion services. The company also believes that the resulting better coordination of the project from start to finish means a better finished facility.

Educational Services

An extreme example of the wide variety of the company's services – or of the possibilities that a company with a background in construction may generally have as an "integrated" service provider – is Haskell's educational services department.

The department's core business is running schools. It was created to provide integrated services to municipalities, employers and other entities seeking to build innovative charter schools. Charter schools are public schools operated by a group other than a school district, but whose charters are issued by the local school authority.

The company can provide site selection, project financing, design and construction as well as curriculum development, personnel and school management services to groups building charter schools. The company hopes to gain a strategic advantage by offering a single point of contact, and moreover, by increasing its share of the presumably growing charter-school-construction market.

While the company has designed and constructed numerous public schools based on design-build, its first charter school project was at Pembroke Pines, FL. The project had a construction schedule of just eight months and was completed in the fall of 1998. It was a short $10 million, two-campus project including a 500-student elementary school, a 200-student pre-kindergarten facility and a 250-student primary learning center.

8.4.2 Pros & cons

The main advantage of this solution is that the design-build entity has a stable and experienced management structure and has probably already solved many of the problems that any ad hoc arrangement is likely to meet.[115] There is no longer need to adapt separate professional, business and management approaches. Thereafter, the owner as well as the design-builder can be sure that the actors are able to focus entirely on the issues of major importance (cf. Table 53).

In some cases, however, the owner may be concerned about whether the design-builder has the best available resources for both the design and construction part of the project. The arrangement may not be flexible enough to adapt to the particular needs of an owner or project. On the other hand, an integrated design-builder is likely to have equal experience from both the design and construction side as far as certain project types are concerned, and moreover, the company is likely to compete just on the corresponding markets.

From the design-builder's viewpoint, the main drawback is that such an integrated design-build entity takes much time and effort to establish. It requires a strategic decision and long-term commitment and cannot be established merely by concluding a contract. Also, the primary design-build entity cannot shift any significant part of the responsibility to other parties (except insurers).

8.4.3 Applicability

Appropriateness. This organizational form is generally appropriate for any design-build project and may be especially appropriate for demanding projects involving a design-builder with a corresponding differentiation strategy and experience. The market share of projects realized by integrated design-builders is rather small in general, while in the process industry most of the projects are implemented by an integrated design-builder.

Compatibility. There are no major limitations as to various design-build procedures to be used in combination with realization by an integrated design-builder.

[115] Naturally, also in the case of separate design and construction entities, potential problem sources may have been largely removed in the course of long-term co-operation. In both cases, these issues should be looked at case by case.

Table 53. Advantages and drawbacks of the integrated design-builder mode.

Advantages	Drawbacks
• The owner largely avoids the challenge of evaluating excellent design and construction references by two separate organizations that may even have hardly any experience from working together. • The design-builder's internal management structure is usually stable, good channels of communications and feedback have been established, and the segments are probably even able to communicate with less data/confusion by using company standards. • Team spirit is easier to achieve here than in other organizational arrangements where the separate design and construction elements have very different professional and business goals. • Disputes between the design and construction elements are less likely to occur than in arrangements based on separate design and construction organizations, and are likely to be solved quickly and fairly.	• The architect is usually assumed to follow his traditional instincts as the owner's advisor – a role for which there may sometimes be less room in the integrated design-builder organization than in the other options. • In special cases, an in-house design or construction department may not have the appropriate experience needed, and it may be difficult to find better resources through outsourcing due to the firm's employment policy.

8.5 Summary

The basic alternatives for organizing a design-build team and project were presented above. For simplicity of description, it was supposed that the team consists of a primary architect/engineer and constructor only. However, in practice some other major parties may belong to the core team as well. Besides them there are plenty of subcontractors and suppliers inherent in every construction project as outlined in Table 44 above.

As to the main parties, the project team may also include a developer if significant land-use issues are involved such as zoning changes, code changes, street location, and so on.[116] Moreover, the lead architect may, for instance, want to add other architects or engineers to the team to strengthen professional expertise and to share risk. An architectural firm with a national reputation for designing projects similar to the project being awarded, and a local architectural firm familiar with the local conditions as well as officials, could offer a good combination of needed properties. Similarly, a local contractor's relationships in the subcontracting community can be valuable for a contractor coming from outside the region and who is required to provide certain expertise. Involvement of another contractor may also be a solution when the project is extremely large and one contractor may not wish to bear the financial risk alone.

These additional members are likely to confuse the basic forms described. However, the decision to add these members to the team may also be effectuated in three ways:[117]

- The "additional members" can be added to the first-tier group as individual team members if the team is based on a joint venture arrangement.
- A group of "second-tier" entities can form a joint venture arrangement that would be a member in the first-tier group (regardless of its organizational structure). This option is sometimes used in order to diminish the risks for participating actors.
- The "additional members" can be subcontractors or subconsultants to a first-tier team member (regardless of its organizational position).

All in all, there are numerous options for organizing a design-build entity in general. Most often the party liable for a design-build contract is, however, a construction contractor which is due especially to the financial risk that has to be carried. Yet, various joint venture arrangements and realization by an integrated design-builder play meaningful roles in the market as well. Designer-led design-build occurs also in the process industry, for instance.

Whatever the organizational structure, the contracts between the parties should, as far as practically possible, reflect actual responsibility for the various activities of the project

[116] The developer may even act as a prime contractor so that the A/E and the contractor work as subcontractors for the developer. This option, "developer-led design-build" is not, however, discussed in the book since it makes sense to use the model only for projects, which include the responsibility for real estate development. In other words, the form is for design-build-plus projects which are, as already stated in the introduction, also excluded from this book focussing just on the design and construction of a facility.

[117] Modified from: Taub, K. Teaming Agreement. In: Cushman & Taub (1997), p. 7

and anticipate potential problem areas. Besides, as concerns owner-design builder relations, Table 54 examines forms of contract and the way they deal with various "problem areas". Nevertheless, design-build is not a “fill-in-the-blanks” contracting method as can be judged from Table 55. It is absolutely necessary for the contracting parties to look carefully at any standardized contract and ensure that the document reflects their intentions. In fact, many industrial and commercial owners and government agencies have prepared their own forms of agreement to meet their specific needs.

Table 54. Nutshell: Introduction of different standard forms of contract.[118,119]

There are a number of families of standard forms specifically designed for design-build projects. The common purpose of these forms is to provide an economical and convenient way for parties to contract without having to resort to expensive juridical aid in order to create a contract for a new project. The following survey focuses on various forms of contract provided by different organizations.

American Institute of Architects (AIA)

The AIA's documents are based on a two-part contracting system. The first part deals with services for preliminary design and budgeting. The deliverable is a proposal that provides the owner with price, time and scope commitments, including, among other things, preliminary design and outline specifications.

If the owner accepts the proposal, the parties execute the second part, which covers final design and construction. The owner is not permitted to use the results of the first part if the latter is not executed with the same design-builder. Moreover, AIA's two-part system requires substantial modifications when an owner is interested in selecting the design-builder based upon a competitive RFP process.

Engineers Joint Contract Documents Committee (EJCDC)

While AIA's contracting format enables the owner and design-builder to work together to establish a preliminary project design, the EJCDC's presumptive contracting approach is not accommodating to the owner who prefers to engage a design-builder directly or through competitive negotiation. EJCDC's contract suggests that the owner's program will normally be well defined in advance of design-builder selection and that price, time and other commercial terms will be established as a part of the selection process. The forms also suppose that an engineer is the lead design professional and thus, they are especially suited for "engineering projects".

Associated General Contractors of America (AGC)

AGC's forms offer both of the above procedural options since there are separate documents for a preliminary agreement and an agreement for design and construction. The former provides for the development of the project plans to a point where the owner can assess the project's feasibility and decide whether and how to proceed.

The parties may also bypass a preliminary agreement which enables them to contract directly, regardless of whether the owner has well defined programs before starting the design-build process or not.

Design-Build Institute of America (DBIA)

The DBIA documents' premises and usability with regard to phasing correspond to those of the AGC's forms. The documents are also flexible enough to be used either in competitive or negotiated scenarios.

Moreover, DBIA aims at a balanced state while, typically, each standard form of contract document reflects the philosophical views and biases of its sponsoring organization. For instance, elsewhere the owner may be granted a limited license to the design-builder's schematic design in case the parties do not enter into a contract proper.

Summary

EJCDC's design-build contracts are lengthy and comprehensive while AGC's forms, and especially those of AIA, are brief and simple. Those by DBIA fall somewhere in between.

It is important for the user to recognize views and biases at the outset when determining which family of forms to use on a particular project. There are differences in the way the various forms allocate risks, etc. For the same reason, it is not usually possible to use them jointly on the same project although the standards have forms for various relations within a design-build project/team.

[118] Partial sources with appropriate updates: Loulakis & Fisher (1995) AND Design-Build Manual of Practice (2000)
[119] Cusman & Taub (1997) includes various model agreements as well. Besides, International Federation of Consulting Engineers (FIDIC) has also created its own forms that seem to be directed particularly to Third World countries [Molineaux, C. The New FIDIC Design-Build Conditions. In: Master Builder. Integrator of the 21st Century (1996)].

Table 55. Nutshell: Limitations of standard forms of contract.[120]

While various standard forms of contract offer a shortcut to economical and convenient contracting, they do not provide any "fill-in-the-blanks" solution. Instead, the following issues should be taken into account and carefully considered when entering into a design-build contract using existing standard forms.

Scope of work. The scope of work of a design-build contract is typically the most significant issue that one needs to address. Unless the design is virtually complete, the scope of work will be defined by a statement of facility requirements, often in performance-based language. The less objective the performance criteria, the greater the potential for ambiguities and misinterpretations regarding precisely what the design-builder will be providing. The parties must carefully review, define, and draft the exact scope of work and not rely on the language in the standard form of contract.

Design-builder's responsibilities. Although the standard forms define the design-builder's responsibilities, care must be taken to ensure that the responsibilities match what the owner has in mind. Responsibilities may vary dramatically from project to project depending on the owner's needs and the completeness of the design at the time the design-builder submits its proposal.

Owner's responsibilities. Because of the varying nature of an owner's involvement in a design-build project, it is difficult to standardize the owner's responsibilities in a specific project. An owner's involvement can be limited to signing the contract and waiting to "turn the key" in a completed structure or it can cover full-time inspection and approvals during performance. There is a need to specifically address what rights the owner will have to review and approve the design, construction schedules, and shop drawings and amend the form to reflect this state of affairs.

Ownership of documents. Who owns the design documents and when does that ownership take effect are critical issues confronting the parties to a design-build project. Although the standard forms address these issues, both the owner and design-builder must ensure that the terms reflect their understanding.

Changes of law. Although the design-builder has the responsibility to design and build the project for the stated price, the question regarding who has the responsibility to pay the costs created by a change in laws and regulations during performance remains. Some parties shift this risk entirely to the owner on the proposal date. Others require that the design-builder bear the consequences of changes affecting construction. Although this concept is addressed in the standard forms, it is clearly a business issue that should be evaluated and discussed.

Performance guarantees. A key issue is how to deal with the consequences of project delays and shortfalls in performance guarantees. In industrial and power generation projects, the ability to obtain performance guarantees is often the single most important reason the owner chooses the design-build approach. The standard forms do not adequately address these issues.

Limitations of liability. Because of the potentially disastrous economic consequences associated with breach of contract, most design-builders seek and obtain limitations of liability on their projects. There can be limitations on recovery of a certain type of damages (e.g. consequential damages) or a general ceiling on damages (e.g. a percentage of the contract price). The standard forms are silent on this issue.

Inspection, acceptance, and warranties. Although standard forms generally address these issues, each business deal typically differs in the rights afforded to the owner. For example, in the case of a process facility, acceptance may be deemed to have occurred upon completion of a specific performance test even though it may only demonstrate performance for a 48-hour period. Parties should carefully address these issues and the owner's rights to look to the design-builder for correction of latent defects.

[120] Summarized from: Loulakis & Fisher 1995, pp. 2–3

9. PROJECT'S PHASING

According to traditional practice, the owner's architect/engineer designs the entire building – including frame, façade, interior systems, etc. – before construction is launched. In other words, all design decisions are made more or less simultaneously in the early phase of the project. In corresponding design-build, the liability for design is transferred to the contractor, but in terms of concluding the contract, the entire building is still considered an undivided entity, and the owner has to know all his requirements in detail in the early phase of the project. Thereafter, any significant modification of interior details calls for a change order, adding confusion to the process and affecting the original contract price.

On the other hand, the commercial interiors[121] practice has developed a phased process and various creative technical solutions in response to market demand for increased flexibility in decision-making and space utilization. To support deferred decisions on details, and more importantly, the turnover of rental space, the building shell (frame and exterior) and core (shared service space) have evolved into a separate entity from the leased office floors they support. Thus, speculative office building interiors are designed for maximum flexibility, anticipating the wide range of tenants that will occupy them. Each space is then adapted, or built-out, to suit its tenant.[122]

In accordance with the phased design of the shell and core, and customer fit-out, the contractor's involvement in the corresponding works may also be carried out in phases. Recognition of this alternative approach is of extreme importance in the design-build context, where the expression of detailed requirements may be insurmountable in the early stage of the project – especially when design-build is used to accelerate the process as the case often is.

All in all, these developments are aimed at better life cycle economics and improved sustainability. While the phasing of design and construction is of primary interest to a speculative developer enticing tenants to the building, it is also an increasingly critical issue in any "built to purpose" project as well. Companies operating in a dynamic environment do not know very early which branch of the organization is going to occupy the prospective building.

Therefore, this chapter will discuss the different practices as regards phasing and segregation/separation of the base building and interior construction, but only to the extent relevant for the design-build context. The principles of design-build also apply differently to interior construction where numerous ready-made movable and demountable, modularized product systems are available.

[121] The office and retail market is the main area of application. The increasing international trend of using these ideas in residential construction hardly concerns the US [Kendall & Teicher (1999)].
[122] McGowan (1996), p. 1

9.1 Comprehensive contract

9.1.1 Description

Comprehensive contract refers, here, to the mode where the owner commissions the design and construction of an entire building by one contract so that the scope of the contract covers both the base building and fit-out works.

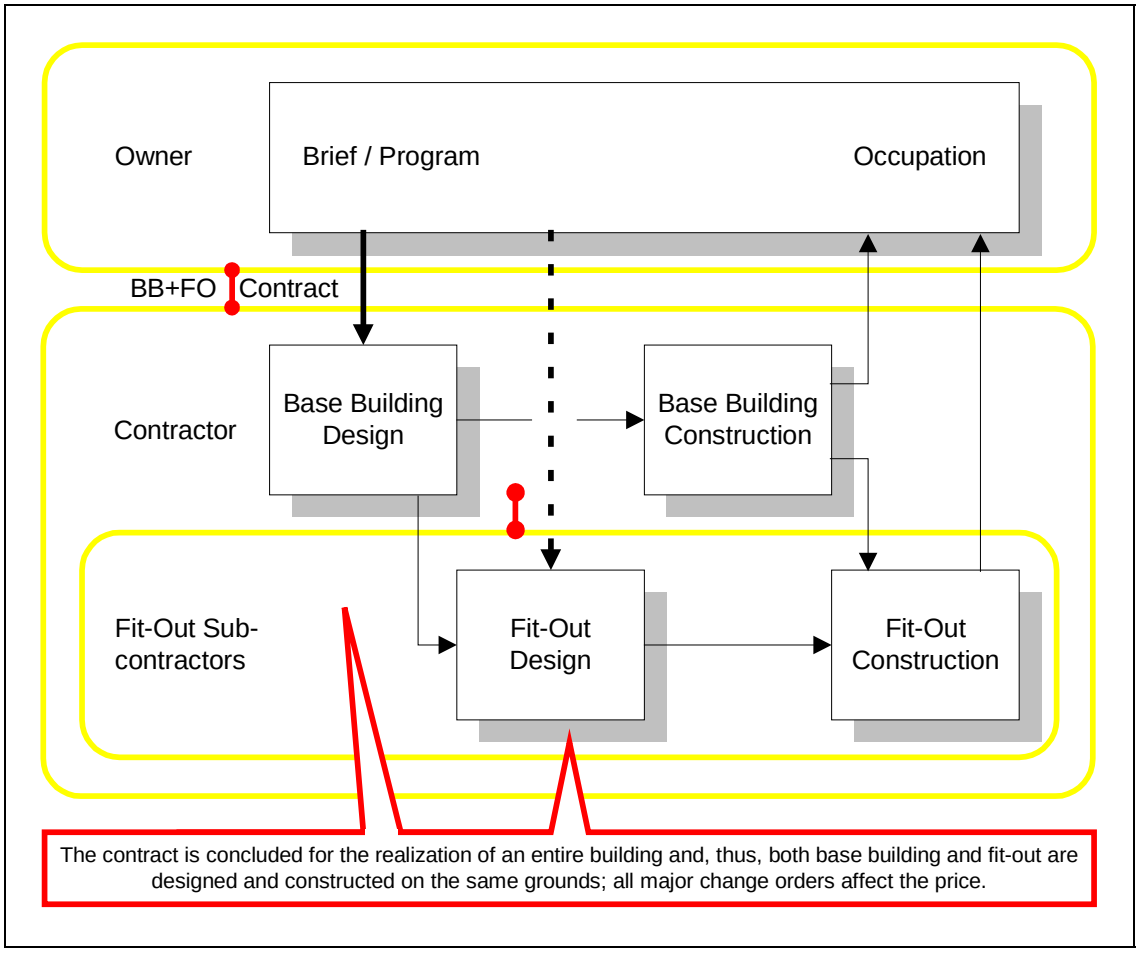

Figure 17. Design and construction of an entire building as one contractual entity.

"Built to purpose" refers to the building practice, where the need for a new facility launches the process. The user is known already at the beginning of the process and, thus, the requirements for the building including all the internal solutions can largely be defined, and the realization of an entire building can be commissioned. Typically, the party that commissions the construction also occupies the building after its completion.

The overall process is broadly the following:

1. *Strategic Facility Planning and Programming*. The current and future facility requirements are analyzed to determine the appropriate facility development plan for the owner. The program definition is formulated then by the owner's consultant, which, in some cases, may be a full service design-builder.

2. *Procurement of a Design-Builder*. After completion of the appropriate documents and competitive proposals and/or negotiations, etc. the owner signs a contract for the construction of an entire building; both base building and fit-out[123] are designed and constructed on the basis of this contract.

3. *Design and Construction*. The design-builder carries out the design and construction of the facility in connection with the normal review and approval process. All the likely change orders have a price effect. After completion, the owner typically occupies the building himself.

The point in this process is that the owner employs one design-builder, which gives the owner a single-point-responsibility for the entire facility. The decision-making model can, however, partly adhere to the phased model and, in practice, there are always some changes in design after entering into a contract (cf. broken line in Figure 17). While there might well be some flexibility in the agreed framework, all amendments that increase quantities above set limits are considered change orders and have a price effect (redesign, extra work or material, etc.). This is made possible by the use of unit price schedules that are part of the contract. However, the idea is to keep the changes in scope to a minimum.

When the Fit-Out works are implemented as a part of a comprehensive contract, no single and distinct Fit-Out contractor is used but the main contractor typically employs the appropriate number of subcontractors to carry out the work.

9.1.2 Pros & cons

Table 56 presents some characteristics that are relevant when considering the use of the comprehensive contract mode.

9.1.3 Applicability

Appropriateness. Currently, this mode is used especially in residential construction and it is a sort of basic mode in other than business premises construction.

Compatibility. Commonly used, especially with various "design-build-plus" modes.

[123] The terms "base building" and "fit-out" are explained in Section 9.2 below since they are the key items in the phasing scheme described in that section, and constitute the difference between these two processes in question.

Table 56. Advantages and drawbacks of the comprehensive contract mode.

Advantages	Drawbacks
• The simplest process to carry out if all needs and requirements are known from the beginning of the process and the building can be defined in detail in an early phase. • Offers a single point of responsibility for the entire building and helps avoid possible disputes concerning the scopes of separate contractual entities.	• Late modifications may not be possible or they may be priced higher than the tasks included in the original scope of works. • The need for detailed definition of the owner's requirements, also concerning fit-out prior to design-builder’s selection, may delay the process.

9.2 Phased progress and contracts

9.2.1 Description

Phased progress and contracts refers, here, to the mode where the owner commissions the design and construction of the shell and core, on the one hand, and the customer fit-out, on the other, in phases under separate contracts.

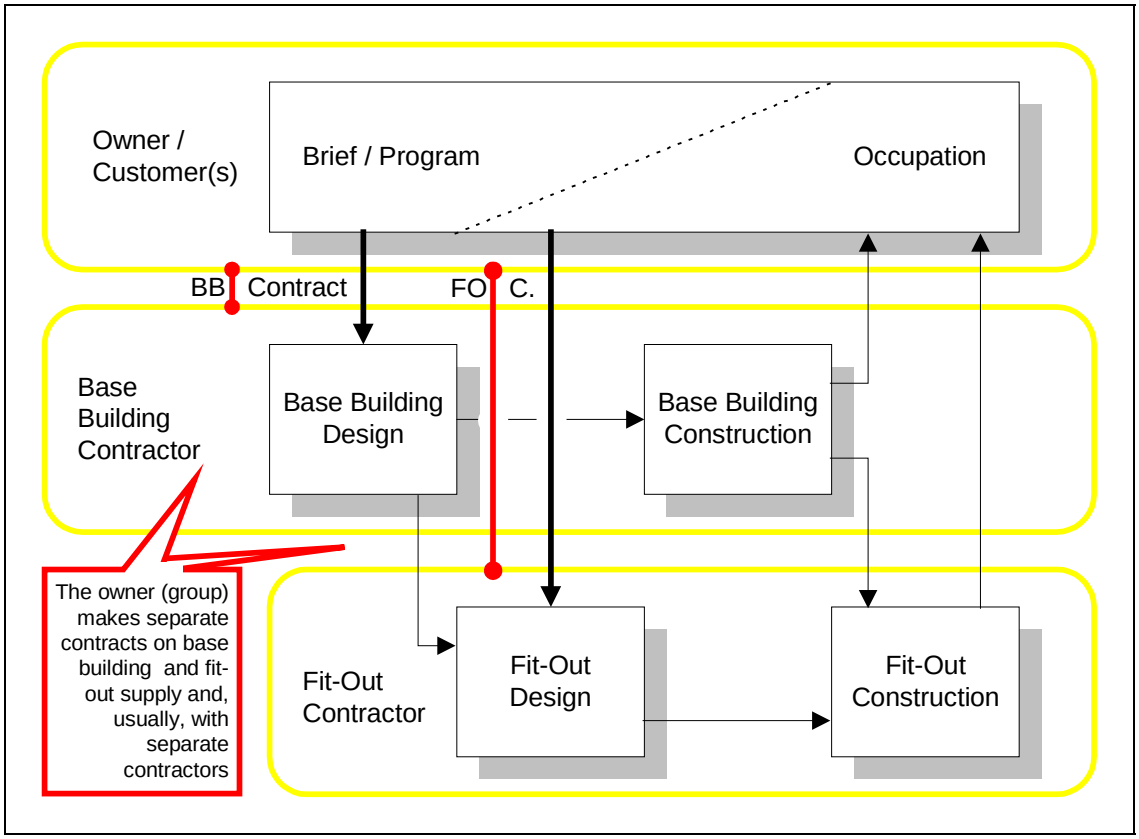

Figure 18. Division of base building and fit-out works into separate contracts.

The phased progress and contracts model separates the base building and fit-out processes. These two elements of a building can be understood as follows:

- **Base Building** refers to the (commercial office) building shell (frame and envelope) and core (shared service space, e.g. staircase, and building services supply). In addition to the structure, the base building includes the main ducts for essential services, such as the heating, ventilating, and air conditioning (HVAC) system, and elevators and rest rooms.
- **Fit-Out** refers to the materials and constructions that form the internal system responding to the individual tenant's needs and which are not part of the base

building. They are also called tenant improvements. Fit-out works cover such systems as raised floors, ceilings, partition walls, and furniture, furnishing and equipment (FF&E). Moreover, secondary ducts of the building services may be part of the fit-out as well as lighting, cabling, etc.

The phased process involves the following general steps:

1. *Strategic Facility Planning and Programming*. The current and future facility requirements of the owner (built to purpose) or the demand in the market (speculative project) are analyzed to determine the appropriate facility development plan. Special emphasis in program definition and requirement design is placed on the base building's capacity to incorporate various internal solutions.

2. *Procurement of a Design-Builder for the Base Building*. After completion of appropriate documents and competitive proposals and/or negotiations, etc., the owner concludes a contract for the construction of the base building element.

3. *Construction of the Base Building*. The design-builder carries out the design and construction of the base building (i.e. in parallel with the following tasks).

4. *Finding the User*. In speculative (multi-tenant) projects the owner continues marketing and negotiations until a lease agreement is concluded per space (see *Table 57*). In an owner-occupied project, the owner decides the occupant groups of the spaces.

5. *Procurement of a Design-Builder for the Fit-Out*. After completion of the appropriate documents and competitive proposals and/or negotiations, etc., the space possessor – the owner or the prospective tenant depending on the clauses of their mutual lease agreement – makes a contract for the construction of the fit-out element.

6. *Construction of the Fit-Out*. The design-builder carries out the design and construction of the interior system, the fit-out. After completion, the appropriate party can occupy the building.

The point in this process is that (design-build) contractors are employed separately and sequentially for the base building and the fit-out. Typically the base building contractor is different from the fit-out contractor(s). This is the case in multi-tenant buildings especially. In owner-occupied facilities, the owner may use the same contractor for the base building and interior works but separate the works under two agreements in order to defer the decisions on internal systems as close to occupation as possible.

Interior design constitutes a separate discipline from other building design and, thus, the client's consultants and designers are employed in different stages as well. The client for the interior works can be either the actual landlord (the base building owner) or the tenant of a specific space. In the former case, the practice introduced in Table 57 is followed.

Table 57. Nutshell: Speculative construction and lease practice.[124]

The term "speculative construction" refers to a practice where the prospective owner launches a project at his own risk and, thereafter, leases (or sells) the spaces to other parties usually not known to him (definitively) prior to the launching of the project. In such cases, the interior construction of any specific space unit is deferred until the user of this space is known – although the construction of a base building may already be proceeding at full speed.

The base building's spaces are designed for extensive flexibility as regards variations in space layout and internal construction. Interior construction of tenant spaces starts just after the conclusion of an agreement with the tenant.

Spaces are typically leased by giving the tenant the right to the exclusive use and occupancy of a specified space for a stated period of time in return for a stipulated rent. Besides, an agreement determines:

- the ***base building standard***, or building standard, which is a package of typical tenant improvements provided by, and sometimes required by, the landlord. By standardizing such building components as suite entry doors, suite signage, lighting fixtures, and window treatments, the landlord can maintain coherence in design and consistency in maintenance routines throughout the building.
- the ***tenant improvement allowance*** to cover standard items that will be installed at no cost to the tenant, i.e. they are included in the rent. Two main praxes are used in defining the allowance:
  1) The allowance may be simply stated as a certain amount of money to be provided by the owner per square foot of leased space including information on unit prices.
  2) The amount of tenant improvements is indicated per square foot of rentable space. The document that describes these improvements to the rented space is the **work letter,** which is attached to, and becomes part of, the lease.

An example of the definitions of a work letter:

1. **Standard interior partitions**: One lineal foot consisting of steel studs, 1/2" gypsum wallboard on each side to ceiling height, taped and spackled for every 10 square feet leased.
2. **Standard demising partitions**: One lineal foot for every 60 square feet leased.
3. **Standard interior doors with frame and hardware**: One for every 400 square feet leased.
4. **Standard corridor doors with frame and hardware**: One for every 1,200 square feet.
5. **Standard acoustical ceiling**: Exposed grid suspended system with 2' by 2' acoustical lay-in tegular tiles throughout the demised premises.
6. **Standard recessed lighting fixtures**: One for every 80 square feet leased.
7. **Duplex electrical outlets**: One for every 120 square feet leased.
8. **Light switches**: One for every 200 sq. ft.
9. **Telephone outlets**: One for every 200 square feet leased.
10. **Wall finishes**: One prime coat and 2 coats of building standard latex paint. Colors shall be selected by the Tenant from building standard selections allowing one color per room and up to three colors per suite.
11. **Venetian blinds**: One standard 1-inch slat, furnished and installed at all windows.
12. **Flooring**: Building standard carpet or vinyl throughout. Color shall be selected by Tenant from building standard samples.
13. **Suite entry identification**: Plaque for each Tenant indicating suite number and firm name. Standard lettering and design shall be used throughout the building.

[124] Much of the information (modified) and the work letter were drawn from McGowan (1996), pp. 6–7.

Other modifications and amendments in addition to those covered by the tenant improvement allowance are also possible but, naturally, at extra cost. If included in the rent, the cost will be divided over the entire lease period.

On the other hand, when the tenant engages the suppliers of the fit-out system, he becomes an owner of those systems as well. This is another key characteristic guiding the practice, since tenant enterprises are able to depreciate interior construction systems faster than actual building systems in their accounting.

In the case of fit-out, bids and contracts are more likely based on unit prices than in the case of the base building and/or an entire building. There, the contract is usually based on the fixed price or GMP practice and unit prices are used only to make adjustments to contract as a result of change orders.

9.2.2 Pros & cons

A major benefit of phased contractor's involvement is the possibility for late decision-making as regards interior construction. This is a must in a large multi-tenant project but is sometimes also used in other projects. A few comments on the pros and cons of the phased progress mode are made in Table 58.

Table 58. Advantages and drawbacks of the phased progress and contracts mode.

Advantages	Drawbacks
• The process can easily adapt to any late change in the users' needs and interior design solutions – possibly reflecting changes in the user's operations in an increasingly dynamic environment. • The mode enables increased overlapping of design and construction and, thus, shortens the overall construction period.	• The mode goes against the principles of single-point-responsibility and emphasis has to be put on the coordination and compatibility of different procurement entities. • The process involves increased contract administration as a result of more contracts entered into.

9.2.3 Applicability

Appropriateness. The approach is typically applied to commercial multi-tenant construction of offices and business premises. They involve so many wants and needs that it is not sensible to consider them at the initial design phase. Also in a "built to suit"

case the owner may find it difficult to define his needs early enough to be able to conclude an undivided contract.

Compatibility. While the phased approach can generally be considered compatible with the procedures introduced in this book, a couple of remarks have to be produced for fit-out works. Firstly, forms of contract different from those discussed elsewhere in this book have been published for interior works. Competition methods could also be slightly “lighter” in such cases since the product can be defined in quite close detail due to the existence of ready-made product systems. A comment on pricing arrangements was also made above (Section 9.2.1).

9.3 Summary

The liability for both design and construction is, by definition, the core of the design-build method. The concept does not, however, define that the liability for design and construction of the entire building should be carried by one, and only contracting party, although this is quite often the case in practice. Design-build is usually also perceived as a method used to procure entire facilities.

The chapter presented a review of the use of design-build for portions of a project in order to shed light on the other possibilities to benefit from the principles of design-build. Two alternative approaches from the viewpoint of a project's phasing were presented: implementation can either be divided into base building and fit-out phases or not. Such division is not applied only in design-build; base building and interior construction may be divided also in other delivery methods, or either one can be implemented according to the principles of design-build.

The phased option was considered worth discussing since it is obviously becoming more relevant in the increasingly dynamic environment where more flexibility is required in adapting spaces to clients' needs and individualization is emphasized. There are also other ways of dividing the implementation of a building project among various parties than the presented one, but the increased burden of coordination and likely incompatibility of various parallel contracts resulted in other options being excluded from this review. The required management effort also places such a method outside the actual design-build category, which, at least implicitly, is reserved for modes adhering to the concept of a “single point of responsibility”. Design-build subcontracting is, again, a separate issue which is shortly discussed above in Table 44 (p. 118).

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GLOSSARY

This glossary consists of terms and definitions collected from various sources, and rearranged. The terms have been selected to correspond to the nature, scope and subject area of the report. Yet, some definitions may reflect more conventional thinking than is desirable in the design-build context. Definitions have not, however, been changed apart from a few indispensable additions in brackets. Italicized words in definitions, again, indicate that they are explained elsewhere in this glossary.

Adjusted low bid: a form of *best value* selection in which *qualitative* aspects are scored on a 0 to 100 scale expressed as a decimal; bid price is then divided by qualitative score to yield an "adjusted bid" or "cost per quality point". *Award* is made to offeror with the lowest adjusted bid. [iii]

Advertisement for bids: a legal notice in a journal of general circulation soliciting *proposals* for a *construction* project; required for *public sector* projects and aimed at objectivity and marketplace economics in selecting contractors. [ii]

Agency construction management: [a system where] the construction entity is typically retained at the same time as the design team and provides continuous *services* to the *owner* without taking on financial risks for the execution of the actual *construction*. [ii]

Agent: one who is empowered to act in behalf of and in the best interests of another for prescribed activity. Agency is the act or quality of being an agent. [ii]

Agreement; Form of agreement: a document setting forth the provisions, responsibilities, and obligations of parties to a *contract*. Standard forms of agreement for *building construction* are available from the American Institute of Architects and the Associated General Contractors of America [and the Design-Build Institute of America] and are designed to allow the insertion of data relevant to particular projects. [ii]

Alliance: a long term relationship between parties for *services* on several projects. *Owner-contractor* alliances are sometimes called *partnering* or preferred suppliers. [ii]

Allowance: a sum of money stated in *contract documents* to cover the cost of materials or items in those documents, the full description of which is not known at the time of bidding. All contractors bid the allowance as part of their *proposals*. The actual costs of the items are determined by the *contractor* (not including installation) at the time of their selection by *architect* or *owner* and the total contractual amount is adjusted accordingly. Examples: brick, carpet, appliances. [ii]

Architect: an individual who is educated, trained, and experienced in the art and technology of building planning and *design*, construction administration, and coordination of the specialized skills of structural, mechanical, and electrical design engineers. Use of the term is usually limited to law to those who have been licensed to practice architecture. [v]

Architect-engineer: a term frequently used to designate a design professional when it is not clear which shall be retained, an *architect* or *engineer*. AE is the frequent abbreviation to describe a designer or *design* firm. Very few persons are both architects and engineers. [ii]

Assignment: the transfer of rights or responsibilities, or the placement of contractual obligations by one person or another. Frequently, prime trade *contractors* are assigned by an *owner* to a general contractor or construction manager to better coordinate the execution of a *construction* project. [ii]

At-risk construction management: [a system where] the construction entity, after providing agency *services* during the pre-construction period, takes on the financial obligation to carry out *construction* under a specified cost *agreement*. A *guaranteed maximum price* is frequently provided by the construction manager in at-risk CM. At-risk CM is sometimes called CM/GC because the construction entity becomes essentially a general contractor through the at-risk agreement. [ii]

Award: the act by one party of granting a contractual opportunity to another party typically as a response to a *proposal*, as in an *owner* awarding a *contract* to a low bidder or a general contractor awarding a subcontract. [ii]

Base building: the commercial office building shell and core, including essential *services* such as the elevator, HVAC system, and toilet room. [iv]

Base building standard: a package of typical *tenant improvements* provided by, and sometimes required by, the landlord. Sometimes called to building standard. [iv]

Best value: also known as "greatest value", any *selection process* in which proposals contain both price and qualitative components, and *award* is based upon a combination of price and qualitative considerations. *Qualitative* can be further subdivided as to *technical* factors [/*proposals*] and *management* factors [/*proposals*]. [iii]

Bid: a *proposal* submitted in various forms, oral or written, to perform remunerative work or to buy an object. [ii]

Bid bond: a *bond* given by a bidder to accompany a *construction* or supply *contract* to guarantee that the bidder, if awarded the contract within the time stipulated, will enter into the contract and furnish any prescribed *performance* and payment *bond*. Default (not proceeding after being awarded a contract) will ordinarily result in *liability* to the

obligee for the difference between the amount of the principal's *bid* and the bid of the next lowest bidder who can qualify for the contract. In any event, however, the liability of the *surety* is limited to the bid bond penalty. [ii]

Bidding: the practice of soliciting competitive cost proposals from more than one party for the *design* and/or *construction* of the project described in the solicitor's documents. [v]

Bills of materials: schedules or lists prepared by *contractors* or *subcontractors* of materials needed for all or part of a project. [ii]

Bond: a written agreement containing a financial guarantee that one party, the *surety*, obligates itself to a second party, the *obligee* (usually an *owner*), to assure the performance, service, or payment by another party, the principal (usually a *contractor* and sometimes called an obligor). [ii] See *Bid bond*, *Completion bond*, *Contract bond*, *Performance bond*.

Bonus: a payment over and above a basic amount for superior performance; may be part of an *incentive clause*, in which case it must be contractual. [ii]

Bridging: process in which a *criteria professional* completes *design* to such an advanced stage that the *design-builder's* role is limited to completion of *construction documents*, and *construction*; the design-builder is selected on the basis of price. See *Draw-Build*. [iii]

Building authority: the governmental agency or person who enforces *building codes* through plan reviews, field inspections, and code interpretations. [ii]

Building codes: legislated statutes by state and local governments, under their police power, to regulate *design* and *construction* to protect the health and safety of citizens. Codes are most concerned with fire protection, safe egress from buildings, structural stability, and sanitation. Special subsets of codes cover plumbing, HVAC, fire protection, and elevators. Codes are usually updated annually and copies are available for sale to interested parties. [ii]

Building construction: the segment of *construction* involved in commercial, institutional, and some industrial buildings, but excluding houses. [ii]

Building permit: a regulatory device employed by *building authorities* to enforce building, zoning, environmental, and other legislated codes. Drawings and specifications must be submitted for review and must meet all applicable codes for a permit to be issued. Similar permits are issued for specialty work such as plumbing, HVAC, electrical, elevators, etc., usually by sub-agencies of the building authority. Temporary or conditional permits may be issued for accelerated work or for other cases where a start of *construction* prior to completed documents is desired by the *contractor* and allowed by the building authority. Fees are charged for all permits and are

theoretically in an amount to cover the activity of the building authority, including field inspection. [ii]

Certificate of occupancy (CO): a regulatory device employed by *building authorities* to assure that all code requirements are met prior to occupying a building. Conditional CO's may be granted for a phased move-in by the *owner*. CO fees are usually part of the *building permit* fees. The *architect* or *contractor* typically notifies the building authority to request a final inspection for a CO. [ii]

Change order: amendment to a *contract* based on a change initiated by the *owner*, designer, *contractor*, or building official and documented by a written amendment signed by the owner and contractor after price and schedule adjustment are agreed upon. [ii]

Changes in the work: changes in a project ordered by the *owner* or *architect* which are revisions from work as shown in the *contract* documents. If within the scope of the work, the *contractor* is required to perform the revisions (usually with *change orders*). If the changes are additions to the scope there in no mandate to make them, but such changes are ordinarily negotiated. [ii]

Claim: an assertion by one party that he or she has been damaged or otherwise wronged by some act or failure to act on the part of another, and for which the party making the assertion seeks money or other recompense to make it whole for the damages suffered. [v]

Client: the party who retains the *design professional* and/or *contractor* to provide *design* and/or *construction services* in connection with a given project. The client is sometimes referred to as the *owner*. [v]

Close-out: a process of completing a *construction* project and turning it over to the *owner*. It is usually a multi-week sequence of approvals, partial occupancies, a punch list, documentation, and celebrations. [ii]

Collateral: anything of value pledged to the *surety* to protect the surety against loss by reason of default by the principal. [ii]

Commission: an *agreement* whereby one party requests and rewards *services* from another party, as in an *owner* awarding a design commission to an *architect*. [ii]

Commissioning: a process of assuring that all equipment is working properly and that operators are trained in use of equipment. This may be part of the *services* of designers or *constructors* under a special contractual *agreement* with the *owner*. [ii]

Comparative selection: a method of procurement in which the client selects the top three to five prequalified *design-build* teams, each of whom is invited to submit design

concept proposals for the *client's* evaluation and review, along with information about the separate qualifications of each of the various design-build teams. [i]

Competitive bid: *proposals* are compared to each other on some prescribed basis, such as a set of *contract documents*, and the "lowest and best" *bid* is usually accepted. [ii]

Completion: finalization of a project and conclusion of a *contract*. *Substantial completion* is the condition when gainful occupancy may be taken by the *owner* or users and when final payment (except retainage) is ordinarily made to the *contractor*. Final completion is when a project is thoroughly completed, including all punch list items, and is "closed out". The contractor receives all remaining payment due upon final completion. Both completions are usually certified by the *architect*. [ii]

Completion bond: a *bond* covering performance of a *construction* project that names as an *obligee* a lender or other party in a position to invoke the performance features of the bond without an obligation to provide funds to complete the project. [ii]

Comprehensive services: a term relating to a full range of *services* provided by a designer or *contractor* beyond the "basic services" ordinarily described in an *agreement* with an *owner*. An *architect's* comprehensive services may include land planning, *programming*, *feasibility studies*, financing, and special consulting. A contractor's comprehensive services may include those same items plus site selection, land acquisition, *commissioning*, start-up, and maintenance. [ii]

Constructability (sometimes spelled **constructibility**)**:** a *design* review process by experienced *constructors* and designers with the objective of establishing during design rational and efficient *construction* procedures for field execution. The ultimate aim is to cause the designer to adopt materials, systems, and details which are both cost effective and time effective in the field without sacrificing aesthetic intent Constructability is frequently combined with *value engineering* as a review process. [ii]

Construction: a general term for a multitude of activities which integrate to become a built product. The term is normally applied to the industry responsible for constructing the vast array of buildings, *public works*, and monuments of modern society. Branches of construction include [e.g.] *building construction* and *residental construction*. [ii]

Construction documents: see *Contract documents*. [ii]

Construction management: a *project delivery system* based on an *agreement* whereby the construction entity provides leadership to the *construction* process through a series of *services* to the *owner*, including *design* review, overall scheduling, cost control, *value engineering*, *constructability*, preparation of bid packages, and construction coordination. [ii] See *Agency construction management* and *At-risk construction management*.

Construction professionals: a term used to describe the principal players retained by the *client* in a *construction* project (typically the *design professional* and the *contractor*). [v]

Constructor: the term adopted by practitioners who execute *construction* to define the persons who are responsible for all or part of the building process. In some *contracts* constructor is used to designate the party directly responsible for the execution of a project. [ii]

Contingency: something uncertain but probable; in planning or budgeting contingency items or costs are included for anticipated events, the details of which are unknown in advance. [ii]

Contingency fund: an amount of money set aside in anticipation of costs beyond a target price or contractual amount. Contingency funds are important in any agreement with a guaranteed maximum price. Following are types of *contingencies* used with GMPs (one, two, or three may be used): *Design contingency*, *Owner's contingency*, *Contractor's or construction manager's contingency.* [ii]

Contract: a binding *agreement* between two parties describing obligations of both parties. Contracts may be based on a variety of forms and conditions from handshakes to complex documents. Most *construction* contracts are based on standard *forms of agreement* provided by associations such as the American Institute of Architects and the Associated General Contractors of America [and the Design-Build Institute of America]. Some *owners* generate their own contract forms. Standard forms have the advantage of being broadly recognized instruments with clauses which have evolved over time due to dispute resolution and court tests. [ii]

Contract bond: a *bond* given to secure the performance of a *contract*. Frequently, two parts are required; one part of the bond covers performance and the other part covers payment of certain labor and material bills. This is essentially a combination of *performance* and *labor and material payment bonds*. [ii]

Contract documents: the drawings, specifications, and attendant documents which make up the total *agreement* and obligations between *owner* and *contractor*. Sometimes called *construction documents*, they describe in advance the finished product to result from the *contract*. [ii] See *Design*.

Contract price: the entire sum of money which passes from the *owner* to the *contractor* when final settlement is made between the parties to the *contract*. [ii]

Contractor: a person or company who accepts responsibility to perform the obligations of a *contract*; a term usually applied to one who engages in contract execution as regular employment. [ii]

Contractor's liability insurance: ongoing coverage for premises/operations, protective *liability*, completed operations, broad form property damage, contractual liability, and blasting/tunneling/high hazard; documented by certificates indicating amounts of coverage in effect at the time of entering a *contract*. [ii] See *Insurance*.

Contractor's or construction manager's contingency: a fund to cover cost growth during *design* or *construction* and used in the discretion of the *contractor* or construction manager, usually for costs which are the result of project circumstances rather than any one party's instigation. [ii] See *Contincency fund*.

Contractual joint venture: an *agreement*, possessing the legal characteristics of a *partnership*, between two or more parties who join forces to achieve some specific, short-term goal, such as the *design* and *construction* of a project. [v]

Coordination: part of the administrative and management duties performed by a *contractor* or construction manager to schedule, advise, and guide other parties such as *subcontractors* and tradespersons; usually directly performed on site by a project superintendent. [ii]

Corporation: a business organization which creates a legal entity separate from individual participants, and owned by stockholders or shareholders. Corporations have the effect of continuing an organization while participants change and of providing a mechanism to partially shield individuals from liability. Articles of incorporation must be filed with the appropriate public official (usually Secretary of State) in the state of incorporation, and officers and shareholders must be identified. Most *construction* companies are closely held corporations, which means that the shares are retained by a small group of people, are not actively traded, and usually contain provisions for returning shares to the company upon resignation, retirement, or death of a shareholder. [ii]

Cost control: the process that seeks to ensure that actual costs do not exceed estimated costs, or the efforts to seek the lowest possible costs during both the *design* and *construction* phases. [ii]

Cost plus: one of several methods of compensating a *contractor* for work performed in connection with a project. Using this method, the contractor is paid for actual direct and indirect costs incurred in constructing the project, plus a separately stated *fee* for his or her *services*. [v]

Cost-plus a fee contract: the *project delivery system* whereby a *contractor* and *owner* negotiate an *agreement*, the pertinent aspects of which are that the costs of labor and material are billed to the owner plus the contractor's *overhead* and *profit*, the latter of which is a fixed *fee* or a percentage of the costs. [ii]

Cost proposal: the pricing information submitted by a *design-build* entity to a prospective *client* in response to the client's request for such information. Normally, a cost proposal is part of a more comprehensive *proposal* which may include the conceptual or schematic *design* of the project, and information concerning project scheduling, project organizational structure, and key project personnel. [v]

Criteria package: the facility program, design criteria, *performance specifications* and other project-specific technical material sufficient to provide the basis for *best value proposals*. The criteria package becomes part of the *Request for Proposals.* [iii]

Criteria professional: a *design professional* who develops the *criteria package*. The criteria professional may be in-house or may be an outside consultant. See *Owner's Consultant*. [iii]

Deliverables: the drawings, specifications commentary, models, etc., prepared by the offeror in response to a *Request for Proposal*. Deliverables are sometimes referred to as "submittal requirements" in RFPs. [iii]

Design: a process of composing ideas and requirements into an understandable scheme or plan for a product. Building design involves *architects*, *engineers*, consultants, and sometimes *constructors* working together to develop drawings and written descriptions (specifications) for a building. Architectural design terms and phrases, generally in the order in which they occur, include: *Programming*, *Schematics*, *Design development*, *Contract documents* [*Construction documents*]. [ii]

Design-bid-build: the "traditional" project delivery approach where the *owner* commissions an *architect* or *engineer* to prepare drawings and specifications under a *design services* contract, and separately contracts for *construction*, by engaging a *contractor* through competitive *bidding* or negotiation. [iii]

Design-build: the system of contracting under which one entity performs both architecture/engineering and *construction* under a single *contract* with the *owner*. Also known as "design-construct" or "single responsibility". [iii]

Design-builder: the entity contractually responsible for delivering the project *design* and *construction*. The design-builder can assume several organizational structures: a firm possessing both design and construction resources in-house, a *joint venture* between designer and *contractor*, a contractor-led team with the designer in a subcontract role, or a designer-led team with the constructor in a *subcontractor* role. [iii]

Design-build-lease and Design-build-lease-to-own: types of *design-build* wherein, by contractual *agreement*, a party commits to lease a completed structure for a period of time, and in the latter case later receives the building for ownership. [ii]

Design competition: a method of procuring *design-build services* in which design-build teams submit detailed *design proposals* to the *client*, who then selects a team based on the ability of their proposal to meet the requirements of the project. The "winner" of the competition is awarded the *contract* to complete the *design* and construct the project. [v]

Design contingency: a fund of money established to absorb cost growth during the design process. [ii] See *Contingency fund*.

Design development: the information from the *schematic* stage is further investigated; materials and components are further researched and compared, and detail drawings are undertaken; specifications are begun, and an updated estimate is given by the *architect*. *Value engineering* and *constructability* are frequently performed during design development by a team including designers, *constructors*, and consultants. (*Owner* approval may be required to proceed to the next stage). [ii] See *Design*.

Design professional: a term used generally to refer to *architects*; civil, structural, mechanical, electrical, plumbing, and heating, ventilating, and air conditioning *engineers*; interior designers; landscape architects; and others whose *services* have either traditionally been considered "professional" activities, require licensing or registration by the state, or otherwise require the knowledge and application of *design* principles appropriate to the problem at hand. [i]

Design proposal: see *Technical Proposal*. [iii]

Developer: a party who procures the right to develop real estate through purchase, lease, or other means, and who improves the real estate for later sale or lease to others. Developers engage the *services* of *design professionals* and *contractors*, either separately or as members of *design-build* teams, to provide required *design* and *construction* services for those projects. [v]

Direct selection: a *negotiated selection* process in which the *design-builder* is identified and selected by the *owner* most often on the basis of prior experience, and contract scope, terms and price reached through negotiation. [iii]

Draw-build: a variation of the *design-build* process in which a *criteria professional* develops design documentation to such an advanced stage (generally 30 to 35 percent) that the *design-builder's* design role is reduced to preparation of detailed working drawings and specifications. The draw-builder is usually selected on the basis of price only. [iii]

Engineer: one who by education, training, and experience is skilled in the art and technology of site or building engineering and *design*. Use of the term is usually limited by law to those who have been duly licensed to practice engineering. [v]

Equivalent design - Low bid: a form of *best value* selection in which *technical proposals* are followed by a critique rather than scoring. Each offeror responds to the critique of its proposal with *design* changes and corresponding price amendment. Revised designs are evaluated for compliance and price envelopes, both base and amendment, are opened. *Award* is made on basis of lowest price because the proposal critique creates relative equivalency of designs. See *Technical Leveling.* [iii]

Estimating: forecasting the costs of labor, material, equipment, and related items prior to their actual execution, usually based on units of historical data in the *contractor's* files, published indexes, and information supplied by *subcontractors* and suppliers. A general contractor must determine which segments of a job should be *bid* in-house and which segments should depend on prices from specialty contractors. A formal bid is the total project estimate plus mark-ups for *overhead*, *profit*, and *contingencies*. In vernacular terms, contractors say that the estimate is the cost of buying a job and the bid is the price of selling the job to the *owner*. [ii]

Feasibility; Feasibility study: related to advisability of engaging an operation or project based on its probability of success, particularly from a financial aspect. [ii]

Fee: payment for work or *services*, usually negotiated in advance between parties. Fees can be based on a number of arrangements, including a fixed amount, percentage of the cost of the work or services, hourly rate, value of services, or a combination of factors. *Contractors* sometimes call the *profit* margin placed on the *bid* the fee. [ii]

Fit-out: the *design* and completion of shell space (i.e. raw floor space bounded by walls but not specifically adapted to the requirements of its occupants) with the specific interior partitioning, floor, ceiling, mechanical, electrical, and environmental requirements of its occupants included. [v]

Fixed price - Best design: a form of *best value* selection in which contract price is established by the *owner* and stated in the RFP [*Request for Proposal*]. *Design proposals* and management plan are evaluated and scored, with *award* going to the firm offering the best *qualitative* proposal for the established price. [iii]

Force majeure: an unforeseen event of major impact and the related consequences, particularly as those consequences might affect a project schedule or cost (act of God). [ii]

Form of agreement: see *Agreement*. [ii]

General conditions: a set of guidelines that define many of the rights, responsibilities, and limitations of authority of the *owner* and *contractor*, and include the general procedures governing the performance of the work. [v]

Guarantee: an assurance of *quality* of work or value of *services* for a set period of time, and legally enforceable. Most building *contracts* call for a one year guarantee of

completed buildings. Components and equipment may carry longer guarantees or *warranties*. [ii]

Guaranteed maximum price: a method of limiting the *design* and *construction* costs of a project whereby the *design-build* team is compensated for its actual costs incurred in connection the design and construction of the project, plus a *fee* – all subject, however, to a ceiling above which the *client* is not obligated to pay. [v]

Honorarium; Stipend: the amount paid to the *design-build* teams who are not chosen by a client in a design-build competition, to help defray their costs of participation. [v]

Incentive clause: a contractual inclusion which provides payments beyond the stated amount in the *contract* if completion is ahead of schedule or if other objectives are reached which may involve cost savings, safety, *quality*, or absence of disputes. Incentive clauses are much more frequent in private work than *public work*. [ii]

Indemnification: an obligation contractually assumed by or legally imposed on one party to protect another against loss or damage from specific *liabilities*. [v]

Individual project partnering: the *owner*, key *contractors*, and designers agree to cooperate on *quality* standards, information exchanges, and dispute avoidance. The process does not follow a standard form but usually involves a preconstruction conference, set of agreements, and charter of cooperation signed by all parties. [ii] See *Partnering*.

Insurance: coverage through an *agreement* (*contract*) whereby one party insures (underwrites, provides coverage) to guarantee against losses of another party which may result from perils specified in the agreement. Insurance types and terms are as follows: *Contractor's liability insurance*, *Owner's liability insurance*, *Professional liability insurance*. [ii]

Invitation to bid; Invited bid list: pertaining to solicitation of competitive bids from a select group of *contractors*, usually in the *private sector*. [ii]

Joint and several liability: where one party, typically a partner in a *partnership* or a member of a *joint venture*, is equally responsible to a third party for the acts and omissions of the other partner or member. [v]

Joint venture: sometimes referred to as a contractual joint venture, whereby two or more parties join forces to form an entity with the legal characteristics of a *partnership* to achieve a specific objective. [v]

Labor and material payment bond: a *contract* between a *contractor* and a *surety* company in which the surety, in return for a premium paid by the contractor, agrees to pay *subcontractors*, laborers, and material suppliers amounts due to them for their

materials and *services* under the terms of their contractual *arrangements* with the contractor, should the contractor default in his or her payment obligations to them. [v]

Liability: a term describing a party's potential legal exposure for responsibilities, acts, omissions, happenings, etc. which may be damaging to other parties. Ordinarily all parties carry *insurance* to cover exposure to liability. [ii]

License: permission granted by authority of the state to engage in an occupation or to practice a profession, the engagement or practice of which is unlawful without a license. [v]

Life cycle costing: an evaluative process aimed at projecting the costs of building components and operation over time. Factors include capital (initial) costs, replacement costs, maintenance, replacement frequency, durability, and energy usage. The life cycle is the useful life for a building prior to major rehabilitation or removal, usually forty years for a commercial building but shorter for hospitals, processing plants, and research laboratories. Different components have different lives, masonry walls being relatively long and some air conditioning components being relatively short. [ii]

Liquidated damages: losses incurred by the *owner* (almost always in the *public sector*) due to a project duration extending beyond a contractual completion date. These losses (damages) are usually projected as costs per day and are liquidated by withholding payments from the contractor. The terms of liquidated damages must be established in the contract documents so that bidders can consider them in estimating a project. To be fully legally binding, liquidated damages should be rationally related to actual losses incurred by owner. [ii]

Long term relationship partnering: a relationship between the *owner* and the *construction* company or *design* firm wherein the *owner* agrees to *award* a series of *contracts* to the construction company in return for assurances of priority service. These are sometimes called *alliance* agreements or preferred supplier agreements. [ii] See *Partnering*.

Lump sum: a fixed price for an agreed upon project or amount of work; a *project delivery system* based on an *agreement* whereby the *contractor* or *subcontractor* performs a specified *scope of work* for a fixed cost agreed upon prior to commencement of *construction* and altered only by *changes in the work* agreed upon by both parties. [ii]

Lump sum bidding: a *design-build* procurement method in which the *client* requires the design-build teams to propose their compensation (place their *bid*) in the amount of a total payment for all *services*, costs, and expenses incurred in the *design* and *construction* of the project. [v]

Management proposal: that portion of a *design-build proposal* which contains the management plan including project approach, personnel, organization, schedule,

affirmative action plan, etc. The management proposal may be a subset of the *qualitative* proposal. [iii]

Negligence: the failure of a party to conform its conduct to the standard of care required by law. The law requires a person to exercise that degree of care that a reasonable person would exercise under the same or similar circumstances. As applied to *design professionals*, it is the failure to exercise that degree of skill, care, and diligence that other design professionals would exercise under the same or similar circumstances. [v]

Negotiated selection: see *Qualifications-Based Selection*. [iii]

Obligee: the party to whom a *bond* is given; the party protected against loss. An *obligee* may be a person, firm, corporation, government, or agency. [ii]

Overhead: project costs not directly related to labor, material, and equipment. Job overhead includes those costs which can be accurately allocated to a particular project, such as job office secretary, utilities, phone, and security. Office overhead includes those activities in the home office which cannot be allocated to particular jobs and which must be covered to varying degrees by all the projects of a company. [ii]

Owner: the party to the *contract* who has legal possession of the property or who is duly selected to represent the property owner, and who typically provides the financing for the construction. The owner may or may not be the primary user of the property. In the case of a public school, the owners are the taxpayers of the district represented by the board of education and the users are the teachers and students. [ii]

Owner's consultant: a consultant or consulting firm that is employed or engaged by an owner to assist in organizing and administering the *design-build selection process*, and for other consulting *services* such as review of detailed *design* and *construction* for compliance with the RFP [*Request for Proposal*]. Is often the *criteria professional* who develops the facility program, *performance specifications* and other RFP components. [iii]

Owner's contingency: a fund to cover cost growth during *design* or *construction* and used only with approval of the *owner*; usually used for items requested by the owner. [ii] See *Contingency fund*.

Owner's liability insurance: comprehensive coverage for an *owner's* regular operations plus an endorsement or rider to cover *liability* related to the project. [ii] See *Insurance*.

Partnering: a formal structure to establish a working relationship among all the stakeholders through a mutually developed strategy of commitment and communication. There are two principal partnering variations: *Individual project partnering* and *Long term relationship partnering*. [ii]

Partnership: an *agreement* between two or more individuals or entities to pool all or a portion of their resources in a common enterprise for *profit*, and to share in the profits and losses of the enterprise in proportion to their contribution of resources. [v]

Pass-through joint venture: a form of *joint venture* in which the joint venture itself is nothing more than the formal documents used to create it. A pass-through joint venture owns no assets other than its interest in those *contracts* it may have with its *clients*, nor does it perform any *services*. Instead, the joint venture subcontracts to each of its members or to third parties all services that it is required to provide to the client. The joint venture retains no *profits*. The profits, together with any losses, are passed on to the joint venture members through their respective subcontracts with the joint venture. [v]

Penalty clause: a contractual inclusion (different from *liquidated damages*) which reduces the *contract* sum based on inadequate performance on the part of the *contractor*, usually tied to project duration. May be offset by an *incentive clause*. [ii]

Performance bond: a *bond* issued by a *surety* company which guarantees the *client* that if the *contractor* fails to complete the project in accordance with the terms of the construction *agreement*, the surety company will either complete the *contract* itself, or arrange for a client-approved contractor to complete the contract. The surety company will pay the new contractor the amount required to finish the work, minus the unpaid amount under the original contract. However, the surety company is not obligated to pay more than the penal sum or limit of *liability* stated in the bond. [v]

Performance specification: a specification expressed in terms of an expected outcome or acceptable performance standard. Often used in *design-build* criteria to articulate the owner's requirements. Contrasts with *Prescriptive Specification.* [iii]

Post-construction services: a range of activities performed following the actual *construction* process, including *commissioning*, start-up, *warranty* documentation, and maintenance. [ii]

Preconstruction services: a range of activities performed by a *contractor* prior to execution of *construction*, including *value engineering*, *constructability*, cost and schedule studies, procurement of long lead time items, and staffing requirements. [ii]

Prequalification: the process in which an *owner*, based upon financial, management and other *qualitative* data, determines whether a firm is fundamentally qualified to compete for a certain project or class of projects. Prequalification should be distinguished from *shortlisting.* [iii]

Prescriptive specifications: the traditional method of specifying materials or techniques found in *design-bid-build* documents. The range of acceptable products, manufacturers, and techniques, to be adhered to by the builder is stipulated in detail.

Prescriptive specifications are often used by a *design-builder* to contract with trade contractors and vendors. [iii]

Price proposal: the portion of a *best value proposal* which stipulates the price at which the offeror will provide *design* and *construction* of the project. [iii]

Primary contractor: an individual or entity that has a direct contractual relationship with the *client* or *owner* of the project. In *design-build*, the primary contractor is responsible for providing either by itself or through subcontract arrangements with other individuals or entities, all of the *design* and *construction services* required for the project. [v]

Private sector: that which is neither owned nor controlled by federal, state, or local government. [v]

Professional liability insurance: coverage for *services* rendered by the designer and sometimes called errors and omissions insurance; an important coverage in *design-build* projects (not included in wrap-up packages). [ii] See *Insurance*.

Professional standard of care: that degree of learning and skill that the law requires all professionals to exhibit and which is ordinarily possessed by professionals in good standing in that profession in the same locality and under similar circumstances. [v]

Profit: the amount of money remaining after all expenses on a project have been paid, including both job and of office *overhead*; the amount on which company income taxes must be paid. Uses of profit include building up reserves, investment in new equipment, training, bonuses to employees, and dividends to stockholders if the company is a corporation. [ii]

Programming: typically done prior to the *design* process, but sometimes integrated with early design procedures, programming clarifies objectives of the proposed building and lays a strategy for the design and *construction* processes. [ii] See *Design*.

Project delivery system: a comprehensive process wherein designers, *constructors*, and various consultants provide *services* for *design* and *construction* to deliver a built project to the *owner*. [ii]

Project policy: an occurrence-based *insurance* policy that affords protection to *design professional* engaged on a single project from *claims* that may arise during the course of the project and for a stated period of time following *substantial completion* of the project. [v]

Proposal: an offer to perform *services* or work, usually including a price and other stipulations such as time, level of performance, and description of the end product. The

term is somewhat interchangeable with "*bid*," except that a bid is based on specific conditions and a proposal may be either general or specific. [ii]

Proposal bond: typically referred to as a *bid bond*, is a form of security offered by a bidder to the party soliciting the *bid*, guaranteeing that the bidder will enter into a contract within a specified period of time and will furnish any required *performance* and *labor and material* [*payment*] *bonds*. [v]

Provide vs. Perform: the distinction some courts have made in determining whether a state's professional registration or licensing statutes, which prohibit parties from engaging in certain defined activities in the absence of a valid registration or *license*, have been violated by the conduct of a given individual. These courts interpret "perform" to mean "to do oneself," and "provide" to mean "to arrange for the performance by others who are properly qualified." Courts in these jurisdictions determine that it is not a violation of the state's licensing or registration statutes for an unlicensed party to "provide" required *design services* for a project as long as services will be "performed" by properly licensed or registered persons. [v]

Public sector: that which is owned or controlled by federal, state, or local government. [i]

Public work: projects which are paid for totally or in part by public funds, i.e. taxpayers' dollars, whether at the national, state, or local level. Public work carries statutory requirements for *advertisement* [*for bids*], *bidding*, *contractor selection*, and bonding. Other considerations such as prevailing wage, minority business involvement, and *liquidated damages* are required by various governmental units for certain *contracts*. [ii]

Qualifications-based selection: a form of *selection* based upon qualifications of the offeror for the project, selection being followed by negotiation to determine contract cost. [iii]

Qualifications submission: a written submission by interested *design-build* offerors, more generic and limited than a *proposal*, used by an *owner* for *prequalification* or *shortlisting*. [iii]

Qualitative: as applied to a *proposal*, the non-price factors that characterize an offeror or its proposal. Such factors would include management factors, e.g. the experience and management plan of the *design-builder* and technical factors, e.g. the aesthetic, functional and other technical aspects of a design. See *Management Proposal* and *Technical Proposal*. [iii]

Quality; Quality control: pertaining to the many efforts both formal and informal by designers and *constructors* to select products and to monitor the execution of *construction* to assure a high level of quality of the resulting building. [ii]

Reimbursable: those costs which are expended by consultants or *contractors* and which are directly reimbursed, by *owners*, perhaps with a small multiple, including printing, travel, and special purchases or in *cost-plus* a *fee contracts*, labor and material. [ii]

Request for proposal (RFP): the document that totally describes the procurement process, forms the basis for *proposals*, and ultimately becomes a potential element in the *contract*. Requests for proposals contain information about the size, scope, and complexity of the project, the client's requirements and budgetary considerations, selection criteria, and the desired form and content of the proposals. [i]

Request for qualifications (RFQ): the document issued by the owner prior to an RFP that typically describes the project in enough detail to let potential proposors determine if they wish to compete; and forms the basis for requesting *Qualifications Submissions* in a "two phase" or *shortlisting* process. [iii]

Residential construction: primarily home building but may also include multi-family and group housing. [ii]

Schematics: accurate pictorial drawings indicating all of the elements shown in diagrammatic but with more information including materials, sizes, colors, and aesthetic factors; may include color renderings and models and usually accompanied by outline specifications and preliminary estimate. *Owner* approval is required to proceed with the next phase. [ii] See *Design*.

Scope of work: a contractual term describing the overall boundaries of work included in a *contract*, such as site and building geometry, extent of improvements, and particular equipment. [ii]

Selection; Selection process: procedure in making an important decision, particularly as it relates to choosing designers or *contractors*. [ii]

Self-performance: work done directly by a prime [/*primary*] *contractor*. This may be covered in the prime contract (some states have laws regarding self-performance) or it may be left to the contractors. An important project preplanning decision is the amount of self-performance vs. subcontracting to be done on a project. [ii]

Services: a broad term with a number of meanings, those most frequently used in *construction* being the valued activities provided to *owners* by designers and *constructors*, and utility services such as water, sewers, electric, gas, and phone. [ii]

Shop drawings: detailed graphics of equipment or building components prepared by manufacturers, vendors, or *subcontractors* of the items. The drawings are used for production, fabrication, and installation of the components and are necessarily approved by both designers and *contractors* prior to execution of that segment of the work. [ii]

Shortlisting: narrowing the field of offerors through the *selection* of the most qualified proposors on the basis of qualifications. The number of shortlisted proposors invited to submit final *proposals* is most frequently between three and five**.** See *Request for Qualifications*. [iii]

Single point (source) of responsibility: the principal feature of the *design-build* method of project delivery in which a single entity provides to the *client* all of the *services* necessary to both *design* and construct all or a portion of the project. [i]

Statement of qualification: a statement, often provided on industry standard forms such as SF 254 and 255 published by the Government Services Administration, identifying a prospective bidder's experience, financial capacity, key personnel, a current profile of the firm's activity, and other information pertinent to a particular project. [i]

Stipend: see *Honorarium*. [iii]

Stipulated price - Best design: see *Fixed Price - Best Design*. [iii]

Stipulated sum: *lump sum* or fixed price. [ii]

Strict liability: the imposition of *liability* on a party regardless of the existence of fault or *negligence* and regardless of the existence of a contractual relationship between the offending party and the injured party. [i]

Subconsultant: an individual contracted by a consultant to *provide services* related to or part of those which the consultant owes to the *client* under his or her primary *contract* with the client. [v]

Subcontractor: an individual hired by the *contractor* to *provide* a portion of the work that the contractor owes to the *client* under the contractor's primary *contract* with the client. [v]

Substantial completion: a condition in which the *owner* can take partial or full occupancy of a project despite some work still needing to be done (such work being enumerated on a punch list). A *certificate of occupancy* is required from the *building authority* for the owner to take occupancy. Usually the remaining contractual amount is paid to the *contractor* at this time except for any accumulated retainage. In the absence of retainage an amount estimated to equal the value of the punch list is withheld. [ii]

Surety: a person or entity who promises in writing to make good the debt or default of another. See *Bond*. [v]

Technical leveling: a part of the *Equivalent Design – Low bid selection process* in which the technical aspects of competing *design-build proposals* are critiqued and offerors respond with adjustments to create technical equivalency across all proposals.

Not to be confused with indiscriminate "shopping" of a proposor's *design* solutions to competitors. [iii]

Technical proposal: that portion of a *design-build* proposal which contains *design* factors, usually including function, layout, materials, aesthetics and specifications. The technical proposal may be a subset of the *qualitative* proposal. [iii]

Tenant improvement: materials and *construction* that form the infill responding to the tenant's needs. [iv]

Tenant improvement allowance: a sum of money allowed for *tenant improvements* typically including standard items that will be installed at no cost to the tenant. The quantity of tenant improvements in the allowance is usually described per square foot of rental space. [iv]

Tenant package: the set of drawings and specifications establishing standard quality, quantity, and configuration information of landlord-provided rental or lease space. [v]

Tenant standard specification: see *Tenant Package*. [v]

Tender: a *bid* or proposed price. [ii]

Traditional method of project delivery: the most common method of *construction* whereby a *client* retains a *design professional* to provide all required *design services* required for the project, and retains separately the services of a *contractor* to provide all *construction* services required for the project. [v]

Turnkey: a variation of *design-build* in which the *design-builder* also provides real estate *services* which may include land purchase and interim financing. [iii]

Two-phase selection process: a procurement process in which the first phase consists of *shortlisting* and the second phase consists of preparation and submission of complete *design-build proposals* from the shortlisted offerors. Also known as two-stage procurement. [iii]

Two-step proposal: also referred to as "two envelope", any selection process in which *qualitative proposals* are submitted separately from price proposals with price proposal remaining sealed until qualitative proposals are evaluated. [iii]

Unit price: *bid* cost (priced in advance) for anticipated extra work, such as additional excavation or concrete. [ii]

Value engineering: a *design* review process involving critical evaluation of elements of a building to determine the relative value to the *owner* of the specified product or system

compared to alternative products or systems. *Life-cycle costing* and *constructability* studies may be parts of value engineering processes. [ii]

Warranty: a statement supplied by a manufacturer, supplier, or *contractor* for material, equipment, or components which provides replacement or reimbursement, usually on a basis of diminishing value over time, in case of faulty performance or failure of a product. [ii]

Weighted criteria process: a form of *best value selection* in which maximum point values are pre-established for *qualitative* and price components, and *award* is based upon high total points earned by the proposers from both components. [iii]

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[i] Window to Design-Build (1997) Terms Glossary by the University of Colorado at: http://www.colorado.edu/engineering/civil/db/DBS/glossary.cg

[ii] Dorsey, R.W. (1997) Project Delivery Systems for Building Construction. Associated General Contractors of America (AGC), Washington, DC, 283 p. (Glossary)

[iii] Design-Build Definitions, Document Number 103. In: Design-Build Manual of Practice. (2000, updatable) Design-Build Institute of America (DBIA), Washington, DC

[iv] McGowan, M. (1996) Specifying Interiors. A Guide to Construction and FF&E for Commercial Interiors Projects. John Wiley & Sons, NewYork, NY, 356 p.

[v] Twomey, T.R. (1989) Understanding the Legal Aspects of Design/Build. R.S. Means Company, Kingston, MA, 385 p. (Glossary)

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Design-Build Procedures. Introduction, illustration and comparison of U.S. modes

Abstract

Design-build is a project delivery system where one party, the design-builder, is responsible for both the design and construction of a project under a single agreement. This book sheds light on the design-build practice as applied in building construction in the United States, where the system's popularity has increased dramatically.

The report divides into two parts. The first part provides a general introduction of design-build and outlines some of its key characteristics and related practical considerations. It also defines design-build in relation to other project delivery systems. Some comparative studies on project delivery methods are also summarized in order to illuminate the talked up superiority of design-build over the other methods.

The second part constitutes the main portion of the book by presenting the various procedures that are part of design-build. It focuses on six different aspects of design-build: the design-builder selection process, the design practice and related division of labor, proposal evaluation and comparison methods, pricing and incentive systems, organization of the design-build entity, and distinction between the construction of shell and core and interior systems. Thus, the presented issues are mostly related to the interfaces between the owner and the design-builder.

Design-build is not, however, just a rigid procedure for carrying a project through which is the key reason for writing this book. There are many alternative operational modes and procedures. Therefore, the book deals with these alternatives by examining design-build practices from one standpoint at a time. Each previously listed aspect is dealt with by introducing modes that are, at least to some extent, alternatives. Each presentation of an alternative emphasizes its mode, advantages and weaknesses, and applicability. For instance, the design-builder selection process is such a standpoint providing various options for operations. Similarly, design-builder selection can be based on qualifications or it may follow a two-stage process involving design proposals, etc.

The applicability of various procedures, naturally, depends on the complexity, size and scale of the project as well as the objectives, experience and available resources of the owner, etc. These issues are also discussed in connection with each procedure. The same structure has been used for all alternative procedures independent of the aspect in order to maintain the illustrative and comparative format. In addition to alternative procedures proper, around forty thematic boxes have been included in order to inform the reader about some key issues and examples related to the design-build practice in general. These are called "nutshells" and "mini-cases", respectively.

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buildings, construction, design-build projects, United States, risk allocation, project control

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This book sheds light on the Design-Build practice as applied in building construction in the United States, where the popularity of this project delivery method has increased dramatically and it seems to be the method of the future. Its key characteristics and likely benefits and pitfalls are also outlined.

Design-Build is not, however, just a rigid procedure for carrying a project through although that is too often the perception. There are many alternative operational modes, and the main contribution of this book is that it introduces and illustrates several possibilities to choose from. Advice is also given on the alternatives' advantages and weaknesses and applicability to different project types and owner's goals and resources.

In a departure from most works on Design-Build, which are either general or focus on a certain situation and its characteristics, this book attempts to serve as a comprehensive popular study of Design-Build in order to communicate its many possibilities. Great emphasis has been placed on the introduction of the alternatives by employing a simple, illustrative and comparative format.

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