

# 2012

## Construction Design Build Guide



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## **Construction Design Build Guide**

### **Contents**

<b>Executive Summary</b> .....	4
Definition.....	4
A. Variations .....	4
<b>Part 1 - Objectives of Design-Build</b> .....	4
A. Time Savings.....	4
B. Other Objectives.....	4
<b>Part 2 - Project Selection Procedures</b> .....	5
A. Criteria for Selection:.....	5
B. Project Types and the Benefits for Each When Using Design-Build.....	5
<b>Part 3 - Project Development</b> .....	6
A. Pre-bid Procedures .....	6
<b>Part 4 - Preparation of the Scope of Work (Owner)</b> .....	7
A. Definition .....	7
C. CONTENT.....	8
D. COST ESTIMATE .....	10
<b>Part 5 - Design-Build Contractor Selection Process (Part 1 of a Two Phase Process)</b> .....	10
A. Advertising Documents .....	10
B. Statement of Bidder Qualification Requirements.....	11
C. Selection of Design-Build Firms based on Qualifications (Short-Listing).....	12
D. Technical Review Committee.....	13
<b>Part 6 - Pre-Proposal Guidelines</b> .....	13
<b>Part 7 - Design-Build Contractor Selection Process (Part 2 of a Two Phase Process)</b> .....	14
A. Submitting Requirements .....	14
B. Technical Proposals .....	14
C. Price Proposal.....	14
<b>Part 8 - Proposal Requirements</b> .....	15
A. Selection Process (Maricopa County Arizona Example) .....	15
B. Performance Evaluations .....	16
<b>Part 9 - Pre-construction Guides</b> .....	17
A. Pre-construction Meeting Guides .....	17



## **Construction Design Build Guide**

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B. Contractor Project Work Scheduling .....	17
C. Project Administration Guides .....	17
<b>Part 10 - Construction Guidelines</b> .....	<b>17</b>
A. Quality Assurance Provisions .....	17
B. Contractor Quality Control Plan .....	17
C. Acceptance Provisions .....	18
D. Conflict Resolution Guides .....	18
<b>Part 11 - Final Acceptance Procedures</b> .....	<b>18</b>
A. Final Acceptance Guide .....	18
<b>Part 12 - Status of Practice</b> .....	<b>18</b>
A. Benefits and Limitations .....	18
B. Summary of Experiences .....	18
About the Author .....	19



## **Construction Design Build Guide**

### **Executive Summary**

Design-Build is a contracting procedure used to accelerate procurement of a contract by allowing the contractor to begin construction before the final design has been completed. This guide will enable owners/clients to evaluate the feasibility of using Design-Build for potential projects based on previously completed projects.

### **Definition**

Design-Build is the process by which a single entity provides both the design and construction through the use of a single contract between the organization and the design-build (D-B) contractor.

### **A. Variations**

1. Bridging: Also referred to as draft-build -- the Owner's Architect and Engineering firm (A/E) develops preliminary project designs (30-50 percent) and the D-B contractor completes final detailed design and construction.
2. Turnkey: Same definition as D-B, more commonly applied to technically complex projects where owner requires outside expertise and a private entity "turns over the keys" to the owner at project completion.
3. Design-Build-Warranty (D-B-W): Combines a warranty provision with Design-Build.
4. Design-Build-Maintain (D-B-M): Combines a maintenance provision with Design-Build.

## **Part 1 - Objectives of Design-Build**

### **A. Time Savings**

1. A savings in project completion time occurs when the project construction begins at the 0-50% design level compared to traditional contract procurement.

### **B. Other Objectives**

1. Design-Build assigns design and construction to a single party, allowing some construction work to begin before the final design is completed.
2. Design-Build gives singular responsibility- single point of contact for quality, cost, and schedule.
3. Design-Build reduces administration and inspection costs.
4. Design-Build reduces or eliminates change orders and claims due to "errors and omissions."



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5. Design-Build allows maximum contractor flexibility in the selection of innovative designs, materials, and construction techniques.
6. Design-Build provides expertise not available in-house (Example- Intelligent Transportation Systems).
7. Design-Build-Warranty provides a warranty provision that promotes quality/performance during warranty period.

### **Part 2 - Project Selection Procedures**

#### **A. Criteria for Selection:**

1. The project has a clearly defined scope, design basis, and performance requirements.
2. The project is free from complicated issues such as utility conflicts, right-of-way acquisition, hazardous materials, wetland and environmental concerns, or other such issues that must be resolved.
3. The project is non-controversial in nature; no unresolved political issues.
4. The project has room for innovation in the design and construction effort.
5. The project is an emergency project or project with tight time constraints.
6. The project involves a significant design effort with a potential to save cost and time in the design.
7. The project requires expertise not available in-house.
8. To balance the program, agencies should leave enough Design-Bid-Build projects in the program to provide work for smaller firms or those not involved in Design-Build.

#### **B. Project Types and the Benefits for Each When Using Design-Build**

1. Small Design-Build Projects- Bituminous resurfacing or overlay.
  - a. Benefits- These projects can be completed earlier under Design-Build(Example: Emergency Road Resurfacing)
2. Mid-Level Design-Build Projects- Interstate reconstruction bridge rehabilitation, widening, replacement, and construction.



## **Construction Design Build Guide**

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- a. Benefits- these projects can be completed earlier and there can be additional contractor innovation when these projects are initiated at an early level of design.
3. Intelligent Transportation Systems.
    - a. Benefits- the complexity of these projects will allow for the use of special expertise at an early level of design.
  4. Mega Design-Build Projects.
    - a. Benefits- innovation by the contractor in the project scheduling and design will allow for the early completion of the project.

### **Part 3 - Project Development**

#### **A. Pre-bid Procedures**

1. Prior to bidding, organization officials and potential contractors hold meetings to evaluate feasibility of proposed construction procedures and determine if there are workable alternative approaches. Potential third party issues are identified and steps are taken to mitigate any conflicts. Note: these reviews are suggested to insure the best results for any innovative contracting technique.
  - a. Feasibility- Whether or not the use of Design-Build will allow the owner to realize all project goals cost effectively and within desired time constraints.
  - b. Alternative Approaches- Determine if alternative approaches can be used in the project. If only one approach is determined to be feasible, the request for proposals (RFP) will be designed to require this.
  - c. Third Party Conflict Resolution- In the constructability review the details on potential third party conflicts involving utilities, railroad agreements, environmental/archaeological issues, hazardous materials, public support issues, and other potential problems are addressed and a plan is worked out to mitigate such conflicts from developing.



## **Construction Design Build Guide**

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### **Part 4 - Preparation of the Scope of Work (Owner)**

#### **A. Definition**

1. In order to ensure a successful Design-Build project, the procurement organization must communicate project goals through the scope of work.
2. The scope of work represents the organization's essential project expectations, and is probably the most difficult part of the Design-Build process. The scope's purpose is to furnish sufficient information upon which firms may prepare technical and price proposals.
  - a. Example- the Maricopa County Department of Transportation typically shows a design completed to the 10% to 20% level. Now comes the paradox: To ensure that the organization gets what it expects, the scope needs to be more precise than for the design of a traditionally procured project. That might call for a design at the 30% level. If a 30% level scope is used, then the ability of design-builders to innovate may be stifled.
  - b. If innovation is desired, then the solution to the paradox is to make the scope as precise as possible in terms of performance standards.
3. The scope should clearly define the organization's needs and expectations in a final product, without rigidly controlling the means and methods by which those needs and expectations are met.
4. The scope should refer to commonly accepted standards, codes, and specifications. These include, but are not limited to, those design manuals and other technical standards that the design-builder will be expected to use.

#### **B. PROCESS**

1. After reviewing its resources and consulting with its cost-sharing partners, if any, the organization must decide whether to prepare the scope of work with in-house staff, or use a contract architect-engineer firm (A-E). If an A-E firm is to be used, its services must be procured under the qualifications based procedures of the organization.
2. As early as possible in the process, the organization should publish pre-solicitation notices. The purpose is to give potential design-builders time to coordinate design and construction services or develop joint ventures.



## **Construction Design Build Guide**

3. As in all tasks, the organization's project manager is responsible to the organization head for the preparation of the scope of work. The project manager should take advantage of the multi-disciplinary team available to him. It is important that the construction and maintenance representatives of the organization take an active role in the scope preparation.

### **C. CONTENT**

1. The scope should include a summary of the organization's project objectives.
2. The scope should include a description of any information and services to be furnished by the organization (Examples are computer services, quality assurance, survey data, geotechnical information, drainage reports, environmental reports, and existing plans).
3. The scope should clearly define both the design services and the design requirements. Design services may include geotechnical exploration and analysis, surveying, permitting, utility, coordination, etc. Reference should be made to any applicable organization specifications such as: MAG specifications, building codes, national standards or other requirements pertinent to the specific project. The following examples provide guidance about the kinds of design requirements that should be in a scope of work:
  - a. Building requirements may specify performance criteria for the building, including the net and gross interior space, building systems, material quality standards, allowed budget amount, project schedule, site development, aesthetic considerations, domestic, water, sanitary sewerage, storm water management, parking, and regulatory requirements.
  - b. Bridge project requirements may include alignment, prescribed typical section elements, design criteria and guidelines, aesthetic considerations, project schedule, standard detail drawings, subsurface soil data, minimum vertical and horizontal clearances, hydraulic information, and roadway approaches.
  - c. A highway project may include corridor limits, horizontal and vertical alignment, required design manuals and criteria, traffic load, standard detail drawings, signal and signage criteria, available geotechnical data, and safety requirements.



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4. The scope should clearly define the construction engineering and inspection services and requirements.
    - a. Services may include construction inspection, materials sampling and testing, as-built drawings, surveying and other services as necessary for the particular project.
    - b. The inspection requirements may include:
      - The number of inspectors for each major activity
      - The experience level of each inspector
      - The type and frequency of reports
      - Submittals of shop drawings
      - The level of detail and type of documentation for materials used in the construction of the project
    - c. The scope should clearly define what documentation, such as engineering calculations, design plans, shop drawings and samples are to be reviewed by the organization. Under Design-Build, these submittals are not for the organization's approval, but rather for verification of compliance with specified criteria.
    - d. The scope should clearly define the final documents required by the organization from the firm upon completion of the project. These should include as-built plans (hard copy and electronic), engineering reports, shop drawings, test results, daily reports, etc.
    - e. As previously mentioned, the scope should specify any geotechnical information or report required of the firm. It is usually necessary for the organization to perform some geotechnical work in preparing the scope. In fact, it is generally preferred that the organization conduct the geotechnical investigations in order to save the short-listed firms the expense.
    - f. The scope should include a dispute resolution process, including an issue escalation matrix. This process should state the chain of command within the organization and require the firm to provide a similar list of people in responsible charge. For the organization, the escalation should begin with the project manager and end with the Overseeing Engineer (Local, County, or State). Each level of escalation should also include a time frame for resolving the conflict.



## **Construction Design Build Guide**

- g. If a warranty is to be included, the scope should clearly outline the details of the warranty, covering the elements to be warranted and the time frame of the warranty.
- h. All insurance requirements should be included in the scope.
- i. The scope should identify the responsibilities for public involvement and who is responsible for dealing with citizen complaints.
- j. The scope should cover all project safety regulations and requirements.
- k. The scope should state the total funds available for the project along with the sources of the funds.
- l. The scope may include other appropriate information.

### **D. COST ESTIMATE**

1. In order to budget funds and evaluate proposals, the organization should prepare a cost estimate covering all design and construction costs. This detailed estimate is normally not included with public copies of the scope of work, and may be treated confidentially.

## **Part 5 - Design-Build Contractor Selection Process (Part 1 of a Two Phase Process)**

### **A. Advertising Documents**

1. The organization follows standard advertisement process for acquiring professional services.
2. In addition:
  - a. A copy of the advertisement is sent to all pre-qualified contractors and engineering firms.
  - b. The advertisement states a general description of the work.
3. The estimated cost of the project is included in the advertisement.
4. In order to take full advantage of the process, each project advertisement should clearly define the unique needs and details of the particular project.



## **Construction Design Build Guide**

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### **B. Statement of Bidder Qualification Requirements**

1. Specific Project Type Experience
  - a. Summary Statement- describes the specialized experience and project approach of the project team members.
  - b. Specific Project Type Experience- information on similar projects the project team members have executed.
2. Proposed Project Team/Individual Experience
  - a. Proposed Project Team- a chart which identifies the function (tasks) of the primary individuals on the proposed Project Team during each phase of the work.
  - b. Individual Experience- the purpose of this section is to demonstrate overall background and experience of each individual on the project team.
3. Composition of Firm/Past Performance
  - a. Composition of firm- provides a general background of each firm involved in the project.
  - b. Present Work Load- identifies the current commitments of each firm on the project team. Includes the staff hours available and committed for the duration of the project.
  - c. References- each project team provides references for whom work has been performed during the past five years.
4. Firm Location
  - a. The purpose of this information is to identify the primary firm and all firms that will be a part of the project team and the location of their offices. The primary firm office is the firm or office receiving 75% or more of the fees.



## Construction Design Build Guide

### C. Selection of Design-Build Firms based on Qualifications (Short-Listing)

1. Once the Statements of Qualifications portion of the Design-build Proposal are received, a "short list" of firms is developed. A **Technical Review Committee (TRC)** is typically used to develop the "short list".
2. The firms are short-listed using the criteria stated in the Statement of Qualifications. An example of Utah's Evaluation Criteria Elements for the I-15 corridor project is shown in Table 1 below.

<b>Table 1. Evaluation Criteria Elements</b>	
Team Name:	
<b>Specific Project Type Experience Possible Points</b>	
a. No related experience	0
b. Minimal related experience	3
c. Considerable related experience	6
d. Extensive specific project type experience	9
<b>Individual Experience</b>	
a. Minimal	3
b. Significant	6
c. Extensive	9
<b>Past Performance</b>	
a. Substantial failure documented	0
b. Average	4
c. Above average	8
d. Outstanding	12
<b>Capacity of Firm</b>	
a. Inadequate	0
b. Minimal	2
c. Adequate	4
d. Extensive	6
<b>Primary Firm Location</b>	
a. Over 400 miles from project site	0
b. Between 100 miles and 400 miles from project site	2
c. Within 100 miles of project site	4
<b>TOTAL SCORE 40</b>	<b>40</b>



## **Construction Design Build Guide**

3. Typically the number of Design-Build firms "short-listed" is between three and five depending on the scope of the project.
4. Short-listed firms selected are allowed to draft proposals for the project.

### **D. Technical Review Committee**

1. Make-up
  - a. Project Manager
  - b. Three or more senior personnel from the involved engineering groups. The members should consist of a mix of state, local, and private engineers.
2. Duties
  - a. The technical review committee is formed prior to and will participate in the development of the scope of work documents.
  - b. The technical review committee is responsible for developing the "short list" of firms that will be authorized to proceed with development of technical and cost proposals.
  - c. The technical review committee reviews design concepts and preliminary drawings prepared by the short listed firms in order to assess the responsiveness of the technical proposals as compared to the scope of work provided by the owner.
  - d. The technical review committee may request clarification during review of the technical proposals to determine if the proposal is responsive.
3. Responses to clarification request that alter the original submittal will not be accepted and that portion of the proposal based on the criteria provided in the scope of services proposal score to determine the lowest responsible bidder.

### **Part 6 - Pre-Proposal Guidelines**

1. A pre-proposal meeting is held for all interested individual parties in order to discuss the project in detail and to clarify any concerns.
2. A second meeting will be held with the short-listed firms to address issues, clarifications, and questions.



## **Construction Design Build Guide**

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### **Part 7 - Design-Build Contractor Selection Process (Part 2 of a Two Phase Process)**

#### **A. Submitting Requirements**

1. Firms develop and submit proposals based on the scope of work. Proposals are prepared in two parts:
  - a. Technical Proposals
  - b. Price Proposals
2. Technical and price proposals must be submitted by the date and time noted in the announcement.
3. Technical and price proposals are submitted in separately sealed packages and are appropriately labeled.

#### **B. Technical Proposals**

1. The technical proposal must include a detailed project schedule for preliminary design plans, preliminary specification, technical reports, calculations, and other data requested in response to the scope of work.
2. The proposal must indicate that it is the technical proposal and shall identify the firm's name, project description, or any other information required to identify the proposal.

#### **C. Price Proposal**

1. Price proposals must include one lump sum cost with an itemized cost breakdown.
2. The package must indicate clearly that it is the price proposal and must identify the firm's name, project description and any other information required.
3. The price proposal must contain a completed Disadvantaged Business Enterprise Affidavit.



## Construction Design Build Guide

### Part 8 - Proposal Requirements

#### A. Selection Process (Maricopa County Arizona Example)

1. The selection of a design-build firm will involve both technical quality and price.
2. After the submittal deadline, the technical proposals will be sent to the Technical Review Committee for evaluation.
3. The Technical Review Committee shall first review the proposal to determine whether they are responsive to the requirements of the scope of work.
4. Each technical proposal found to be responsive should be evaluated based on the rating criteria provided in the scope of work.
5. The team will submit a final technical proposal score for each firm to the project manager of the overseeing division within the organization.
6. The project manager shall use Table 2. below to assign a Quality Credit Percentage to each proposal based on the proposal's technical score:

**Table 2. Quality Credit Percentage for Technical Proposals**

Technical Score	Quality Credit Percentage (%)	Technical Score	Quality Credit Percentage (%)
100	15	84	7
99	14.5	83	6.5
98	14	82	6
97	13.5	81	5.5
96	13	80	5
95	12.5	79	4.5
94	12	78	4
93	11.5	77	3.5
92	11	76	3
91	10.5	75	2.5
90	10	74	2
89	9.5	73	1.5
88	9	72	1
87	8.5	71	.5
86	8	70	0
85	7.5		



## Construction Design Build Guide

7. The project manager shall notify all short-listed firms of the date, time, and location of the public opening of the sealed price proposals.
8. If any of the technical proposals were considered non-responsive, the project manager will notify those firms of that fact.
9. The project manager shall publicly open the sealed price proposals and multiply each firm's price proposal by the Quality Credit Percentage earned by the firm's technical proposal to obtain the Quality Value of each firm's technical proposal.
10. The Quality Value will then be subtracted from each firm's price proposal to obtain an Adjusted Price based upon Price and Quality combined.
11. Unless all proposals are rejected, the Department will recommend to the State Transportation Board that the firm having the lowest Adjusted Price be awarded the contract.
12. The cost of the design-build contract will be the amount in the price proposal.
13. Table 3 below shows an example of the calculations involved in this process.

**Table 3. An Example of Calculating Quality Adjusted Price Ranking**

Proposal	Technical Score	Quality Credit (%)	Price Proposal (\$)	Quality Value (\$)	Adjusted Price (\$)
A	95	12.5	3,000,000	375,000	2,625,000
B	90	10	2,900,000	290,000	2,610,000
C	90	10	2,800,000	280,000	2,520,000*
D	80	5	2,700,000	135,000	2,565,000
E	70	0	2,600,000	0	2,600,000

\*Successful Proposer - Contract Cost \$2,800,000

### B. Performance Evaluations

4. The project manager shall be responsible for conducting performance evaluations of the Design-Build firm.



## **Construction Design Build Guide**

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### **Part 9 - Pre-construction Guides**

#### **A. Pre-construction Meeting Guides**

1. A pre-construction meeting will be held between all short-listed firms initially, and then a meeting will also be held with the firm to be selected as noted above.

#### **B. Contractor Project Work Scheduling**

1. Project work scheduling should use the format of a specified critical path methodology; this will insure that any time constraints on the project are met.
2. Procedures for updating and actions required when delays to the project are encountered should be included in the technical proposal.

#### **C. Project Administration Guides**

1. Under design-build it is required that both the contractor and owner outline their respective resources and how they will be used. This will eliminate any potential problems associated with lack of resources, materials, equipment, and personnel on behalf of the owner, contractor, or both.

### **Part 10 - Construction Guidelines**

#### **A. Quality Assurance Provisions**

1. The owner should clearly specify all quality assurance procedures including sampling, testing, and inspection methods used during the prosecution of the work.

#### **B. Contractor Quality Control Plan**

1. The contractor shall submit a well-defined plan outlining the process control procedures and checkpoints to be used for all items of work.



## **Construction Design Build Guide**

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### **C. Acceptance Provisions**

1. The owner will perform an acceptance analysis at all phases of the project and for each item of work as outlined in the scope of work.

### **D. Conflict Resolution Guides**

1. Conflict resolution procedures should be fully and clearly addressed in the contract provisions.
2. Provisions for the use of a conflict resolution team have been found to be very beneficial in resolving conflicts expediently and cost effectively. Such a team should consist of representatives from both the owner and the contractor and an impartial third party. The cost of the third party should be shared between the contractor and the owner.

## **Part 11 - Final Acceptance Procedures**

### **A. Final Acceptance Guide**

1. Acceptance of each work item will be made in accordance with the acceptance provisions of the contract. This will ensure that the final acceptance of the project will not be delayed.

## **Part 12 - Status of Practice**

### **A. Benefits and Limitations**

1. Benefits- came about due to the just-in-time interaction of having a design firm and a construction firm under one roof.
2. Limitations- Design-Build should not be used on contracts that have cookie cutter characteristics (those that can and have been done in-house) and contracts that do not have tight time constraints.

### **B. Summary of Experiences**

1. D-B includes a range of applications. VADOT employs a modified D-B where state produces design to 30 percent and the bid is based on cost only. Maryland uses a similar approach for smaller construction rehabilitation projects. Both states are experimenting with larger projects. The VA I-95 (Springfield By-pass)



## **Construction Design Build Guide**

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project is the other end of the spectrum. Selection criteria for this mega-project include cost and other parameters.

2. Contractor concerns regarding D-B include favoritism (large contractors), cost to bid, reduced competition, and limits to innovation if project is bid at 30 percent design.
3. Other Topics of Interest
  - a. Bridging and Turnkey concepts should be developed separately from D-B-W, D-B-M, or privatization.
  - b. Draft-Build small value projects, \$2-3 Million as noted in Virginia construction rehabilitation program, have acceptable identifiable levels of risk between the owner and the contractor.
  - c. For D-B (medium value projects) no consensus was reached. Concerns were expressed about what level of design is needed before bid, how the owner gets quality in design and construction, and how contractors should be selected.
  - d. For D-B mega-projects (>\$100 Million), all technical proposals will be paid for and the owner should have oversight during design and construction.
  - e. A consensus was the D-B was pursued in some cases due to politics. Owners want to use D-B, but only as a portion of their program.

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### **About the Author**

Michael McCormick founder of MPCS, Inc and Management Professional with 35 years of experience managing over \$4 billion in projects in the Construction and IT for Commercial and Federal Government industries and is a well-known project management (PM) author, consultant, and authority on the subjects of Construction Management (CM), Facility Management (FM), Business Process Management (BPM), Project Management Office (PMO) and Project Portfolio Management (PPM), Risk Management (RM), software development and technology integration.

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