An ***IPRF*** Research Report

Innovative Pavement Research Foundation

Airport Concrete Pavement Technology Program

Report IPRF 01-G-002-06-1

Using Design/Build Acquisition for Airfield Pavements

TECHNICAL REPORT

Program Management Office
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TECHNICAL REPORT

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The Innovative Pavement Research Foundation and the Federal Aviation Administration thank the Technical Panel that willingly gave of their expertise and time for the development of this report. They were responsible for the oversight and the technical direction. The names of those individuals on the Technical Panel follow.

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LIST OF ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AC	Advisory Circular
ACEC	American Council of Engineering Companies
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AIP	Airport improvement program
AOA	Air operations area
ASCE-CI	American Society of Civil Engineers - Construction Institute
ASR	Alkali silica reactivity
BAFO	Best and final offer
CCA	Canadian Construction Association
CM@Risk	Construction management at risk
CMO	Construction modification order
D/B	Design/build
D/B/B	Design/bid/build
DBE	Disadvantaged business enterprise
D/B/F	Design/build/finance
D/B/F/O	Design/build/finance/operate
DBIA	Design Build Institute of America
D/B/O/O	Design/build/own/operate
DoD	Department of Defense
DOT	Department of transportation
DRB	Dispute resolution board
EIS	Environmental impact statement

EJCDC	Engineers Joint Contract Documents Committee
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FHWA	Federal Highway Administration
IDIQ	Indefinite delivery, indefinite quantity
IPRF	Innovative Pavement Research Foundation
ISO	International Standards Organization
ITS	Intelligent transportation systems
NAICS	North American Industry Classification System
NAVFAC	Naval Facilities Command
NEPA	National Environmental Policy Act
NSPE/PEPP	National Society of Professional Engineers/Professional Engineers in Private Practice
PCC	Portland cement concrete
PDS	Project delivery system
PFC	Passenger facility charge
QA/QC	Quality assurance/quality control
RFP	Request for proposals
RFQ	Request for qualifications
ROD	Record of decision
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEP-14	Special Experimental Project No. 14
TEA-21	Transportation Equity Act for the 21st Century
TI	Technical Instruction
TRC	Technical review committee

USACE	United States Army Corps of Engineers
USC	United States Code
VE	Value engineering

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PREFACE

This report is the product of Innovative Pavements Research Program (IPRF) Project 01-G-0002-06-1, Using Design/Build Acquisition for Concrete Airfield Pavements. The primary objective of the study was to develop a template that owners can use to define the attributes of projects that could be accomplished using design/build (D/B) acquisition and a guide for the use of D/B concepts for the acquisition of airfield concrete pavements projects.

This report documents the results of a literature survey, review of contract statutes, case study interviews, lessons learned, and performance evaluation for airfield pavement projects constructed using D/B acquisition, and it includes a critique of current published guidance for D/B procurement. The report was written for use by airfield owners, engineers, specification writers, contractors, and contract inspectors as an education/training guide and as a criteria document that will assist the airport industry in the application of D/B acquisition for airfield pavement rehabilitation and construction.

The IPRF Technical Manager for this project was Mr. Jim Lafrenz. The project review panel consisted of Dr. Craig Rutland - Air Force Civil Engineering Support Agency (HQ AFCESA/CEOA), Mr. Gary Mitchell - American Concrete Paving Association (ACPA), Mr. Carlton Lambiasi - Federal Aviation Administration (FAA), Mr. Bob Benko - FAA (Retired), Ms. Susan Winslow - Delta Airport Consultants, Mr. Dean Rue - CH_2M Hill, and Mr. Mike Devoy - RW Armstrong.

Applied Research Associates, Inc. (ARA) conducted the research and developed a best practices guide and a draft FAA Advisory Circular for airfield pavement construction for D/B procurement contracts. The ARA research team included Dr. Jim Hall, Mr. David Hein, Dr. Jack McChesney, and Mr. Chris Olidis, as well as Mr. Justin Jones from Post Buckley, Schuh & Jernigan, Inc. (PBS&J).

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EXECUTIVE SUMMARY

Design/build (D/B) is a method of project delivery in which the design and construction phases of a project are combined into one contract and awarded on either a low bid or best-value basis. D/B projects allow for better collaboration between the designer and contractor in the delivery of transportation projects. Agencies can focus on policy and planning, while the private sector deals with cost efficiency and construction risk.

There are a number of federal and state regulations and policies pertaining to the implementation of alternate procurement methods; these are described in the report. Federal Statute 49 USC 47104 authorized a D/B pilot program for the Federal Aviation Administration (FAA) that expired on September 30, 2003. Statute 49 USC 47142 authorized the FAA to use D/B selection procedures under specific guidelines effective September 30, 2003. The FAA administrator may approve an application of an airport sponsor under this statute to authorize the airport sponsor to award a D/B contract using a selection process permitted under applicable state or local law; the statute describes the specific conditions and criteria.

There are many perceptions regarding the pros and cons of using the D/B procurement methodology. These issues have been addressed throughout this report, and they are put in question-answer format in the final chapter. Briefly, advantages of the D/B methodology include:

- Single point accountability for owner
- Opportunities for efficiency in construction
- Reduction in project delivery time
- Greater access to private sector experience
- Opportunities for innovation and cost savings
- Transfer of delivery risk to the private sector
- Fewer construction claims

The disadvantages of the D/B methodology include:

- Contractors usually do not have the in-house resources with the experience to prepare qualification submittals
- Best value and qualification based selection is not a common practice and experience necessary to provide quality assurance is lacking
- Little experience with contractor led design
- Owner does not have a direct relationship with the designer
- The perception that economics, not functional need, drives the design
- Not suitable for all projects
- Lack of understanding of risk transfer could lead to higher project costs
- Compressed schedules may require quick owner turnaround of submittals

D/B projects typically move from conception to commission faster than the traditional design/bid/build (D/B/B) process. Procurement is achieved through a single process by integration of design and construction into one overall project team. Designers and contractors

can form a joint venture for the project or act as independent firms with one being the prime contractor.

This project included the review of airports/airfields where D/B has been used. The information obtained from the project owners, designers, and contractors is summarized in this report. Opinions on the use of the D/B process were varied, but there were common elements and experiences shared in many of the case studies. Many of the successes and shortcomings were used to assist in developing the best practices guide (chapter 5).

The best practices guide is a consolidation of information obtained from the literature survey, case study analysis, and the experience of the project team. D/B is a unique project delivery process that combines the best features of both professional qualitative selection and competitive price selection. Accordingly, documents should be tailored to a D/B process and the project requirements.

The first step in determining the suitability of a project for D/B procurement is to determine if legislation exists to allow it. The next step is to evaluate whether the project provides the opportunity for any of the remaining primary considerations:

- Savings in project delivery time
- Potential for value engineering (VE) for project enhancement
- Project complexity, including environmental assessments, design, and construction

If there are no fatal flaws identified, then an analysis should be completed to evaluate the anticipated benefits and risks associated with the D/B procurement methodology. The best practices guide contains a suitability matrix that assists users in deciding when D/B is the best approach. The remaining steps include the development of the request for qualifications and request for proposals, advertising, evaluating and awarding a contract, and then monitoring the project work for compliance with the specifications.

CHAPTER 1 BACKGROUND

In the design/build (D/B) project delivery method, the design and construction phases of a project are combined into one contract and awarded on either a low bid or best-value basis. D/B allows for greater collaboration between the designer and contractor. Agencies can focus on policy and planning, while the private sector deals with cost efficiency and construction risk.

Under the traditional design/bid/build (D/B/B) procurement method, the owner designs the project in-house or through a contract with a consultant firm. When the design is completed and approved, the project is then advertised and the owner enters into another contract for the construction of the project. The contract usually is awarded to the lowest responsive bidder. This process may be repeated a number of times for different elements of a project until the project is fully commissioned.

Under the D/B procurement method, the owner identifies the project's desired outcome, leaving most of the decision making to the D/B entity. Prospective bidders are provided with a preliminary design (anywhere from 30 to 50 percent complete) and mandatory performance-related requirements. In turn, the bidders are asked to prepare a technical proposal and a price proposal showing how they intend to complete the remaining design and construction of the project. The contract is awarded to a firm that provides the best value offer.

The use of D/B is attractive because it provides the opportunity to obligate funds quickly. The methodology requires a single procurement phase, the guaranteed maximum price of the project is known, and fast tracking is accomplished by paralleling design and construction activities. In contrast, traditional D/B/B projects use separate contracts for design and for construction, the budget for the project is based on the designer's estimate, and the construction schedule is not detailed or finalized until the construction phase commences.

Many transportation agencies have developed guidelines or acquisition criteria for D/B contracts. Guidelines for D/B airport projects are provided in Federal Aviation Administration (FAA) Administration Order 5100.38C, Paragraph 931, and the criteria developed by the Department of Defense (DoD) titled "Unified Facilities Criteria, UFC 3-260-11FA." The latter contains information pertinent to preparing requests for proposal for airfield D/B projects. The primary objectives of the document are:

- Establish the roles and responsibilities of the government and contractor
- Provide an adequate definition of project design and construction criteria

The ultimate goal of the FAA Order 5100.38C and UFC 3-260-11FA manual is to reduce the risks of D/B contracting for both the government and the contractor. However, there are some unanswered questions that need to be addressed in using the criteria:

- How are the acquisition criteria different from the D/B/B process?
- Do these criteria promote or stifle innovation?
- How applicable are these criteria to the FAA and other agencies?

1.1 Issues and Perceptions with Design/Build

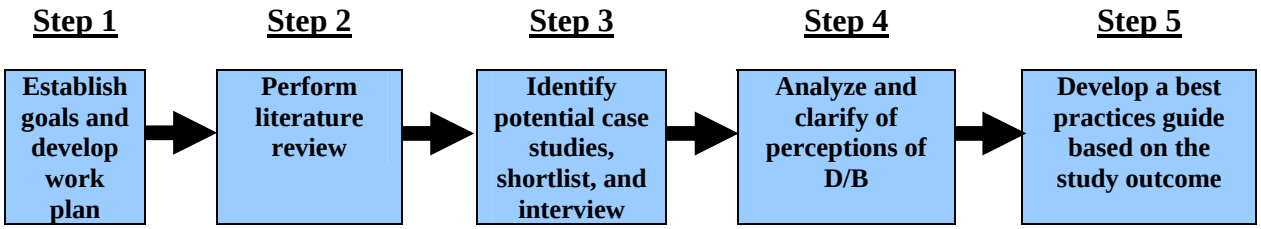
The pros and cons of the D/B procurement methods, as applied to construction of airfield pavements, need to be investigated and critiqued and the outstanding questions answered using facts obtained from past projects. Some of the lingering issues that need to be explored include:

- If D/B acquisition is cost-effective, why isn't it used for all pavement construction projects?
- What are the characteristics of projects that are suitable for D/B?
- Is the level of effort and cost for the owner higher for the preparation of the bid documents for D/B than for D/B/B?
- How does the role of design engineers in D/B compare with their role in traditional D/B/B procurement?
- Does D/B promote poor construction because the owner's engineers sometimes are removed from the decision process?
- What information should the owner provide to prospective bidders?
- Who is the final authority in selecting options and materials?
- Is the quality of D/B projects lower than D/B/B? How does the owner attain assurance from D/B contractor? Can a third party assurance be effective?
- Does the owner relinquish control of the project?
- Do D/B projects reduce the time to deliver a project?
- How can the integrity of the procurement process be ensured?
- Should D/B projects be available to small and non-airport experienced contractors?
- Should a requirement for disadvantaged business enterprises be included in D/B contracts?

1.2 Innovative Pavements Research Program (IPRF) Project 01-G-0002-06-1

The primary objective of this study was to develop a template that owners can use to define the attributes of projects that could be accomplished using D/B acquisition and a guide for the use of D/B concepts for the acquisition of airfield concrete pavements projects. The approach to completing this study is illustrated in Table 1.1.

Table 1.1. Study approach.



The primary project activities were as follows:

1. Assess, document, and compare the merits and deficiencies of the D/B method of acquisition versus traditional D/B/B acquisition for airfield pavement projects through the provision of a "best practices" approach. Document the pitfalls that can be experienced in D/B acquisition and how they can be avoided.

2. Compare and document the economics, quality, owner satisfaction, expediency, number of disputes, number of construction modification orders (CMOs), and overall functional practicability of D/B and D/B/B projects that are similar in scope.

3. Develop a template that owners can use to define the attributes of projects that are suitable for D/B, as well as to identify projects that do not lend themselves to the D/B method of acquisition.

4. Document the level of detail that an owner must provide to acquire a D/B contractor. Is there a minimum threshold for the level of details that must be provided? Document best practices for D/B acquisition.

5. Document and clear up any misconceptions about D/B relevant to airfield pavement projects.

6. Define how owners in D/B acquisition are given assurance that the final products meet their requirements and expectations.

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CHAPTER 2 LITERATURE REVIEW

A comprehensive effort was conducted to identify and review literature related to the D/B method of project delivery for structures, highways, and airfields in both the private and public sectors. The literature review revealed numerous research studies and case studies concerning highway and airport pavement construction projects that were completed using the D/B approach. In addition, the research team identified and reviewed D/B procedural manuals and guidance from several state and federal transportation organizations.

2.1 Alternative Delivery Mechanisms

There are several alternative methods for procurement delivery, as described in the following paragraphs.

The **design/bid/build** procurement method requires that transportation agencies (owners) design the project, either in-house or by contract, and then advertise the project to potential construction contractors. Once the design is approved, the owner enters into another contract with the lowest bidder for the construction of the project. For D/B/B projects, the owner controls the entire project delivery process. This is considered to be the traditional method of project delivery.

Design/build is a method of project delivery in which the design and construction phases of a project are combined into one contract and awarded on either a low bid or best-value basis. D/B projects allow for greater designer and contractor collaboration in the delivery of transportation projects. Agencies can focus on policy and planning, while the private sector deals with cost efficiency and construction risk.

In **construction management at risk** (CM@Risk) projects, the owner selects a construction manager to develop and deliver a project within a guaranteed maximum price. The construction manager assists the owner in developing an appropriate design and then retains one or more contractors to construct the project. The principal advantage of the CM@Risk delivery method is the coordination between the designer and contractor, which results in faster delivery of the design and expedited construction using the means and methods preferred by the contractor. Other project schedule efficiencies can include accelerated design, submission, and ordering of long lead materials. The principal disadvantage of this method is the lack of priced competition, since the selection of the contractor is based only on qualifications at the beginning of the project. CM@ Risk has been used in projects such as building construction, where the contractor subcontracts much of the work. In this situation, the reasonableness of the guaranteed maximum price can be verified by the owner's analysis of the bids from the contractor's subcontracts.

Design/build/finance (D/B/F) is a variation of D/B in which the D/B team also is responsible for providing financing for the project. The D/B/F team is repaid for their financing through a variety of mechanisms, such as annual payments or shadow tolls.

The **design/build/finance/operate** (D/B/F/O) delivery method is a variation on the D/B/F method in that the contractor/concessionaire is responsible for the operation, maintenance, and rehabilitation of the infrastructure for a designated period of time.

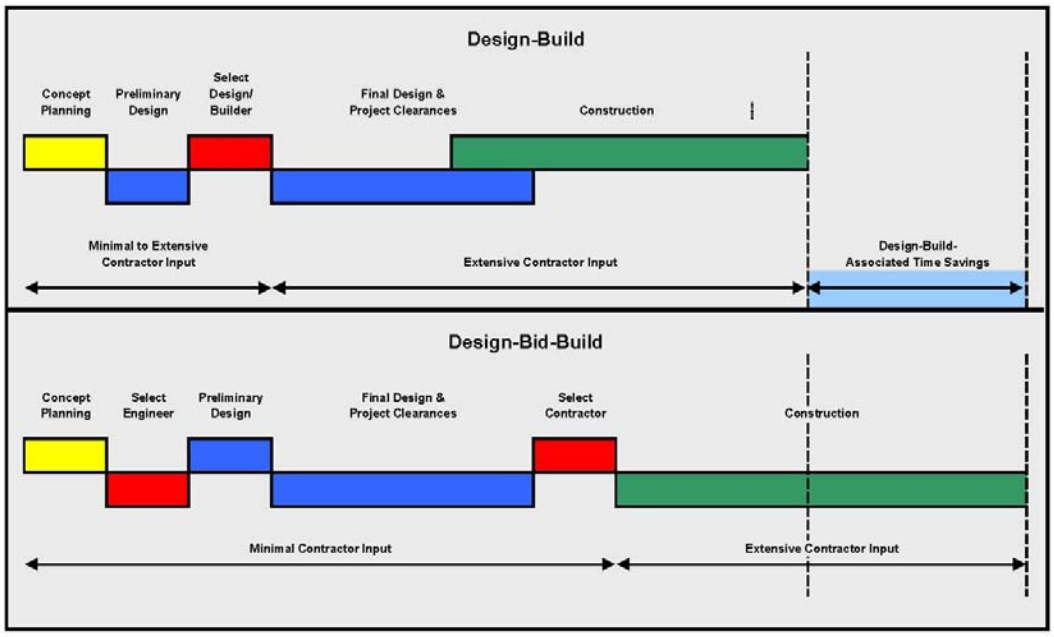
The **design/build/own/operate** (D/B/O/O) delivery method transfers all responsibility for the design, construction, maintenance, and rehabilitation of the transportation infrastructure to the contractor/concessionaire.

2.2 D/B/B versus D/B

The most prevalent procurement practice for selecting design firms and contractors for airfield and highway projects has been the sequential D/B/B process. Under the D/B/B method, the design must be completed before the project is advertised.

D/B projects typically move from conception to commission much faster than the traditional D/B/B process because procurement is achieved through a single process by integration of design and construction into one overall project team. Designers and contractors can form a joint venture for the project or act as independent firms with one being the prime contractor. Typically, one firm or team is selected to complete the project in its entirety, which can potentially reduce the time that is required to complete a project. If the team is led by a contractor, the process is called *contractor-led design/build,* and if the team is led by a designer, then the process is called *design-led design/build*.

A comparison of the typical D/B/B versus D/B is shown in Figure 2.1.



Source: Dr. Keith Molenaar, University of Colorado at Boulder

Figure 2.1. Comparison of D/B and D/B/B.

The D/B/B method provides sound procedures for procurement of transportation projects. However, when a balance of time, quality, and price is desired, the D/B approach, especially the best value method of procurement, becomes more attractive since it encourages innovations and allows the contractors to optimize their work force, equipment, and schedule. The D/B process changes some fundamental relationships between the owner, the designer, and the builder.

Based on a 2005 American Association of State Transportation and Highway Officials publication (*AASHTO Joint Task Force on Design/Build 2005*), D/B has long been used by some project owners, including the DoD and the power industry. Starting in the late 20th century, private sector use of D/B, primarily for vertical buildings, has expanded rapidly. Interest in D/B delivery has spread more gradually within the public sector and has been used primarily for vertical projects, but it also has included some horizontal transportation projects. Today, many public and private sector agencies are using the D/B approach to reduce construction duration and user costs, as well as delays associated with construction, while maintaining the durability and quality of projects. These benefits often are achieved without an increase in the size of the agency's staff.

One survey found that the use of D/B by government agencies resulted in time savings ranging from 15 percent for the Naval Facilities Command (NAVFAC) to 28 percent for the Department of Veterans Affairs. Cost savings of 14 percent were reported by the DoD in that same survey (*Loulakis 2003*). According to a recent Federal Highway Administration report (*FHWA 2006)*, on average, the D/B project delivery reduced the overall duration of projects by 14 percent, reduced the total cost of the projects by 3 percent, and maintained the same level of quality as compared to D/B/B project delivery. The federal government's experience with D/B and best-value contracting generally has been favorable (*Loulakis 2003)*.

In a survey by the Colorado Department of Transportation (DOT), most of the respondents agreed that D/B promotes innovation, reduces the overall project time, and as a result reduces user costs (delays and vehicle operation cost). However, they expressed that the D/B approach does not necessarily reduce overall agency costs, arguing that cost savings was never the intent of the D/B projects (*Ardani & Jesaitis 1999*). The overall project cost-effectiveness, however, could be optimized by balancing time, quality, and cost.

Under the D/B method of contracting, the owner identifies the project's desired end through a request for proposal, leaving most of the decision making to the D/B entity. The prospective bidders (shortlisted and pre-qualified) are provided with preliminary designs, advanced anywhere from 10 to 50 percent of the design (national average is approximately at 30 percent), and mandatory requirements. In turn, the bidders are asked to prepare a proposal showing how they intend to complete the remaining design and construction of the project.

The submitted proposals are reviewed and rated by one or several technical review committees (TRC), depending on the size of the D/B project. Generally speaking, four major criteria are used in the selection process:

- Overall cost of the project
- Quality requirements for the proposed design, including use of emerging innovations and techniques
- Management capability and past performance of the bidder
- Schedule and time required to complete the entire project

The contract is awarded to the D/B team that provides the best value offer meeting these criteria. The best value parameters identified from case studies involve aspects of cost, schedule, qualification, quality, and design (*Scott et al. 2006*). The best value offer may not necessarily be the lowest bid.

The following factors make the D/B method of procurements attractive to owners:

- Owners have one single point of responsibility; i.e., the contracting agency deals with one party for the quality, cost, and overall management of a project. This reduces the owner's responsibility for coordinating activities between the designer and builder. At the same time, this reduces the project administration due to the transfer of responsibilities to the contractor and designers.

- When the designers and the builders are jointly responsible for the overall quality of the final product, the potential for dispute and litigation between them is diminished.

- Overlapping portions of design and construction can accelerate the completion of the project, which can translate into cost savings for the traveling public and the contracting agency.

2.3 Legislation Related to D/B Projects

There are a number of regulations and policies pertaining to the implementation of alternate procurement methods.

Since 1990, the FHWA has allowed the state DOTs to evaluate non-traditional contracting techniques under a program titled "Special Experimental Project No. 14 (SEP-14) - Innovative Contracting." The ultimate goal of the SEP-14 was to allow transportation agencies the use of alternate contracting, enabling them to accelerate construction projects in a cost-effective manner while maintaining product quality and contractor's profitability. Originally, the contracting practices approved under SEP-14 were cost-plus-time bidding, lane rental, D/B contracting, and warranty clauses. After a period of evaluation, the FHWA decided that all four practices were suitable for use as operational practices (non-experimental).

Today, SEP-14 remains as a functional experimental program that may be used to evaluate promising non-traditional contracting techniques. In fact, the term "alternative contracting" may be a better descriptor than "innovative contacting," as some of these techniques are widely used

and are no longer considered to be innovative by some contracting agencies. Thus, in 2002, the title of SEP-14 was changed to "Alternative Contracting" (*FHWA 2002).*

Section 1307 of the Transportation Equity Act for the 21st Century (TEA-21) required the FHWA to develop regulations to allow the D/B project delivery system in the federal-aid highway program. The D/B contracting final rule was published on December 10, 2002, and became effective on January 9, 2003 (*Federal Register 2002).*

Subsequent modifications required by section 1503 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) resulted in revisions published in a final rulemaking on August 14, 2007. Among the revisions made by SAFETEA-LU were the elimination of the dollar thresholds for "qualified" projects and permission to release a request for proposals (RFP) or award a D/B contract prior to completion of the National Environmental Policy Act (NEPA). D/B procurement processes that deviate from the requirements of 23 CFR 636 may require an SEP-14 work plan and approval.

The following lists the most salient parts of the FHWA's D/B contracting final rule for consideration by both representatives of transportation agencies and firms interested in proposing on prospective projects using the D/B contracting approach (*FHWA 2006*):

- Allows but does not require use of D/B contracting approaches
- Permits the use of D/B contracting on both qualified and non-qualified projects, where qualified projects are those over $50 million (or $5 million for intelligent transportation systems [ITS] projects)
- Allows responsive unsuccessful proposers to receive stipends as partial compensation for their proposal development costs *(note that FAA currently does not permit the payment of stipends from funds that they provide)*
- Eliminates minimum percentage participation by prime contractors on D/B teams
- Allocates various forms of risk based on ability to manage and control these risks
- Encourages consideration of value engineering (VE) and life cycle costing
- Permits multiple notices-to-proceed to enable work to proceed on specific project sections when environmental, utility, permit, and right-of-way clearances have been completed for those sections
- Defines requirements for avoiding conflicts of interest in the procurement process
- Allows for public-private partnerships to submit D/B contract proposals under a competitive process, consistent with state and local laws, as well as applicable non-procurement requirements such as Buy America, Davis-Bacon minimum wage, and right-of-way acquisition requirements

- Suggests using a two-phase selection procedure consisting of (1) shortlisting qualified teams based on responses (containing technical and qualifications-based information) to a request for qualifications (RFQ) and (2) evaluating technical and price proposals submitted in response to an RFP

2.4 Statutory and Regulatory Requirements Related to D/B Projects

The following sections outline the statutory and regulatory requirements for civilian and military use of the D/B procurement method for airport/airfield projects.

2.4.1 Statutes

Relevant United States Codes (USCs) related to the use of D/B include:

- 10 USC 2862. Authorizes the use of D/B procedures within the DoD.

- 41 USC 253m. Authorizes the use of D/B selection procedures by civilian agencies. FAR Part 36.3 (addressed below) sets forth the policy and procedures governing D/B.

- 49 USC 47104. This statute authorized a D/B pilot program for the FAA that expired on September 30, 2003.

- 49 USC 47142. This statute authorizes the FAA to use D/B selection procedures under specific guidelines effective September 30, 2003. The FAA administrator may approve an application of an airport sponsor under this statute to authorize the airport sponsor to award a D/B contract using a selection process permitted under applicable state or local law if all of the following apply:

    - The administrator approves the application using criteria established by the administrator

    - The D/B contract is in a form that is approved by the administrator

    - The administrator is satisfied that the contract will be executed pursuant to competitive procedures and contains a schematic design adequate for the administrator to approve the grant

    - Use of a D/B contract will be cost-effective and expedite the project

    - The administrator is satisfied that there will be no conflict of interest

    - The administrator is satisfied that the selection process will be as open, fair, and objective as the competitive bid system and that three or more bids will be submitted for each project under the selection process

2.4.2 Federal Acquisition Regulation (FAR)

- 36.102 Definitions. "Design/build" means combining design and construction in a single contract with one contractor.

- 36.104 Policy. Unless the traditional acquisition approach of D/B/B established under the Brooks Architect-Engineers Act (40 USC. 1101 *et seq.*) or another acquisition procedure authorized by law is used, the contracting officer shall use the two-phase selection procedures authorized by 10 USC. 2305a or 41 USC. 253m when entering into a contract for the design and construction of a public building, facility, or work, if the contracting officer makes a determination that the procedures are appropriate for use. Other acquisition procedures authorized by law include the procedures established in this part and other parts of this chapter and, for DoD, the D/B process described in 10 USC. 2862.

- 36.3 Two-Phase Design/Build Selection Procedures. "Two-phase design/build selection procedures" is a selection method in which a limited number of offerors (normally five or fewer) are selected during phase one to submit detailed proposals for phase two.

- 36.300. This subpart describes policies and procedures for the use of the two-phase D/B selection procedures authorized by 10 USC 2305a and 41 USC 253m.

- 36.301 Use of Two-Phase Design/Build Selection Procedures. During formal or informal acquisition planning , if considering the use of two-phase D/B selection procedures, the contracting officer conducts the evaluation using the criteria below:

    - Three or more offers are anticipated

    - Design work must be performed by offerors before developing price or cost proposals, and offerors will incur a substantial amount of expense in preparing offers

- The following criteria have been considered:

    - The extent to which the project requirements have been adequately defined

    - The time constraints for delivery of the project

    - The capability and experience of potential contractors

    - The suitability of the project for use of the two-phase selection method

- The capability of the agency to manage the two-phase selection process
- Other criteria established by the head of the contracting activity

The two-phase design/build selection procedures can then be used if the contracting officer determines that this method is appropriate.

- 36.302 Scope of Work. The agency develops, either in-house or by contract, a scope of work that defines the project and states the government's requirements. The scope of work may include criteria and preliminary design, budget parameters, and schedule or delivery requirements.

- 36.302 Procedures. One solicitation may be issued covering both phases, or two solicitations may be issued in sequence. Proposals are evaluated in phase one to determine which offerors will submit proposals for phase two. One contract will be awarded using competitive negotiation.

- 36.303-1 Phase One. Phase one of the solicitations includes:
  - The scope of work
  - The phase one evaluation factors, including:
    - Technical approach (but not detailed design or technical information)
    - Technical qualifications to include
      - Specialized experience and technical competence
      - Capability to perform
      - Past performance of the offeror's team (including the architect-engineer and construction members)
    - Other appropriate factors (excluding cost or price related factors, which are not permitted in phase one)
  - Phase two evaluation factors
  - Statement of the maximum number of offerors to be selected to submit phase two proposals. The maximum number specified should not exceed five unless the contracting officer determines, for that particular solicitation, that a number greater than five is in the government's interest and is consistent with the purposes and objectives of two-phase design/build contracting

After evaluating phase one proposals, the contracting officer selects the most highly qualified offerors (not to exceed the maximum number specified in the solicitation and requests that only those offerors submit phase two proposals.

- 36.303-2 Phase Two. Phase two of the solicitation(s) is prepared in accordance with FAR Part 15 and includes phase two evaluation factors, developed in accordance with subpart 15.304. Examples of potential phase two technical evaluation factors include design concepts, management approach, key personnel, and proposed technical solutions. Phase two requires submission of technical and price proposals, which are evaluated separately, in accordance with Part 15.

- Transportation Acquisition Regulation (FAR Supplement). No supplemental guidance is provided on the use of D/B procedures.

2.4.3 Federal Aviation Administration Guidelines

FAA Order 5100.38.C provides guidance and sets forth policies and procedures to be used in the administration of the Airport Improvement Program (AIP). Specific guidance is provided for procurement and contract requirements for federal grant programs which refers extensively to Title 49 CFR,Part 18.36 requirements. This document stipulates that the granting agency (FAA) has a minimal role in the procurement used by airport sponsors. For example, if the sponsor is a state, they are authorized under Part 18.36 to use the same procurement policies and laws that they use for procurements not funded in whole or in part by federal sources. The document stipulates that all procurement transactions will be conducted in a manner providing full and open competition. It also includes unreasonable requirements on firms, non-competitive price impact, organizational conflicts of interest, unnecessary experience and bonding requirements, unnecessary product or brand name specifications and preference to in-state or local bidders. An extract of interest from FAA Order 5100.38.C Section 9.04 is as follows:

> "Other methods of contracting may be appropriate when used for an AIP project. One such method is considered a two-step procurement in which a general scope of the project is provided to prospective bidders. A technical proposal is submitted and the sponsor determines which bidders provide a technical proposal that meets the requirements of the general scope. An invitation for bids that encompasses the general scope and incorporates a bidder's technical proposal by reference is issued to each bidder whose technical proposal is deemed acceptable. The bidder then bids on the general scope as well as its technical approach and the responsible and responsive bidder submitting the lowest bid is awarded the contract. Other methods that may have some use under AIP are various forms of Design-Build. Except in those circumstances under which a project has been approved under a Design-Build pilot program, sponsors should be cautioned that the design-build contracting must still meet the requirements of both Paragraph 904(b)(2) above for professional services as well as the price competition for construction. In addition, sponsors should be cautioned that except under limited circumstances (See Chapter 3, Section 2) costs incurred prior to a grant are not necessarily reimbursable so

the contract phasing should reflect the need to perform construction services after a grant is issued."

Program Guidance Letter 01-2 provides further guidance for the procurement of D/B services, including qualification-based selection and competitive proposal selection.

FAA Advisory Circular (AC) 150/5100, *Architectural, Engineering and Planning Consulting Services for Airport Grant Projects,* provides similar guidance as detailed above.

FAA AC 150/5370, *Standards for Specifying Construction of Airports,* provides standards for the construction of airports. This circular does not constitute a regulation and in general is not mandatory. However, use of these guidelines is mandatory for airport construction funded under the AIP or the Passenger Facility Charge (PFC) Program.

The General Provisions section of the AC presents the standard D/B/B approach to airport construction; D/B is not addressed in the AC as currently written. As a minimum, the authorizations set forth in 41 USC 47142 for use of D/B procedures in airport construction should be set forth in the AC, reiterating the criteria described in Section 2.4.1 above.

2.4.4 DOD Guidelines for Airfield D/B Projects

UFC 3-260-11FA contains information primarily pertinent to preparation of RFPs for airfield D/B projects (*DoD 2005*). The document does not cover discussions related to various aspects of the D/B processes; rather, the primary objectives of this recently published document are to:

- Establish the roles and responsibilities of the government and contractor
- Provide an adequate definition of projects design and construction criteria allowing the prospective D/B contractors to prepare proposals

The ultimate goal of the UFC 3-260-11FA manual is to reduce risks of D/B contracting for both the government and the contractor, and to provide them with a clear, mutual understanding of the end result. Paragraphs 1-5.1 and 1-5.2 of the document describe the general roles of the government and the contractor. Generally speaking, the criteria used in developing RFPs can be stratified into three levels: nominal, partial, and full criteria, with each level providing more detail than the preceding one. For example, the full criteria option is used for special circumstances where government preferences are extensive and mandatory and allow little or no flexibility for the D/B contractor. Nevertheless, there are common items that are included in most airfield projects for all three levels, including project description, completion time, airfield traffic constraints, phasing requirement, requirement for control of construction traffic, cleaning requirements for pavements, and permits.

Overall, the UFC 3-260-11FA is a comprehensive document that addresses numerous RFP topics related to planning, design, and construction of vertical and horizontal airfield facilities. However, it remains to be seen if there are any differences between D/B and

D/B/B RFP criteria. Many of the topics covered in this document direct the reader to use other references. In particular, many references are made to the Technical Instruction (TI) 800-03 of the United States Army Corps of Engineers (USACE).

UFC 1-300-07A, *Design/Build Technical Requirements*, also provides useful information and some relevant lessons learned for D/B projects. Guidance for RFP content is provided in detail and may be used as a basis for airport/airfield projects.

2.4.5 State and Local Authority Regulations for D/B Projects

State and local authorities may have their own regulations that may or may not enable D/B procurement. Considering the number of government authorities that may be involved in a particular project, and the on-going modifications to improve legislation, airport operators considering the use of D/B procurement should consult their state procurement acts, statutes, and local regulations to ensure that D/B procurement is permitted for a particular project.

2.5 Design/Build Procurement Process and Contracts

This section describes the most prevalent selection methodologies for D/B projects. The three common approaches to selecting a D/B entity are:

- Low bid – selection based on the lowest construction bid
- Best value bid – combination of a weighted technical approach and low bid
- Qualifications-based selection – the construction bid is not a factor in the final selection

Based on the FHWA Design-Build Effectiveness Study *(FHWA 2006)*, just over half of the D/B projects were procured based on low bid with 42 percent based on best value and 4 percent based on multi-parameter approaches. Of the best value projects, 41 percent were awarded based on adjusted bid and 14 percent were awarded based on adjusted score, for a combined total of 55 percent.

Many agencies award their D/B contracts based on a best value determination evaluated by TRC following the review of the submitted proposals. Other agencies award their D/B contracts on a lowest ultimate cost determination and technically acceptable basis proposals. These agencies are obliged by their state's legislative requirements to award D/B contracts using a low bid system. However, with the revision of procurement laws in many states, more agencies are having the option of awarding D/B contracts on a best value basis.

2.5.1 Low Bid System

The low bid system may be used with either a one- or two-step process. With the one-step process, the bids are submitted along with qualifications. All cost proposals are opened. Contract award under this system is contingent upon the lowest bidder adequately addressing all the requirements of the proposal. If the technical proposal of the lowest bidder is determined to

be non-responsive, the TRC considers reviewing the cost and technical proposal of the next apparent low bidder. The low bid two-step process involves the review of qualification first. The cost for bidders passing the qualifications requirements are then reviewed, with the lowest overall cost bid selected.

2.5.2 Best Value Procurement Process

Best value bid appears to be the preferred approach (where low bid is not legislatively mandated). Specifically, the preferred approach is a two-phase approach where the first phase consists of an evaluation of bidder qualifications and the second phase involves the technical and financial submission of a shortlisted group of bidders. According to one survey (*Parsons Brinckerhoff 2002*), the majority of the states surveyed used a best value, two-step process for procurement of D/B contracts.

The first step in the process involves prequalification (shortlisting) of firms based on their responses to an RFQ. The issuance of the RFQ is designed to reduce costs to both industry in responding to D/B proposals and the agencies evaluating and ranking proposals. The average number of shortlisted firms for D/B projects ranges anywhere from three to five. According to Molenaar (*2001*), the general components of an RFQ include:

- Identification of the owner
- Description of the project scope and size
- Description of selection process
- Identification of jurors or selection entity
- Minimum requirement of D/B team
- Submittal requirements
- Prequalification selection criteria
- Submittal deadline and address

There are a number of different methods that can be used:

- Pass/fail
- Modified pass/fail
- Qualitative rating
- Direct points scoring

The pass/fail method provides a list of evaluation criteria, with the proposer either meeting the criteria or not. If they do not meet the criteria, the bid may be disqualified. The modified pass/fail allows some “gray area” where a reviewer may pass a bid if the majority of the criteria are met and the others are close to being met. The qualitative rating uses a system such as good, fair, poor to rank the submissions. The direct points scoring method assigns points to each rating criterion, with a minimum number of points considered acceptable to move forward in the bidding process. Each method has advantages and disadvantages, and the agency needs to determine which method best suits its needs.

Evaluation factors should focus on differentiators (i.e., factors that will allow the owner to determine real differences between the proposers). Care should be taken to avoid requesting extensive, time-consuming, or costly information that will not be used by or useful to the agency in differentiating proposals (*New York State DOT 2005*)**.**

Some of the most prevalent criteria used in evaluating proposals include:

- Understanding the project
- Management team qualification
- Team organization and past experiences
- Safety program
- Financial condition
- Bonding capacity
- Record of performance
- Adequacy of plant and equipment

The project description and detailed scope of work are the most important aspects and should be developed early in the process (*Massachusetts Highway Department 2006).* Appropriate evaluation factors also should be established early in the project development process, with reference to the project goals. In determining the evaluation factors, one should identify the objectives related to each factor—why the particular information is being requested and what the owner expects to learn from the information submitted.

The second step is the issuance of an RFP and evaluation of the technical and price proposal of the pre-qualified or shortlisted firms. The RFP conveys the scope of work and requires the prospective D/B firms to follow a set of guidelines in preparing and submitting their proposals.

During the pre-proposal period, the proposers have the opportunity to submit questions to the owner regarding the procurement documents. Usually, the owner will provide copies of the questions to all the proposers; if the owner decides to change the proposal requirements or the contract terms in response to a question, an addendum to the RFP will be issued (*Loulakis 2003*).

There may be an opportunity for the D/B firms to obtain pre-approval of alternative technical concepts, and there may be discussions/negotiations followed by subsequent proposals, best and final offers (BAFO) (*AASHTO 2005, Parsons Brinckerhoff 2002*). Although similarities exists in the factors used for evaluating the qualifications submittal and those used for evaluating the technical proposal, there are some significant differences between the two processes. Some of the salient features in evaluating a technical proposal include:

- Responsiveness of the proposal
- Total cost
- Duration, scheduling
- Safety record
- D/B experience of the proposer firm

- Joint experience of the D/B entities working together
- Incidents of litigation/dispute history
- Management team qualification/approach
- Project team organization/experience
- Past performance
- Key project team members and their resumes
- Quality control/assurance plans and organization
- Construction team member safety records
- Bonding record or proof of bonding ability

Based on a recent survey (*FHWA 2006*), the most important factors considered in awarding projects under the D/B approach were, in descending order, cost, cost and duration, duration only, team reputation, and quality management plan.

2.5.3 Qualifications-Based Selection

For qualifications-based selection, the D/B team is selected based on their qualifications only. The bid cost is then negotiated with the selected team. Selection may be based on a written proposal and/or interview(s). Qualification criteria and weighting systems similar to those used in the best value process can assist in evaluating a proposer's qualifications.

2.6 Design/Build Contract Formats

Many D/B contract templates have been developed over the past 10 years by various industry and trade organizations, including the following:

- American Institute of Architects (AIA) – http://www.aia.org/db2_template.cfm?pagename=db_a_contracts

- Design Build Institute of America (DBIA) – http://www.dbia.org/pubs/contracts/

- Associated General Contractors of America (AGC) – http://www.agc.org/cs/contracts

- Engineers Joint Contract Documents Committee (EJCDC) is a joint venture of the American Council of Engineering Companies (ACEC), National Society of Professional Engineers/Professional Engineers in Private Practice (NSPE/PEPP), the American Society of Civil Engineers - Construction Institute (ASCE-CI), and the AGC. EJCDC has a publication list of contracts for D/B – http://store.acec.org/merchant.mvc?Screen=CTGY&Category_Code=EJCDC-008

- Canadian Construction Association (CCA), Construction Specifications Canada, and The Royal Architectural Institute of Canada. *Standard Construction CCA-CSC-RAIC Document 14-2000: Design/Build Stipulated Price Contract*

- DoD UFC 3-260-11FA, 25 May 2005, *Model Design/Build (DB) Request for Proposal (RFP) for Airfield Contracts, (US Army Corps of Engineers, Naval Facilities Engineering Command, Air Force Civil Engineer Support Agency)*

2.7 Projects Suitable for Design/Build

Owners use a variety of factors when considering the D/B method for procurement. NAVFAC provided the following description of the process that it follows in deciding whether to use D/B. NAVFAC reviews projects to formulate acquisition plans based on the specific circumstances of that project. The current NAVFAC goal is to deliver at least 80 percent of all projects over $750,000 using the D/B procurement methodology. It stated that its experience indicates D/B can be a successful strategy when all or most of the following are true (*Parsons Brinckerhoff 2002*):

- Project scope is well defined
- Project requirements for the most part can be stated as performance specifications
- Project value is sufficient to attract competition
- Project location, security requirements, or other factors will not overly restrict competition
- Little or no design is required in order to advertise the D/B contract
- Completing NEPA requirements will not significantly delay contract award
- A different acquisition method would not produce better pricing, life cycle cost, or overall time
- There are no acceptable plans and specifications from another similar project that can be re-utilized with minimal effort
- The (internal Navy) client is on board with using this approach

The New York State DOT (*2005*) considers the following factors in determining if a project is suitable for the D/B method of delivery:

- Time: D/B approach results in shorter time for project delivery compared to the traditional D/B/B method
- Clarity and Consistency of Scope: A successful D/B project needs a well-defined, consistent scope of work

- Flexibility: The D/B firms have a fair degree of latitude in determining the solution to a given problem or situation

- Innovation/Creativity and Complexity: The D/B approach offers opportunities for innovation and creativity relating to design, construction scheduling, engineering solutions, phasing, etc.

- Current Status of Design: It is best to determine whether to use the D/B method of delivery early in the project planning phases, before significant design work is done

- Cost/Funding: D/B projects result in greater cost certainty and see fewer cost escalation claims to CMOs

- Miscellaneous Requirements: D/B projects are adaptable to handle miscellaneous requirement such as erosion and sediment control, public information, community relations, and environmental mitigation

- Potential Proposal Costs and Stipends: Preparation costs for D/B proposal usually are significantly higher than the traditional D/B/B projects

2.8 Related Components to D/B Procurement

This section addresses several miscellaneous items dealing with the D/B procurement process.

2.8.1 Integrity of the Procurement Process

As referenced in 49 USC 47142, the following integrity criteria must be present for use of the D/B selection methodology:

- The administrator is satisfied that there will be no conflict of interest

- The administrator is satisfied that the selection process will be as open, fair, and objective as the competitive bid system and that three or more bids will be submitted for each project under the selection process

Competition and process transparency are keys to maintaining the integrity of the D/B selection methodology. In the shortlisting phase, the evaluation factors must be set forth clearly and the basis for selecting those offerors to submit detailed bids for the project must be articulated and followed by the selection authority.

The factors for evaluating detailed bids must be developed in accordance with FAR 15.304. Typically, these are the same factors noted in the earlier discussion of Statute 36.303-2. Price or cost shall be an evaluated factor in every instance; however, it need not be the highest rated factor.

According to FAR 15.304, the evaluation factors and significant subfactors in evaluating offers include the following:

- The award decision is based on evaluation factors and significant subfactors that are tailored to the acquisition.
- Evaluation factors and significant subfactors must—
  - Represent the key areas of importance and emphasis to be considered in the source selection decision; and
  - Support meaningful comparison and discrimination between and among competing proposals.
- The evaluation factors and significant subfactors that apply to an acquisition and their relative importance, are within the broad discretion of agency acquisition officials, subject to the following requirements:
  - Price or cost to the Government shall be evaluated in every source selection (10 U.S.C. 2305(a)(3)(A)(ii) and 41 U.S.C. 253a(c)(1)(B)) (also see Part 36 for architect-engineer contracts);
  - The quality of the product or service shall be addressed in every source selection through consideration of one or more non-cost evaluation factors such as past performance, compliance with solicitation requirements, technical excellence, management capability, personnel qualifications, and prior experience (10 U.S.C. 2305(a)(3)(A)(i) and 41 U.S.C. 253a(c)(1)(A));
  - Except as set forth in paragraph (c)(3)(iii) of this section, past performance shall be evaluated in all source selections for negotiated competitive acquisitions expected to exceed the simplified acquisition threshold.
  - For solicitations involving bundling that offer a significant opportunity for subcontracting, the contracting officer must include a factor to evaluate past performance indicating the extent to which the offeror attained applicable goals for small business participation under contracts that required subcontracting plans (15 U.S.C. 637(d)(4)(G)(ii)).
  - Past performance need not be evaluated if the contracting officer documents the reason past performance is not an appropriate evaluation factor for the acquisition.
  - The extent of participation of small disadvantaged business concerns in performance of the contract shall be evaluated in unrestricted acquisitions

expected to exceed $550,000 ($1,000,000 for construction) subject to certain limitations (see 19.201 and 19.1202).

- For solicitations involving bundling that offer a significant opportunity for subcontracting, the contracting officer must include proposed small business subcontracting participation in the subcontracting plan as an evaluation factor (15 U.S.C. 637(d)(4)(G)(i)).

- If telecommuting is not prohibited, agencies shall not unfavorably evaluate an offer that includes telecommuting unless the contracting officer executes a written determination in accordance with FAR 7.108(b).

- All factors and significant subfactors that will affect contract award and their relative importance shall be stated clearly in the solicitation (10 U.S.C. 2305(a)(2)(A)(i) and 41 U.S.C. 253a(b)(1)(A)) (see 15.204-5(c)). The rating method need not be disclosed in the solicitation. The general approach for evaluating past performance information shall be described.

- The solicitation shall also state, at a minimum, whether all evaluation factors other than cost or price, when combined, are:

  - Significantly more important than cost or price;

  - Approximately equal to cost or price; or

  - Significantly less important than cost or price (10 U.S.C. 2305(a)(3)(A)(iii) and 41 U.S.C. 253a(c)(1)(C)).

2.8.2 Impact on Small and Disadvantaged Contractors

Prime contract awards to the various segments that make up the small business community (disadvantaged, woman-owned, veteran-owned, and so forth) have declined in many agencies as contracts have tended to be fewer in number and larger in scope *(Loulakis 2003)*. For example, many agencies have concentrated on indefinite delivery, indefinite quantity (IDIQ) contract vehicles that are perceived as reducing the opportunities for small business awards. The general rule for setting aside a specific procurement for exclusive small business participation in accordance with FAR 19.502 is that offers will be received from two or more responsible small business concerns and that award will be made at fair and reasonable market prices. Small business size standards are prescribed under the North American Industry Classification System (NAICS) codes and applicable size standards. In general, where small businesses produce products, size standards are set forth in terms of number of employees. Where services are being provided, size standards are set forth in terms of annual revenues of the particular concern. The set-aside decision may be preceded by publication of a synopsis or invitation for interested offerors to submit qualification statements including the size status of the offeror with respect to a specific NAICS size standard. States and municipalities often have similar programs. Where a

set-aside for the procurement for small business concerns is not warranted, subcontracting with small businesses often is mandated.

D/B projects are likely to be governed by NAICS size standards for either architectural services (541310) or engineering services (541330), both of which have a size standard of $4.5M in annual revenues. Most architectural/engineering firms that are able to handle large D/B projects likely will be classified as large businesses. This is similar for construction firms with a current size standard of $33 million. Accordingly, attention must be paid to providing subcontracting opportunities to small business concerns.

2.8.3 Issues in Subcontracting

The perception in the contracting community is that small business cannot compete with larger companies on D/B projects. However, the FHWA reported that the role of small business contractors on D/B projects was similar to that of D/B/B projects (*FHWA 2006*). Further, in the acquisition process, many RFPs award points to technical proposals that have a balanced approach to subcontracting.

For the most part, subcontracting and disadvantage business enterprise (DBE) goals for D/B projects are similar to D/B/B projects. Many agencies have established regulations that require the prime contractor to perform certain percentage of the total contract.

Per FAR 19.702, contracts exceeding $550,000 ($1M for construction) require the contractor to establish a small business subcontracting plan by either mandating percentage goals for awards of subcontracts to small business concerns, or at least by requiring the contractor's best efforts to award such subcontracts. This provides opportunities for those small or disadvantaged firms that do not qualify for the prime contract award.

In addition to the standard practice of flowing down prime contract provisions to subcontractors, in D/B projects, particular attention must be paid to the following (*Kilpatrick Stockton 2007*):

- Whether any liquidated damages provisions are included in the master agreement
- The need for a clear dispute resolution provision
- The ability to terminate the subcontract for cause (performance issues) or for convenience if the prime agreement is cancelled
- A process to resolve inconsistencies or conflicts among provisions of the agreement

2.8.4 Use of Stipends

Many owners pay a stipend to the proposers who submit responsive but unsuccessful proposals. D/B projects typically are advanced by the owner to the 30 percent stage. The design often lacks sufficient detail to develop a responsive technical and financial proposal, and the stipend helps to offset some of the costs of the D/B team in preparing a response to the RFP. In return, the owner may require that all innovations and concepts used in the submitted proposals become the property of the owner. Overall, the use of stipends encourages qualified D/B teams to participate and promotes competition. Although the stipend may not cover the full cost of the D/B team efforts, it does provide an incentive to propose.

Stipends are permitted in federal projects and are most often focused on large projects with opportunity for significant innovation and where the cost of preparing and submitting a proposal is substantial. In such cases, stipends sometimes are used to stimulate competition, compensate unsuccessful D/B teams for a portion of their proposal preparation costs, and ensure that smaller companies are not put at a competitive disadvantage. While the use of stipends may be growing in popularity, there are some legal considerations to be aware of. Agencies need to ensure that stipends are not prohibited on constitutional grounds (when viewed as gifts or are contrary to agency contracting policies or procedures). Owners should consult with legal counsel regarding the authority to pay stipends before including such a provision in solicitation documents. On the other hand, the payment of stipends may reduce disputes from unsuccessful D/B teams and may enhance rights of ownership to design concepts presented by a losing firm (*Ryan 2007*). It is noted that currently the FAA will not permit the payment of stipends from the funds that they supply for project.

Based on the current FAA AIP Handbook (*June 2005*), costs incurred prior to a grant are not necessarily reimbursable. Such costs would include stipends.

The literature review did not indicate any consistency in the amount of stipend paid. The range of stipends paid is from none to a high of 0.2 percent of the estimated cost of design and construction. In Arizona, the legislation suggests the DOT "shall award a stipulated fee equal to 2/10 of 1 percent of the Department's estimated cost of design and construction to each short list responsible proposer who provides a responsive but unsuccessful proposal."

2.8.5 Dispute Resolution

In general, the D/B method of acquisition generates fewer disputes than tradition D/B/B contracts. One of the main reasons for fewer disputes in D/B contracts may be that the contractor in the D/B contracts assumes most of the risk and has a lot more control over the design and construction phases of the project than the D/B/B contractor, who is in charge of the construction only.

Nevertheless, disputes happen even under D/B contracts. One way to minimize dispute is through partnering, which is a management tool that fosters cooperation between the owner and

the contractor to resolve their disputes. Many owners and contractors have established dispute resolution boards (DRB) with the ultimate goal of defusing issues before they become formal disputes. Typically, the DRB consists of three respected, experienced individuals: one appointed by the owner, one appointed by the contractor, and one appointed jointly. Arbitration also is a frequently used method for dispute resolution.

Traditional dispute resolution mechanisms include the following (*Bramble & West 1999*):

1. Negotiation – The parties communicate their differences through conference, discussions, and compromise in an effort to resolve them.

2. Mediation – The parties work together with the aid of a facilitator (mediator) to reach a settlement. The mediator's role is advisory and nonbinding. Resolution of the dispute rests with the parties themselves.

3. DRB – The owner and D/B contractor select a three-member panel after the contract agreement is signed but before any disputes arise. The panel members are available to observe problems and suggest solutions at the job site, which facilitates timely resolution of disputes before adversarial positions develop and harden.

4. Arbitration – The parties agree through contract provisions to submit a dispute for binding resolution by a person or persons. The contract provisions normally address the range of issues to be resolved, the degree of relief to be granted, and the procedural aspects of the arbitration process.

5. Litigation – The parties resort to legal proceedings in a court of law, and resolution is achieved through the judicial process.

These approaches, in ascending order, reflect increasing time consumption, cost of resolution, process formality, and loss of control by the parties involved. The trend in D/B contracting is to favor combinations of the first three approaches in lieu of binding arbitration or litigation.

2.8.6 Warranties

Warranty clauses incorporated into D/B projects can provide contracting agencies with added insurance that they are getting quality products that last their design life, especially when the contractor is the entity responsible for quality assurance/quality control (QA/QC) processes. Typically for D/B projects, the D/B entity is responsible for the quality of the project. Express warranties require the D/B contractor to address defects for specific project elements, such as pavement, electrical, or building elements. An advantage of express warranties is that they outline the performance requirements for each warranty element and the requirements for remediation of any defects. Based on a survey conducted for the New York State DOT (*2005*), most warranty terms for pavements ranged from 1 to 5 years. Warranties often have extensions for corrective work completed during the warranty period.

FAR 46.702 states that the use of warranties for supplies or services is not mandatory, and it sets criteria for determining whether the use of a warranty is appropriate for a particular acquisition. Technical factors may include complexity and function, degree of development, state of the art, end use, difficulty in detecting defects before acceptance, and potential harm to the government if the item is defective. Cost factors may include the contractor's charge for accepting the deferred liability created by the warranty, as well as government administration and enforcement of the warranty.

D/B projects deal with performance uncertainties in various ways. Performance guarantees may be included for design responsibility and specific output requirements (energy use, pavement life, pollution discharge, etc.). The D/B contractor takes on an obligation that all or parts of the project will perform in a certain way similar to performance specifications. Such provisions are legally enforceable as long as they are clear and unambiguous.

Where performance guarantees are not included, there is nonetheless an implied warranty of fitness for a particular purpose. This brings up the standard of care for design aspects of the project based on express statements in the agreement, as well as the implied expertise of the D/B contractor (*Kilpatrick Stockton 2007*).

2.8.7 Risk Management

An agency's approach to risk allocation will depend on its ultimate goals for the project. There are some risks that are best managed by the owner, including funding, property acquisition, airside security, changing site conditions, environmental assessments, and natural events such as hurricanes and tornadoes. Likewise, other risks are better managed by the D/B entity, including schedule, labor, and construction means and methods.

Examples of risk transfer assessment include airside security and differing site conditions. If the construction work is to be completed airside, the cost for the contractor to provide security access and airside escort for his equipment and personnel can be a high risk item and, therefore, costly to the project. If it is possible to rezone the work area and make it groundside for the duration of the construction, this risk can be reduced significantly. Additionally, contractors believe that it is more cost-effective for project owners to retain the risk of varying site conditions rather than have the owner pay a premium to a contractor to deal with the impact of the varying site conditions at the time of construction.

Many agencies have found that risk assessment workshops are useful in identifying, allocating, and managing specific project risks. These workshops can include owners, contractors, designers, insurers, and other interested parties. If there are specific high impact/high probability risks, specialists in those areas would be included.

NAVFAC uses a functional analysis concept development procedure for all projects at the beginning of the design phase to identify potential problems and reduce risk. This follows the concepts of VE and uses an iterative process to assess and manage risk.

Early in the project scoping, a risk allocation matrix can be useful for identifying and classifying project risks. In developing the matrix, the owner can evaluate the extent of preliminary design needed to manage the impact of the risk.

2.8.8 Utilities

Utility relocations present major issues in D/B projects. To avoid adverse impact on the project schedule, and to reduce risks, it is highly recommended that owners work closely with the utility owners in identifying and mapping the existing utilities for inclusion in the RFP. To simplify the issues related to utilities, some agencies execute a master agreement with all utility owners and then include the agreement in the RFP.

2.8.9 Value Engineering

For the most part, D/B projects are conducive to VE. Most owners allow contractors to deviate from prescriptive requirement of the RFP and provide them with freedom in using new technologies or innovations to accelerate construction and achieve the lowest price, while maintaining quality. These innovations are considered VE, and the resulting savings are shared between the owner and the contractor. However, post-award VE benefits may or may not be shared with the owner depending upon how the RFP is written. Generally speaking, the greatest opportunity for VE happens for the best-value D/B during the proposal preparation.

2.8.10 Incentives/Disincentives

Many agencies have used incentive/disincentive clauses, primarily to promote early completion of the project, thereby reducing the inconvenience to facility users. Twenty percent of the respondents to a recent survey indicated the inclusion of specific incentive clauses, while 46 percent indicated the use of specific disincentive clauses (*FHWA 2006*).

2.8.11 Environmental Impact Studies/Mitigations

Obtaining permits and approval for mitigating environmental issues under the NEPA remains a challenging task under the D/B method of project delivery. Typically, owners would like to acquire NEPA approvals before expending significant funds and prior to advertising an RFP. However, if the owners are willing to take risks in order to expedite construction, NEPA permits the D/B projects to be procured prior to final approval. This is a risk that many owners are willing to take for critical projects.

2.8.12 Owner's Role in QA/QC Processes/Oversight

In a survey conducted for the New York State DOT (*2005*), most transportation agencies indicated that QC activities should rest with the contractor responsible for design and construction of the project. Most owners believe the contractor should perform the QC, with the owner retaining a level of QA oversight through an independent assurance tester or a hired program manager. For D/B projects, QA testing should be done by the owner.

2.8.13 Summary

D/B can result in time savings ranging from 15 percent to 28 percent. Managers of highway D/B projects estimated that, on average, the D/B project delivery reduced the overall duration of their projects by 14 percent, reduced the total cost of the projects by 3 percent, and maintained the same level of quality as compared to D/B/B project delivery. Although agency cost savings are not always the goal of the D/B projects, overall project cost-effectiveness can be optimized by balancing time, quality, and cost.

Legislation/guidelines related to D/B projects include TEA-21, SAFETEA-LU, the USC, FAR Part 36, FAA Advisory Circulars, UFC 3-260-11FA, and SEP-14.

Of the three methods identified for procurement, the best value selection process is the most utilized method. This allows owners to consider both the quality and the financial aspects to determine the best qualified D/B team for the project. Several contract templates for D/B are available, including those developed by AIA, DBIA, AGC, EJCDC, CCA, and DoD UFC 3-260-11FA.

The advantages of the D/B methodology include:

- Single point accountability for owner
- Opportunities for increased efficiency in construction
- Reduction in construction time
- Greater access to private sector experience
- Opportunities for innovation and cost savings
- Transfer of delivery risk to the private sector
- Fewer construction claims

The disadvantages of the D/B methodology include:

- Contractors may not have the in-house resources to prepare qualification submittals
- Best value and qualification based selection is not common for most construction contracts
- Little experience with contractor led design
- Owner does not have a direct relationship with the designer
- The perception that the driver for design is economics and not functional need
- Not all projects are suitable for design/build
- Lack of understanding of risk transfer could lead to higher project costs
- Compressed schedule may require quick owner turnaround of submittals

CHAPTER 3 CASE STUDIES

Through the literature review, a series of airport design/build contracts were identified for review. Summaries of the information obtained from D/B projects are provided in this chapter. Direct references to the projects were removed for anonymity.

3.1 Project Descriptions

3.1.1 Project A

Award was made to a joint venture D/B firm. The engineer held the bond and insurance for the project. The primary contracting partner was a Portland cement concrete (PCC) construction contractor. The joint venture also had several subcontractors for such items as electrical, earthwork, asphalt mix and lay-down, and base work.

The project scope included the construction of a temporary runway that was 12,000 ft by 200 ft asphalt and concrete construction, located 2500 ft from the existing runway. The existing 15,000-ft by 300-ft runway, constructed in 1953, was badly deteriorated and was replaced completely. Construction of the temporary runway was found to be more cost-effective than alternative strategies. The $100 million project contained five design packages, two for the temporary runway and three for the permanent runway.

The arrangement with the joint venture put the designer and contractor on equal terms and gave the designer ready access to the owner and other team members. Weekly constructability meetings were held throughout the project. This provided for resolution of issues as the work moved forward.

The following are lessons learned from the project:

- An integrated team appears to be a good template for the D/B approach
- Partnering was a key factor to the success of the project

3.1.2 Project B

This facility is home to several military units. A D/B contract was awarded for the reconstruction of a major runway. The design was a new PCC pavement to meet operational requirements for the design aircraft and anticipated 20-year design life.

Background geotechnical information consisted of field and laboratory investigation results. The analysis of the background information provided resulted in design recommendations for reconstruction based on the design aircraft operations. The design analysis was based on current UFC 3-260-02 and PCASE pavement design software.

The following are lessons learned from the project:

- The contractor and designers proceeded very quickly to advance design based on the owner-supplied partial design and treated this as a conventional type project, which resulted in little innovation

- The contractor was reluctant to take any VE advice and "pressured" designers to adopt conventional design and construction techniques; the approach adopted by the contractor stifled innovation on the project

3.1.3 Project C

This project included the reconstruction of a 9,000-ft parallel taxiway including 11 taxiway intersections, widening of another taxiway, and installation of an in-line detention drainage system. The owner-provided information included a 35 percent design, including a preliminary engineering report and factual geotechnical information. This was the first major D/B project for the owner, engineer, and contractor. The procurement included the shortlisting of D/B teams based on qualifications of both the engineering designer and contractor and a second phase based on technical and cost submission. There were some issues with the 35 percent design provided by the owner in terms of unexpected site conditions (pavement structure in place was significantly different that that indicated by the owner), which resulted in some significant re-design during construction.

The following are lessons learned from the project:

- Owner-supplied information turned out to be inaccurate, requiring substantial re-design and cost claims

- Significant effort was required by designers and contractors to respond to the owner's representatives

3.1.4 Project D

This project included the construction of a new runway, taxiway, apron, and roadway/ parking area facilities at a remote location. The owner uses the D/B method of project procurement as a course of normal business. The owner provided a 30-page performance requirements document with a very preliminary airfield layout and air terminal and developed a basic site plan and detailed performance specifications. The bid package also included preliminary engineering report and results of geotechnical investigations. The D/B team was required to submit a detailed QC plan with the submission which was included in the procurement evaluation. The design engineers were required to formally sign off on all project designs, QA, and construction work. The owner also retained an independent firm which completed mostly paper checks on the project. The project was considered a success for all parties.

The following are lessons learned from the project:

- Proper QC procedures and documentation are essential for a successful project

- The owner's significant experience with the D/B procurement method assisted in a successful project

3.1.5 Project E

This project included the design and construction of a terminal including structures and an apron as a part of an overall airport improvement project. The overall contract was awarded to a general contractor, which subcontracted design work and pavement construction. After completion of the project, some pavement distress was observed and continued to get worse with time.

The following are lessons learned from the project:

- D/B allowed for timely completion of the project
- A clearly defined scope of work ensured the end product envisioned by the owner

3.1.6 Project F

Project F had six concrete keyholes attached to the main taxiway. New requirements identified a need to be able to load a heavier aircraft mix, and these aircraft could not fit into the existing keyhole spaces.

An engineering firm prepared the RFP and the preliminary design for the reconstruction and expansion of the apron. The engineer prepared the thickness design and the surface drainage design. The engineer also prepared the project specifications on many of the project items (PCC, aggregate bases, and others), and these were included in the RFP with a statement that they could not be modified.

Even with a large contract change order issued during the contract, the project was turned over 8 months early.

The following are lessons learned from the project:

- The expertise and ability of an experienced architectural/engineering firm to prepare the RFP was very important
- The execution of an experienced contractor to coordinate and complete the work and communicate in a timely fashion went a long way in completing the project early
- Problems such as alkali silica reaction (ASR) that could have substantially affected the project were identified early in the project definition phase
- Good RFP evaluation criteria assisted in selecting the most appropriate D/B team

3.1.7 Project G

An airside ramp was constructed of PCC under the D/B process. This was the owner's first experience with D/B for airfield pavements. The project was primarily for the construction of a hangar facility, and the ramp pavement was a subset of this project. The project was administered by a separate government agency which was responsible for construction inspection.

The following are lessons learned from the project:

- Ensure qualified subcontractors are used for specific tasks
- It is critical to employ program management personnel knowledgeable with the D/B delivery approach
- Include contractor qualifications in the D/B selection process

3.1.8 Project H

This apron project was part of a hangar contract. The building contractor subcontracted the pavement construction to a paving contractor. There was a set of specifications for the work, and the construction manager had a good inspector on site for the pavement construction. Issues during construction were the lack of a slab jointing plan, curb and inlets that were of street design (not intended for airfield pavement), improper installation of dowels, and sawed joints across lanes that did not line up. The project was completed with general success and is performing well.

The following are lessons learned from the project:

- Proper pavement detailing is essential
- Appropriate airfield pavement details and specifications should be utilized

3.1.9 Project I

This project included the reconstruction of a taxiway and taxiway bridge from a two-span structure to a single 800-ft span. The project was awarded using a two-phase approach. In the first phase, D/B teams were shortlisted. The phase two selection was based on submissions and low cost from the shortlisted team submissions. An interesting approach to the procurement was the fact that the owner entered into two separate contracts with the engineers and contractor to complete the design and construction for the project. The contractor had extensive experience with D/B, particularly in the highway market, whereas the designer had no D/B experience. The project was completed on time and on budget.

The following is a lesson learned from the project:

- The owner eliminated any perceived contractor influence over the designer by hiring the designer independently

3.1.10 Project J

This project included the construction of a runway and bridge structure with the placement of over 18 million cubic yards of earth fill from off-site borrow pits in the footprint of the runway/taxiway system by using a 5-mile-long conveyor belt from the borrow pits to the jobsite. The bridge structure contract was completed using the D/B project delivery method. The owner pre-qualified four D/B teams and selected the team with the most innovative design approach and lowest total cost. The design included two bridge structures to span the interstate and frontage roads, which support aircraft with loads of up to 1 million pounds.

The following are lessons learned from the project:

- Excellent coordination between designers and contractors resulted in expedient project delivery

- Excellent public relations and mitigation of the impact of construction on the public

3.2 Summary of Design/Build Case Study Findings

Based on the information available and relevance to this project, six primary case studies were selected for detailed interviews. Face-to-face interviews were completed for Projects A through H as indicated in Table 3.1. Telephone interviews were conducted with the remainder of the contracts.

Table 3.1. Case studies.

Project	Designer	Owner	Contractor
A	✓	✓	✓
B	✓	-	✓
C	✓	-	✓
D	✓	✓	✓
E	1	✓	✓
F	✓	-	✓
G	2	✓	2
H	2	✓	2

1. Declined to discuss the project.
2. Owner requested that we not discuss the projects with the designer or contactor.
- No data available.

3.3 Summary of Lessons Learned

The case study information provided by the owners, designers, and contractors was reviewed, and key lessons learned are summarized in Table 3.2.

Table 3.2. Lessons learned from case studies.

Topic	Lesson Learned
Key Aspects of Design/Build	Expedited schedule.
	By fostering cooperation between the designer and the contractor, innovation and VE improvements can be substantial.
	Many types of projects could be considered for D/B, but those with a higher level of complexity appear to be better suited.
	Virtually all of the entities interviewed for the case studies were excited about the D/B procurement methodology. The work allowed the participants to think outside of the box and take ownership of the final products.
	Several of the D/B teams indicated that while they may have pursued a claim for extras for some items under a traditional D/B/B project, under D/B they did not file a claim due to cost savings from increased productivity elsewhere on the project.
Project Development and Procurement	The owner should have a clear understanding of what they want and ask for it. The level of detail should be commensurate with the needs of the owner but no more. This will provide the D/B team with the opportunity to provide the product at the best price possible.
	As a part of the early planning of a D/B procurement process, the owner should establish a risk allocation matrix clearly indicating what risks the owner is willing to take, what risks are being completely transferred to the D/B team, and what risks will be shared. This will help establish what information the owner will provide as a part of the RFP package.
	Designs need to be advanced to a stage that will enable a contractor to do preliminary estimating.
	For the case studies, designs for the RFP ranged from 10 to 90 percent. The majority of the interviewees suggested that 30 percent designs were sufficient to describe the owner's requirements without compromising the possibility of innovation.
	The owner should provide adequate geotechnical information necessary to complete the detailed designs.
	If a best value procurement process is being established, the evaluation criteria must be established clearly and include best value decision parameters and rating.
	Owners should pre-qualify no more than three D/B firms/teams for each project. D/B team selection should be quality based for shortlisting teams, with final selection based on best value.

Table 3.2. Lessons learned from case studies.

Topic	Lesson Learned
	The owner should provide a suitable stipend to the shortlisted bidders commensurate with the size and complexity of the project. If an owner pays a stipend, he then retains ownership of the intellectual property. If a stipend is not paid, it is thought that an owner sharing one team's intellectual property with another bidder is unethical.
	The majority of the contractors felt that a 1-year warranty would be sufficient to identify any issues with the pavements. The majority of the designers and owners, and one of the contractors, felt that a 3-year warranty would be more reasonable. For up to 3 years, the contractors felt that they would not likely carry much in the way of risk money to cover warranty issues. Beyond 3 years, the majority of the contractors indicated that they would start carrying money for potential issues which increases the cost of the project.
	An arbitration procedure for dispute resolution should be included in the D/B project.
	Contractors in North America generally are not set up to prepare quality-based bid information including project experience, resumes, etc. This typically has fallen on the designer of the D/B team to complete. This is changing with the advent of more and more D/B contracts.
	D/B may work better for some disciplines, such as electrical, where field requirements could dictate design changes that would more rapidly be completed under the D/B format than for traditional D/B/B.
Contract Management	Have regular meetings, review hardships and contingency items, ensure no surprises.
	Deal with any financial issues immediately.
	The design drawings need to be largely complete and accurate and have contractor buy-in before being submitted to the owner for review.
Project Management	Ensure that the owner project team is committed to the D/B process and is not trying to undermine the delivery method. In some cases, staff/agencies were unwilling to change current design and procurement practices. "Fear of the unknown."
	If owners do not have the necessary in-house design review capabilities, they should retain an outside independent firm to review the design submittals. The impartiality of an independent reviewer can ensure that the design submittals are consistent with the requirements of the RFP.
	The owner must recognize that there is a highly compressed schedule for design review, and this may not include the typical 30/60 and 90 percent review drawings. The design reviews should be completed by reviewers highly experienced in the subject matter, not junior personnel.

Table 3.2. Lessons learned from case studies.

Topic	Lesson Learned
	A partnering session should occur early in the project, wherein the owner, designer, and contractor's representative meet to establish not only how certain aspects of the project need to be done but to gain an understanding of why they need to be done. The participants should include those who fully understand the D/B process, and the session should be facilitated by an independent entity that is agreed to by all parties participating.
	For several of the case studies, there did not appear to be an issue with the designers being retained by the contractor as a part of the D/B entity. It was felt that design professionals were subject to self-policing regulatory bodies and an engineering code of ethics which would preclude the impact of any undue influence by other members of the team. In other situations, there is some concern that the designer may be constrained through his role on the D/B team
	To foster innovation within the D/B team, it is advantageous to have contractor personnel be an integral part of the design team. This often will include shared office space during the initial design and construction phases of the project. This practice helps to streamline communication and get immediate feedback and contractor buy-in to the design.
	From the contractor's perspective, ensure the use of top quality in-house and partner staff to maximize innovation early in the project. For teaming projects, set up various levels of authority and financial approvals to ensure rapid response to changes and issues.
	For large projects, hire an "outsider/independent" to act as the design/build entity's program manager who is looking out for everyone's interest and the good of the project. Ensure that the program manager has the authority to make decisions and not be undermined.
	It is very important for the D/B team to develop suitable partners for D/B projects. The development of trust and a good working relationship is critical.
	Subcontractors should be exclusive to the team.
Quality Management	The D/B lead should be responsible for the overall QC of the project and QA checks of the subcontractors' QC.
	A project-specific D/B quality management plan should be established early in the project. The quality management plan should include, organizational details, quality procedures, inspection and testing frequencies, corrective action plans, reporting requirements, etc. International Standards Organization (ISO) guidelines are a good reference. The aspects of the quality management plan need to be measurable.
	All subcontractors should be responsible for the QC of their own work.
	The owner and/or owner's representative should provide QA oversight, which may include access and inspection of all QA/QC records and may also include random quality checks including on-site testing, specialized testing, etc.
	Quality control and assurance information and test results should be readily available to all parties in the D/B project.

Opinions on the use of the D/B process were varied. Nevertheless, there were common elements and experiences shared in many of the case studies. Many of the successes and shortcomings were used to assist in developing the best practices guide (chapter 5).

CHAPTER 4 PERCEPTIONS AND ISSUES WITH DESIGN/BUILD

Common perceptions regarding the pros and cons of using the D/B procurement methodology are summarized in Table 4.1. There may be other issues related to the implementation of the D/B procurement methodology as well, and users should review and evaluate their potential impact for each project.

Table 4.1. Summary of perceptions and issues with D/B.

Perception	Clarification
If D/B acquisition is cost-effective, why isn't it used for all construction projects?	D/B is not always the most cost-effective solution. In fact, most of the case studies indicated that the D/B method of procurement did not save the owner money. Most frequently, D/B is selected due to schedule constraints. Traditional D/B/B procurement budgets are based on the owner's (or owner's agent) estimate of construction costs. Because the D/B entity is doing both design and construction, estimates are based on real costs rather than estimated costs. As a result, D/B contracts are expected to have less construction contract cost growth and fewer costly changes. Some projects simply do not lend themselves to the use of the D/B procurement method.
What are the general characteristics of projects that are suitable or not suitable for D/B?	Typical characteristics indicating D/B suitability include time constraints, project complexity, and opportunity for innovation. Items such as no Environmental Impact Statement and Record of Decision can hamper the D/B process.
Is the level of effort and cost for the owner higher for the preparation of the bid documents for D/B than for D/B/B?	The level of effort and cost to prepare D/B bid documents are less than for D/B/B. The design for a D/B is not being advanced to the same level as for a D/B/B.
How does the role of design engineers in D/B compare with their role in a D/B/B?	For a D/B, the design engineer may no longer have a direct relationship with the owner.

Table 4.1. Summary of perceptions and issues with D/B.

Perception	Clarification
Does D/B promote poor construction because the owner's engineers are removed from the decision process?	There is a misconception of poor construction quality with D/B, but this is not supported by interviews with those who have used D/B. It was felt that integrity of design and proper quality management assured a quality product. In the traditional D/B/B process, the owner often uses method-based specifications to identify materials and construction methods to be incorporated within the project. Acceptance of materials and workmanship is based on owner inspection and testing. In contrast, D/B projects often are developed using performance-based specifications. The owner (or a third party entity such as an independent engineer) will review the D/B firm's QC records and may do some QA inspection and testing for confirmation. D/B quality management often is structured on the principles of the ISO.
What information should the owner provide to prospective bidders?	At a minimum, the information provided should include performance specifications, environmental approvals, geotechnical information, and topographical survey. Airside projects have security and operational constraints that make it difficult for D/B bidders to satisfy themselves of the site conditions. Therefore, the owner should provide sufficient information to allow D/B bidders to characterize the site conditions adequately.
Who is the final authority in selecting options and materials?	Base performance items are determined by the owner as part of the RFP.
Does the owner relinquish control of the project?	The owner's role is perceived to have diminished to that of a reviewer rather than that of an approver. Once awarded to the D/B entity, the owner retains oversight, but the D/B team takes control of design and construction-related activities.
Do D/B projects reduce the overall time to deliver a project?	D/B projects have been found to move from conception to commission much faster than the traditional D/B/B process. By integrating both design and construction into one overall project team, overlap allows for compression of the schedule critical path. Construction activities can be started without 100 percent complete design.
How can the integrity of the procurement process be ensured?	Integrity can be ensured by including clear and fair evaluation criteria with defined scoring procedures.
Should D/B ensure access for small and non-airport experienced contractors?	There should not be restricted access to D/B contracts. Their inclusion is subject to their experience, qualifications, and ability to meet all of the project criteria.
Can a requirement for DBE be included in D/B contracts?	DBE can be integrated into a D/B project, subject to local, state, and federal statutory requirements.

CHAPTER 5 BEST PRACTICES GUIDE

This best practices guide was developed using the results of a literature survey, review of contract statutes, case study interviews, lessons learned, and performance evaluation for airfield pavement projects constructed using D/B acquisition. The guide was written as an education/training guide and as a criteria document that will assist airfield owners, engineers, specification writers, contractors, and contract inspectors in the application of D/B acquisition for airfield pavement rehabilitation and construction.

D/B is a unique, distinctive project delivery process. Best-value selection combines the best features of both professional qualitative selection and competitive price selection. Accordingly, documents should be tailored to a D/B process and the project requirements.

Table 5.1 is a project flow chart that outlines the various steps in developing a D/B procurement, and each step is defined with action items and supporting reference documents. The steps are described in the following pages.

5.1 Step 1 – Determine Suitability of the Project for D/B Procurement

Large airport projects may be up to 3 years in the planning and funding stages, particularly due to the preparation of environmental documentation. Some owners will not move forward with the design until the Environmental Impact Statement (EIS) and Record of Decision (ROD) are complete because they cannot get FAA funds until that time in the process and the results of the EIS could result in a non-feasible project.

The first step in determining the suitability of a project for D/B procurement is to determine if legislation exists to allow it. The next step is to evaluate whether the project provides the opportunity for any of the following considerations:

- Savings in project delivery time
- Potential for VE for project enhancement
- Project complexity, including environmental assessments, design, and construction

If there are no fatal flaws identified, then additional considerations should be analyzed to evaluate the anticipated benefits and risks associated with the D/B procurement methodology.

Table 5.1. Project flowchart.

Step 1		Step 2		Step 3		Step 4		Step 5		Step 6
Determine Suitability of Project for D/B Procurement	→	**Prepare Procurement Development Plan**	→	**Develop RFQ: Qualification Submittal**	→	**Develop RFP: Technical and Financial Submittal**	→	**Advertise, Evaluate, and Award**	→	**Project Performance**
ACTION ITEMS										
1. Define/establish project requirements and scope 2. Evaluate deal breakers 3. Complete suitability matrix		1. Complete strategic planning 2. Develop project description 3. Assess risk 4. Choose selection method 5. Establish owner's team 6. Create knowledgeable selection panel 7. Develop schedule and planning budget		1. Establish pre-qualification requirements 2. Disclose selection criteria and weighting scheme 3. Determine requirements for financial capacity 4. Shortlist qualified firms		1. Balance responsibility/ risk in contract language 2. Disclose project budget 3. Consider stipend and guidelines for use of intellectual property 4. Establish design guidelines 5. Confirm subcontracting and disadvantaged business requirements 6. Define operational requirements 7. Prepare performance criteria/specifications 8. Provide background information 9. Limit design direction 10. Confirm financial guarantees 11. Consider management plans including quality management 12. Define bonding and insurance 13. Establish and disclose warranty and performance measures		1. Arrange bidder meetings and answer questions 2. Evaluate proposal submissions 3. Separate evaluation of price and qualitative issues 4. Hold bidder presentations 5. Review the possibility of the use of documents or design concepts from unsuccessful proposers 6. Award contract		1. Hold chartering sessions 2. Review documents and approval procedures 3. Undertake auditing/monitoring 4. Final acceptance 5. Dispute resolution
GUIDANCE										
IPRF Report 01-G-002-06-1 Sections 2.7 and 3.12		IPRF Report 01-G-002-06-1 Sections 2.1, 2.8.7, 3.12 FAA Order 5100.38.C UFC 3-26-11FA FAR Part 36 49 USC 47142		IPRF Report 01-G-002-06-1 Sections 2.4, 2.5 and 3.12 FAA Order 5100.38.C FAA AC 150/5370-10 UFC 3-26-11FA FAR Part 36		IPRF Report 01-G-002-06-1 Sections 2.4, 2.6, 2.8 and 3.12 FAA Order 5100.38.C FAA AC 150/5370-10 UFC 3-26-11FA UFC 3-260-02 FAA AC 150/5320-6D FAR Part 36 UFC 1-300-07A		IPRF Report 01-G-002-06-1 Sections 2.2, 2.3, 2.5, 2.8 and 3.12 FAA Order 5100.38.C UFC 3-26-11FA FAR Part 36		IPRF Report 01-G-002-06-1 Section 2.8 and 3.12 FAA AC 150/5370-12 FAA AC 150/5370-10 UFC 3-250 Series UFGS Master Series

To determine the suitability of a project for D/B, the key factors specific to the project should be considered. Typically, these factors are divided into primary, secondary, and other considerations which may impact the decision to use D/B for a particular project.

A. Primary Considerations (Deal Breakers)

- Time constraints for project delivery
- Status of environmental approval
- Availability of funding
- Well defined scope

B. Secondary Considerations (Advantages of Design/Build)

- Overall project complexity
- Complexity of performance requirements
- Project size
- Availability of qualified teams
- Owner experience and resources
- Cost of the project
- Degree of team collaboration
- Number of contracts
- Allocation of risks
- Interest in innovation

C. Other Considerations (Risk Transfer)

- Airside security
- Operational constraints
- Utility relocations
- QA/QC responsibilities
- Weather conditions
- Performance guarantees/warranties
- Design reviews/approvals
- Impact of unknown site conditions
- Ability to pay stipend
- Ownership of intellectual property

The primary considerations are those that would have an overriding influence on the decision to move forward with the project. The secondary considerations have a lesser influence and usually are taken into account when there are no overriding considerations or one type of contacting mechanism is not clearly superior for the particular project. Other considerations may have some influence on the procurement type decision but would not preclude the use of D/B. The primary considerations are weighted the highest to reflect their importance in moving forward with the project and the D/B procurement method. This list of considerations was developed for

illustrative purposes based on successful D/B airfield projects. This is not an exhaustive list, but rather reflects a particular owner's needs and expectations. Other constraints and project-specific considerations should be added or deleted as necessary. The individual weighting of the considerations should be modified to reflect local agency needs and expectations.

To assist in evaluating the suitability of projects for the D/B procurement method, a project suitability matrix (template) was developed (Table 5.2). The matrix includes the considerations outlined above with appropriate weighting factors for each group. Within each group, the individual consideration items also are given weighting factors. Each factor is assessed using specific criteria of the owner's needs and expectations for the project. Once the factor is rated, the total scores are summed on a scale of 0 to 100. If the score totals less than 50, the project is not considered a good candidate for D/B procurement. Between 50 and 65, the project can be considered for D/B. Scores over 65 indicate that the project is well suited for D/B.

In the example shown in Table 5.2, the primary considerations have been given a category weighting of 50 points; the secondary considerations are weighted at 35, and other considerations are weighted at 15. When considering the primary factors, there was a preference to accelerate the project delivery. To accelerate project delivery, this example considered that the record of decision and environmental approvals were in place, the funding was committed, and the scope of the project was generally defined. These items were selected as primary considerations because this project could not proceed in a timely manner without them. The secondary considerations are items that can define the benefits of D/B procurement, such as a single contract, owner experience with D/B, overall project complexity, and the like. The other considerations are largely risk-related items that the owner would consider as risk transfer elements.

5.2 Step 2 – Prepare Procurement Development Plan

This phase of the project involves the preparation of the procurement development plan, including project description, strategic planning, etc. This phase ensures the owner has prepared a blueprint for the project and establishes core guidelines for project delivery.

5.2.1 Strategic Planning

Current and future airside requirements are assessed to determine the general facility development for the owner/user. Inputs for strategic planning may include the airport master plan, airport pavement management system, maintenance reports, pilot and tenant feedback, operations reports, and traffic forecast. For specific projects, the relevant environmental documents should be completed and approved.

Table 5.2. Example airport pavement design/build project screening matrix.

A. Primary Considerations

Part A Weighting: 50

(Deal Breakers)

Consideration	Rating	Weighting	Weighted Value	Weighting Guidelines Low	Medium	High
Time constraints for project delivery	Medium	25.0	15.0	Sufficient time for standard procurement	Need to accelerate project delivery	Insufficient time for standard delivery
Status of environmental approvals	High	25.0	25.0	Not started	Underway	Complete
Availability of funding	High	25.0	25.0	Unknown	Multiple funding periods/sources	Funding in place and available
Well defined scope	Medium	25.0	15.0	Concept only	Scope needs refinement	Clearly defined scope
Total		**100.0**	**80.0**			
		Weighted Total:	**40.0**			

B. Secondary Considerations

Part B Weighting: 35

(Advantages of Design/Build)

Consideration	Rating	Weighting	Weighted Value	Weighting Guidelines Low	Medium	High
Overall project complexity	High	10.0	10.0	Simple project	Moderate complexity	Significant complexity
Complexity of performance requirements	High	10.0	10.0	Performance requirements unknown	Performance requirements established	Performance requirements known
Project size	High	10.0	10.0	< $ 1 million	$1 to $ 5 million	> $5 million
Availability of qualified teams	Medium	10.0	6.0	< 3 possible bidders	3 to 5 possible bidders	> 5 bidders
Owner experience and resources	Medium	10.0	6.0	First design/build project	Some experience	Significant experience
Cost of project	Medium	10.0	6.0	No fixed budget	Some budget flexibility	Fixed budget
Degree of team collaboration	High	10.0	10.0	Unknown teaming arrangements	May know some team members	Owner familiar with the teams
Number of contracts	High	10.0	10.0	Many separate small contracts	Several contracts but manageable	One overall contract
Allocation of risks	Medium	10.0	6.0	Owner retains majority of risk	Risks shared between owner and D/B tea	Transfer majority of risk to D/B team
Interest in innovation	High	10.0	10.0	Low	Medium	High
Total		**100.0**	**84.0**			
		Weighted Total:	**29.4**			

C. Other Considerations

Part C Weighting: 15

(Risk Transfer)

Consideration	Rating	Weighting	Weighted Value	Weighting Guidelines Low	Medium	High
Airside security	Medium	10.0	6.0	Airfield operations area work	Some airfield operations area work	Non airfield operations area work
Operational constraints	Low	10.0	2.0	Significant operational constraints	Some operational constraints	No operational constraints
Utility relocations	Low	10.0	2.0	Significant utility relocations	Some utility relocations	Minimal utility relocations
QC/QA responsibilities	Medium	10.0	6.0	Owner's responsibility	Shared responsibility	Design/build entity responsibility
Weather conditions	Low	10.0	2.0	Owner takes all weather related risk	Some weather risk transfer	Weather risk transferred to D/B team
Performance guarantees/warranties	Medium	10.0	6.0	Short term coverage	Medium term coverage	Long term warranties
Design reviews/approvals	Low	10.0	2.0	Significant design review required	Moderate owner review required	Short turn around/minimal review
Impact of unknown site conditions	Low	10.0	2.0	Owner's risk (geotech by owner)	Risk shared	D/B team risk (geotech by D/B)
Ability to pay stipend	Medium	10.0	6.0	Cannot pay stipend	Unknown	Can pay stipend
Ownership of intellectual property	Low	10.0	2.0	Significant intellectual property	Some intellectual property	No intellectual property
Total		**100.0**	**36.0**			
		Weighted Total:	**5.4**			

Sub Totals

A. Primary Considerations	50	40.0
B. Secondary Considerations	35	29.4
C. Other Considerations	15	5.4
Grand Total	**100**	**74.8**
Decision		**Yes**

Decision Range		
From	**To**	**D/B Applicability**
0	50	**No**
50	65	**Can Consider**
65	100	**Yes**

5.2.2 Project Description

The owner (or the owner's program manager) establishes the project requirements in terms of project limits, design and performance criteria, quality standards, applicable codes, regulatory standards, and so on. The project description:

- Outlines the owner's expectations of the key physical aspects
- Identifies the available funding, expected design work, construction work, prospective schedule and technical criteria
- Reviews project constraints (environmental, third party involvement, etc.), and warranty considerations
- Summarizes the selection process and scoring
- Identifies important project issues that are not readily apparent through the technical requirements

5.2.3 Risk Management

The D/B concept shares risk between the owner and the D/B team. The areas of risk should be well defined in the RFP so that the D/B team understands their responsibility for risk. The higher the level of contractor perceived risk and uncertainty, the higher the risk cost priced by the contractor. The airport owner normally maintains responsibility for high-risk areas throughout the duration of the contract. This is to attempt to reduce the cost of the project. If differing site conditions pose increased risk due to such issues as unforeseen ground conditions, hazardous materials, underground utilities, archeological sites, endangered species, or other environmental concerns, the airport owner should accept responsibility unless specified otherwise in the contract. The D/B team may or may not be asked to perform the associated work under a change order.

An effective way to identify and allocate the risks associated with a project is through the use of a risk allocation matrix. The matrix shown in Table 5.3 is based on a matrix developed for highway projects by the Washington State DOT (*2004*), modified for use for airport projects. This table is for illustration purposes only.

Table 5.3. Example airport project risk allocation matrix[1].

RISK[2]	Design/Build	
	Owner	**D/B Team**
Design Issues		
Definition of Scope	X	
Project Definition	X	
Establishing Performance Requirement	X	
Preliminary Survey/Base Map	X	
Geotechnical Investigation - Initial Borings based on Initial Design	X	
Geotechnical Investigation - Initial Borings based on Proposal		X
Establish/Define Initial Subsurface Conditions	X	
Initial Geotechnical Analysis Report based on Preliminary Design	X	
Proposal-specific Geotechnical Analysis/Report		X
Plan Conformance with Regulations/Guidelines/RFP		X
Plan Accuracy		X
Design Criteria	X	
Conformance to Design Criteria		X
Design Review Process		X
Design QC		X
Design QA		X
Owner Review Time	X	
Changes in Scope	X	
Constructability of Design		X
Contaminated Materials	X	
Local Agency and Utility Issues		
Identification of Initial Local Agency Impacts	X	
Obtaining Initial Local Agency Permits	X	
Establishing Local Agency Requirements	X	
Establishing Final/Actual Local Agency Impacts		X
Modifications to Existing Local Agency Permits		X
Identification of Initial Utility Impacts	X	
Establish Initial Utility Locations/Conditions	X	
Defining Required Utility Relocations	X	
Relocation of Utilities Prior to Contract	X	
Relocation of Utilities Under Agreement During Contract		X
Modified Agreement With Private Utility		X

Table 5.3. Example airport project risk allocation matrix[1].

RISK[2]	Design/Build	
	Owner	**D/B Team**
Damage to Utilities Under Construction		X
Verification of Utility Locations/Conditions		X
Coordination with Utility Relocation Efforts during Contract		X
Unforeseen Delays - Utility/Third Party	X	
Utility/Third Party Delays resulting from Proposal Modification		X
Other Work/Coordination		X
Third Party Agreements (Fed, Local, Private, etc.)	X	
Coordinating with Third Parties under Agreement		X
Coordination/Collection for Third Party Betterments		X
Coordination with Other Projects		X
Coordination with Adjacent Property Owners		X
Construction		
DBE Compliance		X
Safety/Safety QA		X
Construction Quality/Workmanship		X
Schedule		X
Materials Quality		X
Materials Documentation		X
Material Availability		X
Initial Performance Requirements of QA Plan	X	
Final Construction/Materials QA/QC Plan		X
Construction/Materials QA		X
Construction QC		X
Construction QA Procedural Compliance Auditing	X	
Construction IE Testing/Inspection	X	
Construction Layout		X
Erosion Control		X
Spill Prevention		X
Accidents within Work Zone/Liability		X
Third Party Damage		X
Operations and Maintenance During Construction		X
Maintenance under Construction		X
Airside Operations		X
Damage to Utilities under Construction		X
Falsework		X

Table 5.3. Example airport project risk allocation matrix[1].

RISK[2]	Design/Build	
	Owner	**D/B Team**
Construction		
Shop Drawings		X
Equipment Failure/Breakdown		X
Work Methods		X
Early Construction/At Risk Construction		X
Community Relations	X	
Performance of Defined Mitigation Measures		X
Warranty		X
Force Majeure/Acts of God		
Strikes/Labor Disputes – On-site Labor		X
Tornado/Earthquake/Hurricanes	X	
Epidemic, Terrorism, Rebellion, War, Riot, Sabotage	X	
Archaeological Discovery	X	
Suspension of any Environmental Approval	X	
Changes in Law	X	
Lawsuit against Project	X	
Storm/Flooding	X	
Fire or Other Physical Damage	X	
Differing Site Conditions/Changed Conditions		
Changed Conditions	X	
Differing Site Conditions	X	
Completion and Warranty		
Establishment/Definition of any Risk Pool	X	
Long term Ownership/Final Responsibility	X	
Insurance		X

1. For illustration purposes only; each project should have its own detailed risk assessment.
2. Shaded items are typically high risk/high cost and should be defined as well as possible.

5.2.4 Selection Method

The three common approaches to selecting a D/B entity are:

- Low bid – selection based on the lowest construction bid
- Best value – combination of a weighted technical approach and low bid
- Qualifications-based selection – the construction bid is not a factor in the final selection

Based on literature review and case studies, the two-step bid appears to be the preferred approach—specifically, an approach where the first phase consists of an evaluation of bidder qualifications and the second phase evaluates the technical and financial submission of a shortlisted group of bidders. Some agencies may not be able to use best value or qualifications-based selection because of legislatively mandated low bids only.

There are also a number of different methods that can be used to evaluate best value and qualifications-based bids:

- Pass/fail
- Modified pass/fail
- Qualitative rating
- Direct points scoring

The pass/fail method uses a list of evaluation criteria that proposers either meet or do not. If they do not meet the criteria, the bid may be disqualified. The modified pass/fail method allows some "gray area" where a reviewer may pass a bid if the majority of the criteria are met and the others are close to being met. The qualitative rating uses a system such as good, fair, poor to rank the submissions. The direct points scoring method assigns points to each rating criterion, with a minimum number of points considered acceptable to move forward in the bidding process.

D/B presents a unique opportunity to optimize price and other issues. The most effective selection results from a competitive process that balances first cost with life cycle costs, design aesthetics, maintenance/operational costs, and other project-specific qualitative and efficiency factors. The Design-Build Institute of America indicates that D/B selection is typically weighted about 60 percent towards the technical submission and 40 percent towards price. Current trend indicates the maintenance of this heavy weighting in favor of technical submissions.

5.2.5 Owner's Team

Depending on the selection method, the owner will need to identify both internal resources and any external supplemental resources used for its project management team.

5.2.5.1 Roles of the Owner and D/B Contractor

In the development stage, the agency oversees the development of the design criteria, the contract documents, and the procurement process. During the design and construction phase, the agency is responsible for controlling the process through design review, notices to proceed, monitoring contract compliance and schedules, processing progress payments, performing QA overview, negotiating contract amendments, and resolving disputes. Technical submittals will require review by the agency for conformance to the technical criteria and contract terms. The agency needs to verify progress payment submissions by the D/B team. With respect to QA, the agency needs to monitor compliance with the contract documents and verify the contractor's compliance with the project QC plan.

The agency's team must be developed to ensure rapid review and processing to avoid schedule impacts to the D/B team.

There are no inherent "design/build" roles and responsibilities simply because a contract is called design/build. To increase the probability of a successful D/B contract, it is necessary that both the agency and D/B contractor have a clear understanding of their respective roles, responsibilities, and risks. The general descriptions of the D/B roles may change to meet the requirements of individual projects.

5.2.5.2 Agency Role

The role of the agency is to:

- Clearly establish the roles of the agency and D/B contractor in the RFP.
- Express the intent of the design and provide an adequate and complete facility design/construction scope and criteria in the RFP.
- Establish execution requirements (e.g., customer schedule, customer operations, and any constraints on contractor work, contractor submittals, permits, special work acceptance requirements) and identify appropriate requirements in the RFP.
- Monitor design and construction during the project implementation for contract compliance.
- Respond quickly to the design and construction needs of the contractor to avoid slowing down or otherwise impeding the contractor's schedule.
- The agency must not assume responsibility for the design adequacy by "approving" design or construction submittals, except to approve requested deviations from the contract when acceptable and appropriate. The agency's role changes from reviewing designs and submittals for technical adequacy for D/B/B projects to reviewing for conformance with the contract on D/B contracts.

5.2.5.3 D/B Contractor Role

Whether the prime is the designer or contractor, or both (joint venture), its role in a D/B contract is expanded from the conventional D/B/B to include the following:

- Project management
- Integrated schedule for design and construction
- Extensions of designs
- Permit preparation (sometimes application)
- Cost control
- Material and equipment acquisition

- Construction
- Inspection and quality control
- As-built survey for acceptance and record purposes
- Training for operation and maintenance
- Turnover, warranty and record drawings.

The D/B contractor employs the designer(s) of record, who must personally ensure the integrity of all extensions of the designs and ensure that all equipment and materials meet the design criteria requirements. This is a D/B contractor function, not an agency function, which is a significant role reversal from D/B/B contracting.

5.2.5.4 Owner's D/B Consultant

An outside firm with adequate pavements and airside electrical D/B experience and expertise may be engaged to assist owners who do not have in-house experience with defining, procuring, or administrating D/B projects. This role typically is called a design/build consultant or a program manager. The owner's D/B consultant should be excluded from availability for any work with the D/B teams.

5.2.5.5 Supplemental Technical Experts

Some owners have sufficient expertise within their organizations to prepare the necessary documents and administer a D/B contract, such as the USACE or large airport authorities. Others without sufficient internal resources may need to use external consultants to provide specific subject matter expertise. These external consultants may be responsible for developing the RFP technical documents, performance specifications, monitoring contract compliance, processing progress payments, performing QA activities, and assisting with the negotiation of contract amendments and disputes. Typically, technical submittals would be reviewed by the external consultants for conformance to the technical criteria and contract terms.

5.2.6 Schedule and Planning Budget

The short project delivery schedule as compared to D/B/B is the reason many owners choose the D/B procurement methodology. The owner will need to establish major procurement and construction milestone dates. In addition, the owner will need to have an understanding of the overall cost of the project for budget allocation.

5.3 Step 3 – Development of the Request for Qualifications

The professional, financial, and experience requirements for D/B teams and the general project parameters are articulated in an RFQ prepared by the owner, in-house, or by the owner's representative or program manager. The RFQ should include an information session where the owner presents the general requirements of the project and their expectations. Guidance is provided in FAA AC 150/5300-9A for pre-design, pre-bid and pre-construction conferences for airport grant projects.

5.3.1 Prequalification Requirements

The project is advertised and qualification statements are received in response to the RFQ. The criteria required to select the D/B team are critical and need to be well defined, and an evaluation method or rating system needs to be established for items such as experience, management, and so on. Large projects require bonding; this may limit the number of firms that can qualify.

The RFQ is used in the two-stage process for D/B procurement to shortlist qualified D/B entities for receipt of RFPs and the opportunity to prepare a detailed proposal for the project. The key considerations of the RFQ are to establish the team's ability to complete the design and construction, the experience and past performance of the team and of key individuals, and the financial capacity of the team to undertake the project.

Below are some of the considerations that could be included when reviewing RFQ submissions:

- Team's understanding of the project
- Individual and corporate team members and experience with design/build
- Previous experience of team members working together
- Relevant design capabilities
- Specialized construction capabilities
- Experience with complex construction staging, airport operations, site conditions
- Safety record
- Key project team member availability and time commitment (project director, design manager, construction manager, quality manager, etc.)
- Quality control organization and performance
- Bonding record or proof of bonding ability
- Past contract performance (completion, liquidated damages, quality, claims, fines, schedule)
- Financial capability
- Understanding the local and political environment of the work location
- Project management and schedule control
- Risk management

Overly extensive proposal requirements are financially burdensome to the proposers, serve to discourage the participation of quality firms, and add unnecessarily to the owner's proposal review process. The quantity of proposal deliverables should be limited to the information necessary to adequately judge competing proposals and to protect the owner's interest in the subsequent contract.

Care must be taken in establishing acceptable qualifications and experience. Raising the bar too high may preclude qualified individuals and firms that normally would be well qualified to undertake the assignment.

The RFQ submissions should be evaluated by a qualified evaluation committee. To ensure consistency in the evaluation process, some agencies have held training sessions for the committee members in advance of the review process.

The FAR suggests that the maximum shortlist number should be limited to five. However, in consideration of the effort required to respond to the RFP, consideration should be given to shortlisting no more than three.

5.3.2 Disclose Selection Criteria and Weighting

The basis for evaluating the proposal should be identified clearly in the RFQ/RFP documents. Specific evaluation criteria, or a fully defined point award system, will allow proposers to provide submissions that maximize benefits and optimize solutions to the owner's needs.

5.3.3 Requirements for Financial Capability

The RFQ should require submitters to provide some form of financial capability by the D/B entity. This may include a list of similar size projects completed, bonding capacity backlog, equipment and staffing, and the like. This will help to ensure that the firms are capable of undertaking the project.

5.3.4 Shortlist Qualified Firms

The first stage of a two-step procurement process should limit the final competitors to a field of three to five best qualified D/B firms. Shortlisting more than five teams undermines the credibility of the process and discourages high-quality proposals. For FAA projects awarded under the AIP Handbook, the method must meet with requirements of both Paragraph 904(b)(2) from Order 5100.38c for professional services and the price competition requirements for construction.

The number of prospective bidders can impact the suitability of a project for D/B. If the owner anticipates fewer bids than the desired shortlist number, then alternative procurement should be considered if this would increase the number of bidders. If only the desired shortlist number or fewer submit bids, do not shortlist.

5.4 Step 4 – Development of the Request for Proposals

The development of the RFP establishes the requirements, standards, and expectations for the project. The RFP also should outline the owner's organization structure and how it integrates with the D/B team.

5.4.1 Balance Responsibility/Risk in Contract Language

D/B inherently imposes additional risk and responsibility upon the D/B entity. Contract language should not needlessly exacerbate this situation by attempting to pass the owner's legal risks and responsibilities on to the proposers. Examples of such unbalanced risk transfer include

making the D/B entity responsible for certain types of zoning or environmental permits, concealed conditions, differing site conditions, third party delays over which it has no control, obtaining property/rights-of-way, and other similar clauses. The D/B contract may properly assign responsibility to the contractor for compliance with performance criteria, compliance with codes, design approvals and certain permits (except those under control of the owner), and adequacy of designs to meet expressed purposes.

The information that the owner provides in the RFP also will impact the allocation of risk. The owner should be aware that risk allocation may impact the cost of the project, as well as affecting the D/B firms' cost of developing technical submissions. For example, if the owner provides only limited or no geotechnical information, it may be necessary for the proposers to undertake their own geotechnical investigations in order to complete technical submissions. This not only impacts the costs to the proposers but also likely will impact operations at the facility.

5.4.2 Disclose the Project Budget

The D/B process can be useful for achieving budgetary goals. If there is a budget amount above which an award absolutely will not be made, this should be stated. Proposers have the right to know that funding is available for the project before investing the considerable resources that a D/B proposal requires.

5.4.3 Create Knowledgeable Selection Panel

The panel responsible for evaluating proposals should include individuals knowledgeable in the D/B process and the technical issues related to the project. The panel should consist of sufficient members with representative expertise reflecting the requirements of the RFP to ensure that a full and detailed technical evaluation of the selection criteria can be completed.

5.4.4 Consider Applicability of a Stipend

On large or complex projects, or where the quantity of documents required for submission of a proposal is relatively great, the owner should consider paying a stipend to the unsuccessful proposers. While many firms may compete in the absence of such payments, excessive submittal requirements and preliminary design effort is considered abusive to contractors and designers and may discourage quality teams from participating. A stipend also is an indication that the owner is serious about awarding and receiving a quality project. A stipend in the order of 0.01 to 0.2 percent is considered typical. The value of the stipend should be commensurate with the work required to prepare the bid. Typically, smaller projects use a higher stipend percentage.

5.4.5 D/B Team Organization

One of the chief benefits of D/B is that the owner will deal with a single entity for both the design and the construction of the project. This does not mean that the owner has relinquished control of the project. The owner still is responsible for developing the project, contract administration, and quality assurance.

The D/B entity should be required to submit a management plan as part of the technical submission. The management plan should include details on the organization of the team, internal and external lines of communication, and levels of responsibility.

The internal structure of a D/B team can take one of two forms: designer-led or contractor-led. The distinction is in which entity assumes the greatest risk and liability. Many would argue that the risks typically associated in construction of a facility are higher than the design of a project, and therefore are best dealt with by a contractor-led team. A typical D/B organizational chart is provided in Figure 5.1.

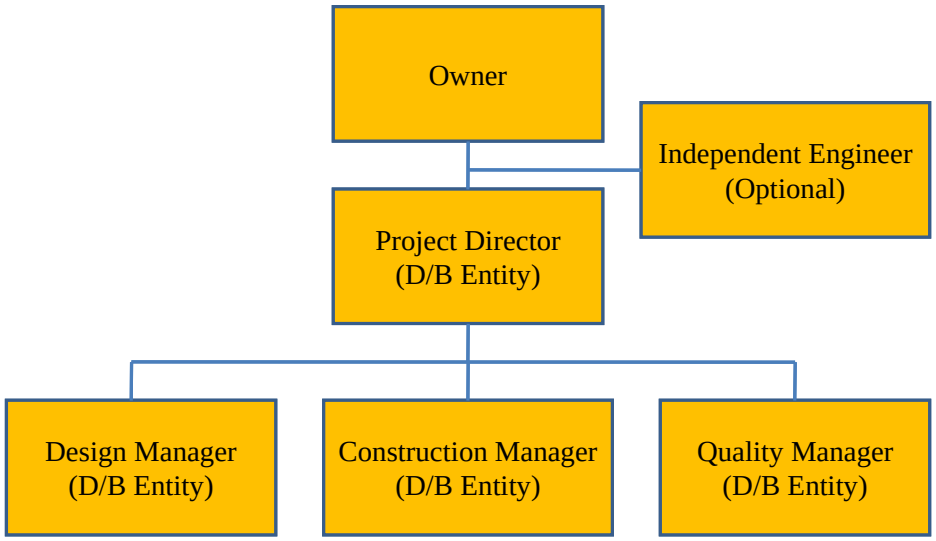


Figure 5.1. Typical organization and project roles for D/B projects.

The D/B entity assumes the combined risk of both the design and the construction of the project. Within the D/B team, roles and responsibilities must be clearly defined. Typically, professional liability insurances do not offer coverage for construction-related claims. This also would include indemnification and dispute resolution.

Many owners have found that independent engineers, retained by mutual agreement between the owner and the contractor, can fill the gap as the owner's agent. The independent engineer can act as reviewer, provide overview, certify works and payment, mediate dispute resolution, and so on. The independent engineer's mandate should be defined clearly in the D/B contract. It is also

very important to choose an independent engineer who understands the D/B process and is willing to work with the D/B team to ensure that the technical requirements are met, and not to dictate design. Often, the cost of the independent engineer is shared between the D/B entity and the owner, and it can be included in the D/B contract.

5.4.6 Design-Construction Team Experience

The RFP typically includes a section on construction team experience. D/B contracts should require information to be submitted in the proposal that addresses the experience of the D/B team. References and information relative to experience should be provided by the RFP offerors for those specific types of design and construction pertinent to the project, such as:

- Airport pavement
- Airport lighting and visual NAVAIDS
- Electronic NAVAIDS
- Aircraft fueling system

The specific different types of airport design/construction for which information is needed should be stated in the RFP. The forms to be completed by the D/B contractor outlining the D/B team's experience, as well as the experience records of key personnel, also should be included.

5.4.7 General Design Guidelines and Mandatory Design Requirements

The project documents should outline general design guidelines and mandatory design requirements. General design guidelines, for example, would include the FAA and UFC design manuals, as well as local and state design criteria. Mandatory design requirements would include aircraft design group requirements, aircraft traffic mix and frequency, design life, FAA and DoD lighting and navigational aids requirements, and so on.

5.4.8 Subcontracting Requirements

The perception in the contracting community is that a small business cannot compete with larger companies on D/B projects. However, experience has shown that many large firms tend to subcontract to local companies. Further, in the acquisition process, many RFPs award points to technical proposals that have a balanced approach to subcontracting. Agencies that encourage, or have mandated, DBE participation should include these requirements in the RFQ/RFP process. Depending on agency preference, points may be awarded to proposers that commit to the minimum requirements.

5.4.9 Operational Requirements

The RFP documents must outline operational requirements for the project. This includes access to the site, available working times, security requirements, restrictions on proximity to live surfaces, height restrictions, noise, and the like.

5.4.10 Use of Performance-Based Criteria/Specifications

The technical requirements listed in the RFP should, as far as possible, be defined in performance terms. They should be comprehensive enough to ensure that the intended result is achieved, but not restrictive in a way that would inhibit creative solutions and best value.

The owner should identify the specifications (e.g., FAA or DoD) that should be followed for the project and the limitations for changes to the specifications that would be accepted. The standard project specifications should be edited and of sufficient detail to ensure that the owner's requirements for construction quality are met. The specifications should be not be modified without the express approval of the owner.

5.4.11 Owner Provided Information

The owner needs to provide adequate information to the bidders to permit the completion of a preliminary design and costing. This information may include:

- Topographical survey
- Geotechnical
- As-built plans (existing electrical, underground utilities)
- Performance documentation
- Design criteria
- Airside layout
- Design requirements (life, aircraft mix, drainage, electrical, lighting, navaids)
- Operational requirements
- Master plan
- Staging areas
- Access and security

There are two philosophies regarding the level of information that should be provided to the D/B team. One is to provide preliminary design information to define minimum requirements such as geometry, pavement type, etc. The advantage of this approach is that the owner can dictate part or all of the design but the disadvantage is the owner takes more risk and limits innovation.

Alternatively, the owner can provide only base data from which bidders must develop their own design to meet the project requirements. Typical base data would include a topographical survey, raw geotechnical information, as-built plans, and historical performance information. The advantage of this approach is that the owner minimizes risk through transferring the design liability to the D/B, but the disadvantage is that the owner has less control over the design.

There is a minimum amount of information that must be provided irrespective of the option chosen. This would include performance specifications, environmental approvals, geotechnical information, and topographical survey. To minimize the amount of disruption to airside operations, it often is impractical to allow each D/B team to undertake its own geotechnical investigation and topographical survey. Therefore, the owner may elect, schedule permitting, to

solicit scope from the teams and consolidate this information into one overall information gathering plan. The resultant data from this investigation are then shared with all bidders. This is one option to transfer the risk from the owner to the prospective D/B teams.

Typically, information is provided to the preliminary (30 percent) design level. This information should state the purpose, function, and characteristics of the project. This typically would include a project site plan, facility layout, geotechnical information, topographical information, performance specifications, pavement sections and critical details, airport master plans, and utility plans. An example for RFP content for drawings is provided in Unified Facilities Criterial Model Design-Build (D-B) Request for Proposals (RFP) for Airfield Construction (UFC 3-260-11FA), Chapter 2. Table 2-1 from this document is provided in Table 5.4.

Table 5.4. Suggested RFP content for drawings.

Drawing Description	Information Provided		
	Minimal	Partial	Full
Cover Sheet		X	X
Location Plan/Project Site Plan	X	X	X
Contractor Access, Storage, and Haul Routes	X	X	X
Horizontal and Vertical Control		X	X
Existing Topography (if available)		X	X
Existing Utilities		X	X
Demolition Plans		X	X
Runway Geometry w/Key Elevations		X	X
Taxiway Geometry w/Key Elevations		X	X
Apron Geometry w/Key Elevations		X	X
Typical Pavement Sections	X	X	X
Phasing Plans		X	X
Conceptual Drainage Plans			X
Conceptual Grading Plans			X
Conceptual Jointing Plan			X
Joint/Sealant Detail			X
Grounding Point Locations			X
Mooring Point Locations			X
Pavement Marking Plans			X
Visual Navigation Aids Location			X
Electronic Navigation Aids Location			X
Apron Lighting Plan			X
Electric Vault Location			X

Guidelines for geotechnical investigations, including test types and frequencies for airside pavements, are provided in UFC 3-260-02 and FAA AC 150/5320.

As the majority of airside projects have security and operational constraints, it is not realistic to require D/B teams to complete their own geotechnical investigations. The owner should complete sufficient geotechnical investigations characterize the site to adequately. If insufficient information is provided in the bid phase, the inherent risk of the D/B team increases significantly, and this risk is reflected in the bid price.

5.4.12 Limit Design Direction in RFP

Certain specific areas of design that are critically important to the owner—and that should not be compromised under any circumstances—should be stipulated in detail without reducing opportunities for full creativity elsewhere throughout the project. In general, limiting direction in design/construction will increase the potential for D/B teams to achieve innovative solutions.

5.4.13 Use Lump Sum Contracts When Selection is Competitive

The contract for D/B services obtained competitively generally should be made on the basis of a lump sum fixed price. The use of cost plus contracts when price was a factor in the initial award is inappropriate and fails to recognize the special risk position imposed on the competitors.

5.4.14 Requirements for Financial Guarantee

A requirement for proposers to submit bid bonds or other forms of financial guarantee assures the owner that the selected D/B team is financially capable of performing the work and reduces the possibility that unrealistic designs are submitted without financial risk for later withdrawing.

5.4.15 Project Management Plans

As part of the RFP submission, the D/B team typically is required to submit an outline of its project management plans. Once selected as the preferred bidder, detailed project management plans that govern all aspects of the delivery of the project must be delivered. The plans typically include:

- Mandatory Project Management Plans
  - Overall Management Plan
  - Design Management Plan
  - Construction Management Plan
  - Quality Management Plan
- Optional Project Management Plans
  - Environmental Management Plan
  - Safety Management Plan
  - Airfield Traffic Management Plan

Typically, these plans would follow the basic framework of the ISO guidelines. In essence, the plans establish the procedures to be followed, how they will be followed, and documentation that they have been followed. These are living documents that may be updated regularly during the course of the project.

An example table of contents of a typical quality management plan is presented in Table 5.5.

5.4.16 Bonding and Insurance

Basic comprehensive liability coverage is typical in the construction industry and would include vehicles and equipment, employers, workers compensation, builder's risk, and excess liability. These policies usually exclude liability arising from design errors and omissions.

As D/B entities often are contractor-led, many take the form of limited liability companies or joint ventures, which customarily carry general liability coverage that would be considered typical for contractors. As a result of policy endorsements and exclusions, there can be gaps in coverage, or insufficient coverage, for professional liability.

D/B agreements should consider project-specific liability insurance with limits commensurate with the size of the project. These policies have terms that continue through construction to upwards of 10 years after construction. These types of policies would insure both the design professionals (and subconsultants) and the constructor (and subcontractors).

Contract surety bonds provide financial security and construction assurance on construction projects by assuring the project owner that the contractor will perform the work and pay certain subcontractors, laborers, and material suppliers. Traditionally, surety bonds excluded coverage for errors and omissions.

The bonding and insurance coverage should be commensurate with the project size and in accordance with specific agency requirements.

5.4.17 Warranty and Performance Measures

The D/B team is responsible for QC and process control. The owner relies on the team's quality management plan to identify and correct non-conformities in the project. As the owner is not directly involved in the quality management of the project, many defects may not be readily identifiable.

Table 5.5. Example table of contents for quality management plans for a D/B project.

PART 1 QUALITY MANAGEMENT SYSTEM
- 1.1 Quality Management System
- 1.2 D/B Team Responsibilities
- 1.3 Quality Management System Requirements
- 1.4 Certification
- 1.5 Documentation Deliverables
- 1.6 Timing of Implementation
- 1.7 Compliance with Quality Management System
- 1.8 Continuous Improvement in Quality Management System

PART 2 QUALITY DIRECTOR
- 2.1 Appointment and General Responsibilities
- 2.2 Specific Responsibilities

PART 3 TESTING
- 3.1 Testing Requirements
- 3.2 Accreditation Standards
- 3.3 Remedial Work

PART 4 QUALITY AUDITS AND MONITORING
- 4.1 Quality Audit Plans
- 4.2 Owner's Quality Audits
- 4.3 Owner's Monitoring
- 4.4 Deficient Quality Audits
- 4.5 Third Party Audits

PART 5 QUALITY DOCUMENTATION
- 5.1 Principles
- 5.2 Quality Plan Reference Documents
- 5.3 Quality Documentation Requirements
- 5.4 Submission of Quality Documentation
- 5.5 D/B Team Obligation to Update
- 5.6 Changes to Quality Documentation
- 5.7 Amendment of Quality Documentation
- 5.8 Quality Records
- 5.9 Quality Management System Reports
- 5.10 Additional Information

PART 6 NONCONFORMITIES
- 6.1 Nonconformity Reporting Process
- 6.2 Nonconformity Report Tracking System
- 6.3 Unresolved Nonconformity
- 6.4 Nonconformity Records

Warranties should require repair or replacement of defective work, or work that does not conform to the contract requirements during the warranty period. The warranty should reference the specific performance measures for the item in question over the term of the warranty. Often, warranties will have extensions for remedial works completed during the warranty period.

Warranty terms typically range from 1 to 5 years. One year is thought to be too short in consideration that the owner is limited to an oversight role during the construction process, and beyond 5 years can raise surety issues and is thought to be excessive. Two to 3 years is reasonable for the initial progression of pavement distress. The length of the warranty should be tied to the amount of QA inspection and testing conducted by the owner; extensive testing by the owner should provide a high degree of confidence in the quality of the construction work and therefore require a shorter warranty period. It also should be recognized that unlike highways, access to the areas to be repaired may be more difficult for airports/airfields.

5.4.18 Construction Phasing

Construction operations in, adjacent to, or requiring construction traffic through an airport's air operations area (AOA) will require a phasing plan. The purpose of the plan is to establish guidelines and constraints the contractor must follow during construction in these areas. This basic information for the phasing plan must be included in the RFP:

- AOA facilities that will be closed or partially closed for construction
- Phasing required to maintain minimum aircraft operation with those airfield facilities that will be opened and closed during each phase identified
- Maximum duration of each phase (or closure)
- Time allowance between phases for preparation to redirect air traffic
- Requirements for temporary marking and lighting
- Liquidated damages for each phase if closure and construction extend beyond the time limit for each phase

The contractor shall submit the phasing plan with the first design submittal and include contractor-furnished drawings showing phasing details and notes.

5.4.19 Safety and Security Plan

Safety and site security during construction are primary considerations. The RFP should require contractors to submit a safety program as part of their management plan which includes guidelines for accident prevention. On airfield projects, a safety plan also acquaints construction personnel with airfield operations and provides a safe environment for aircraft operations and personnel during construction. A security plan is required to assure security at the construction site and the airport.

5.5 Step 5 – Evaluate and Award

Evaluation and award will include answering bidder questions and possibly individual bidder meetings. Once the proposals are submitted, the owner would evaluate the bidder submissions based on the established selection criteria and weighting factors and award the contract.

5.5.1 Answers to Questions and Individual Bidder Meetings

Some agencies allow meetings with individual bidders during the bid phase to assist in clarifying specific points of the design and procurement process.

5.5.2 Proposal Submission and Evaluation

Once received, proposals are evaluated on the basis of quality of design, price, and other predetermined factors (best value).

5.5.3 Conduct Separate Evaluation of Price and Qualitative Issues

Qualitative issues are best evaluated before prices are revealed. This prevents the tendency of allowing knowledge of price to short-circuit a thorough review of qualitative issues. Owners should request that qualitative and cost sections of a proposal be submitted in separate sealed envelopes, with the price envelope opened only after the qualitative evaluation has been concluded.

5.5.4 Shortlisted Bidder Presentations

Typically, shortlisted bidders are asked to present their technical bids at a meeting in front of the evaluation panel. This gives the panel an opportunity to gain a better understanding of the bidder's proposal and evaluate their team qualifications and the technical concepts of the bid.

5.5.5 Promptly Award the Contract

Once a selection has been made, the project should be awarded in a prompt and straightforward manner without on-going adjustments to the proposer's submission. Review meetings with the owner for the purpose of design modification should be conducted following selection and prior to award, not while proposers are in a competitive posture. This principle also applies to price, which should not be subject to negotiation or modification between formal submission and selection.

5.5.6 Use of Documents/Design Concepts from Unsuccessful Proposers

The winning design proposal submitted in a D/B competition is the design that ultimately should be constructed. Providing a stipend reduces the proposers' cost for participating in D/B projects, and in return the owner may require that all innovations and concepts used in their proposals become the property of the owner. Use of design concepts from unsuccessful proposers without compensation is inappropriate and unethical.

5.5.7 Contract Award

Prior to the award of the contract, the contents of both the technical and financial proposal must be reviewed to ensure that the proposer is meeting the expectations of the owner. The selected proposer enters into a contract with the owner that incorporates both the owner's requirements and the D/B entity's proposal.

5.5.8 Execute Contract

The contract should incorporate both the owner's requirements and the D/B team's proposal.

5.6 Step 6 – Project Performance

The last step in the D/B procurement process is the administration of the contract. This would include monitoring of compliance with management plans, including documents and submittals. This may also include the owner's right to complete independent QA inspection and testing.

5.6.1 Documents/Approvals/Construction

Upon completion of the design documents for all elements (or for specific phases) of the project, construction commences. The contract may call for fast track methods, allowing for construction to commence after logical phases of design and permitting are completed, but prior to completion of the entire body of construction documents.

5.6.2 Auditing/Monitoring

Although the contractor is fully responsible for the quality of all work, D/B agreements should provide for the owner's right of access at any time to all records produced in the performance of the work, including inspection records and test results, and to conduct sampling, to ensure the contractor is adhering to all requirements of the agreement. Weekly progress meetings should be held with the D/B team to monitor performance. Meetings should be well documented, including follow-up of action items.

D/B agreements also should include provisions confirming the owner's right to audit the contractor's work to ensure that the owner's requirements are being achieved. Such review may consist of random or milestone inspections or audits, continuous inspection, sampling and testing for audit purposes, or any combination thereof.

5.6.3 Final Acceptance

Prior to final acceptance of the work, all systems being inspected shall be completed and approved for acceptance by the quality management plan. A final inspection should be completed by the quality manager and owner. The inspection will verify that the facility is complete and ready to be accepted. A "punch list" should be developed as a result of this inspection, and the quality manager will ensure that all items on this list are addressed prior to final acceptance.

5.6.4 Dispute Resolution

The D/B contract should outline a method for dispute resolution. The D/B process requires a change in attitude towards the procurement process. One way to minimize dispute is through partnering, which fosters cooperation between the owner and the contractor to resolve their disputes. Many owners and contractors have established dispute resolution boards to diffuse issues before they become formal disputes. Typically, the board consists of three respected, experienced individuals: one appointed by the owner, one appointed by the contractor, and a third appointed jointly. Arbitration is another frequently used method for dispute resolution.

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APPENDIX A

DOCUMENTATION REVIEW SUMMARY REPORT

The purpose of this appendix is to review and summarize important references related to all aspects of the D/B method of procurement. Included in the review are discussions of the pros and cons of using various methods of procurements, including D/B/B, low bid D/B, and best value D/B. The documents reviewed include manuals of practice, guide/textbooks, research reports, and website materials. Each reference includes basic bibliographic information, keywords, and a summary/comments by the reviewer.

Title: Evaluation of Design/Build Practice in Colorado, IR(CX)70-4(143)
Author(s): A. Ardani, P. Jesaitis
Documentation type: Research Final Report
Media type: Report
Date: July 1999
Source: Colorado Department of Transportation
Keywords: innovative contracting, design/build, low-bid, technical proposals
Summary and comments by the reviewer: This report summarizes the activities that took place on a D/B project in region I of Colorado DOT. Under the SEP-14, for the first time, FHWA approved the use of the D/B concept for the reconstruction of 12 miles of I-70 east of Denver. Included in this report is an overview of the D/B concept, discussion of significant events, and results of a questionnaire on the D/B methodology. A total of 37 bidding packages were distributed to the interested proposers, which included approximately 30 percent of the design, including a complete survey for the western 6 miles of the project and a minimal survey for the remaining portion. The proposers were asked to prepare a price and a technical proposal. Numerous mandatory requirements, such as the preference for concrete over flexible pavement, and special bridge and lighting requirements were included in the bidding package. At that time, Colorado laws prohibited the use of best value concept, so the contract was awarded to the lowest cost bidder. Only two local Colorado firms submitted bids. Subcontracting was allowed as long as the prime contractor performed at leas 50 percent of the total contract. Right-of-way acquisition, environmental clearances and permits, and identification of utilities were the responsibility of Colorado DOT for this D/B project. No warranty clauses or stipends were established; however, the contractor was allowed to exercise VE where applicable.

Although Colorado laws at the time of this project did not allow the best value concept, the passage of the House Bill 99-1324 now authorizes Colorado DOT to award contracts to the contractors who provide the best value offer. In addition, this bill authorizes Colorado DOT to include a warranty provision that requires the D/B firms to perform maintenance services on the completed transportation projects. At the preliminary stages of the project development, it was believed that the VE clause had no place in the D/B projects with mandatory requirements. However, further into the project development it was realized that even D/B projects with mandatory requirements could be subjected to the contractor's VE analysis. One VE feature submitted by the contractor was incorporated into this project by a CMO. The savings from this VE feature amounted to approximately $270,000, which was divided equally between the DOT and the contractor. Fifteen CMOs were incorporated into this project. This would seem somewhat high in comparison with traditional D/B/B projects, but unlike traditional bid projects, these CMOs were written primarily as cost savings to the project.

Potential bidders who did not bid on this project indicated that the high cost associated with preparation of their proposals prevented them from participating. Provision of a stipend could have encouraged more firms to participate.

Title: Design/Build Procedures Manual Volume I
Author(s): New York State Department of Transportation
Documentation type: Manual
Media type: website, www.**nysdot**.gov/portal/page/portal/transportation
Date: September 2005
Source: New York State DOT
Keywords: design/build, manual, RFP, RFQ, best-value
Summary and comments by the reviewer: This 2005 manual is a comprehensive document that covers the entire spectrum of D/B method of project delivery from planning and environmental documentation through project execution and closeout. The D/B procedures and the format and content of various documents have been developed based on "best practices" in the D/B industry to meet the specific needs and requirements of the DOT and the state, and to ensure D/B projects progress in conformance with applicable federal and state laws and regulations. The manual is written primarily to help the DOT staff directly involved with D/B projects understand and implement various components of the D/B method of delivery. The manual clearly defines the roles and responsibilities of the DOT, D/B firms, and oversight and regulatory agencies.

To get the full benefits of the D/B approach, the manual encourages DOT staff to determine whether to use the D/B project delivery early in the project planning phases, before significant design work is done. This, in turn, promotes innovation and allows the D/B firms to come up with their best solutions. The manual also allows for environmental issues to be handled by the D/B firms, where applicable. The manual recommends training sessions on D/B for project personnel not familiar with this method of procurement and for stakeholders to ensure that they will buy into the overall D/B process. The risks associated with the project are rated on a scale of 1 to 9 and are assigned to the party that can best manage and deal with them in a positive, proactive manner. Particular attention is paid to the risk factors with ratings of 6 or higher. Where applicable, stipends are paid to unsuccessful bidders. This provides the department with the ownership of all ideas, concepts, techniques, and innovations in the unsuccessful proposers' proposals. VE is encouraged, giving D/B firms continuing incentives to look for creative and innovative design solutions as they develop the project design. A comprehensive methodology is used in evaluating RFQs and RFPs in an orderly manner that is fair and concise and allows proposers for questions and answers. Other topics covered in the manual include utility, right-of-way, warranties, performance-based specifications, special provisions, and minority-owned and disadvantaged business enterprises. Overall, this manual provides excellent documentation of what is required to execute a successful D/B project.

Title: Airport Improvement Program Handbook, Order 5100.38C
Author(s): FAA
Documentation type: Handbook
Media type: website http://www.faa.gov/airports_airtraffic/airports/aip/aip_handbook/

Date: June 28, 2005
Source: FAA
Keywords: procurement, contract methodology, competitive bids, design/build, competitive proposal, noncompetitive proposal
Summary and comments by the reviewer: Chapter 9, section 904 of FAA Order 5100.38C describes the four basic permitted methods of procurement for the FAA: 1) competitive sealed bids, which usually are used for the airport grant program involving construction projects or equipment purchases; 2) competitive proposals, which de-emphasize the price and focus solely on the technical proposals through the issuance of an RFP; 3) small purchase procedures, used for purchases less than $100,000; and 4) noncompetitive proposals, which are used for items primarily available from a single source, or in emergency situations.

In 2000, a pilot program was established to test D/B contracting and other forms of alternative delivery methods. Title 49 of the USC was amended to add section 47142, which established D/B contracting as an approvable form of contracting under AIP. The document provides a very brief explanation of D/B procurement under section 3, Alternative Delivery Methods, and elaborates that contracting for D/B services can be done by two basic methods:

- Qualification-Based Selection (QBS) - Under this method, the sponsor solicits proposals for the project. The sponsor chooses a short list of the most qualified D/B firms for subsequent interview and presentations. The sponsor then selects the most qualified firm/teams and negotiates a contract with them for professional services that also provide the price and guaranteed completion date for an agreed level of preliminary design work.

- Competitive Proposal Selection (CPS) - This is a two-step process. The sponsor first prepares a design criteria package, either in house or by using a design firm. The D/B firms are shortlisted in the same process used for QBS. A design criteria package is issued to the shortlisted firms, and they are asked to respond with separate technical and price proposals. Technical proposals are evaluated first using a numerical point system. The price proposals are evaluated next and factored into the points system to determine the final selection. The price is divided by the technical points score, and the resulting low score wins.

Overall, the information contained in Order 5100.38C, section 3 regarding D/B is limited and does not provide a detailed explanation of the different aspects of the D/B approach. It does not elaborate on what projects are suitable for the D/B approach, what criteria should be used in evaluating proposals, or when to use QBS as opposed to CPS.

Title: Model Design/Build (D-B) Request for Proposal (RFP) For Airfield Contracts
Author(s): Department of Defense
Documentation type: Manual
Media type: Report
Date: May 25, 2005
Source: Department of Defense

Keywords: design/build, contracts, RFP, airfield
Summary and comments by the reviewer: This document contains information pertinent to preparation of RFP for airfield D/B projects. It does not cover discussions related to various aspects of the D/B processes. The primary objectives of this document are to establish the roles and responsibilities of the government and contractor, and to provide an adequate definition of projects design and construction criteria allowing the prospective D/B contractors to prepare proposals

The ultimate goal of the manual is to reduce the risks of D/B contracting for both the government and the contractor and provide them with a clear, mutual understanding of the end result. Paragraphs 1-5.1 and 1-5.2 describe the general roles of the government and the contractor. Generally speaking, the criteria used in developing RFP can be stratified into three levels: nominal, partial, and full, with each level providing more detail than the preceding one. For example, the full criteria option is used for special circumstances where government preferences are extensive and mandatory and allow little or no flexibility for the D/B contractor. Nevertheless, there are common items that are included in most airfield projects for all three levels, such as project description, completion time, airfield traffic constraints, phasing requirement, requirement for control of construction traffic, cleaning requirements for pavements, and permits.

Overall, the UFC 3-260-11FA is a comprehensive document that addresses numerous RFP topics related to planning, design, and construction of vertical and horizontal airfield facilities. However, it remains to be seen if there are any differences between D/B RFP and D/B/B RFP criteria used for airfields. Many of the topics covered in this document direct the reader to use other references; in particular, many references are made to the Technical Instruction 800-03 of the USACE. A stand-alone D/B manual that covers not only the RFP but all aspects of the airfield D/B delivery is highly recommended.

Title: Design/Build Effectiveness Study
Author(s): Federal Highway Administration
Documentation type: Final Report
Media type: Report
Date: January 2006
Source: Federal Highway Administration
Keywords: design/build, SEP-14, alternate contracting
Summary and comments by the reviewer: This study focuses on completed D/B projects that were authorized under SEP-14. The primary objective of the study was to report on the effectiveness of D/B contracting procedures in the federal-aid highway program, as required by TEA-21. This is the first comprehensive study of the SEP-14 program involving both program and project managers directly responsible for federal-aid highway projects delivered under the D/B approach. Its findings and conclusions are based on the results of an extensive literature search and an integrated set of surveys of transportation agency personnel responsible for D/B programs and projects developed under SEP-14. The results revealed that owners have used D/B project delivery for projects of many sizes and complexity since the inception of the SEP-14;

however, it is apparent that most of D/B projects authorized under the SEP-14 have been in excess of $100 million in cost.

The managers of D/B projects surveyed in the study estimated that, on average, D/B project delivery reduced the overall duration of their projects by 14 percent, reduced the total cost of the projects by 3 percent, and overall maintained the same level of quality as compared to D/B/B project delivery. However, conformance with warranty provisions and standard and specifications were both rated higher for D/B projects than for similar D/B/B projects. The percent of design completion prior to contract award for the D/B projects averaged 27 percent. Eighty-one percent of the projects reported design completion of 30 percent or less. The results of the survey also suggested that, while the use of innovation and reducing the duration of the construction were the primary motivators for the owners to use D/B contracting, cost remained a major factor.

Although the best value concept is gaining popularity and momentum in many states, the survey indicated that the low bid continues to play an important role in contract award decisions. For D/B projects completed in 2002, 56 percent were low bid, 38 percent were best value, and the rest were variations of the D/B approach. An overwhelming 86.9 percent of the payment methods used were based on lump-sum, and the rest were based on unit price. Overall, three major factors motivated the contracting agencies in awarding contracts using the D/B procurement: larger projects with lower level of preliminary design and when the contract award was based on the best value concept.

This document provides an excellent review of D/B project delivery, discusses the projects that were awarded under the auspices of the FHWA SEP-14, and provides a summary of the lessons learned as reported by the respondents of the survey and presents the conclusions and recommendations. In addition, the report provides information on other forms of D/B project delivery such as design/build/operate/maintain, design/build with a warranty, and design/build/finance/operate. This report provides an excellent reference for owners that have little or no experience with the D/B method of contracting.

Title: Current Design/Build Practices for Transportation Projects
Author(s): AASHTO Joint Task Force on Design/Build
Documentation type: Documentation of the D/B practices of the transportation agencies
Media type: www.transportation.org/?siteid=63&pageid=1227
Date: January 2005
Source: AASHTO Joint Task Force on Design/Build
Keywords: design/build, two-step process, warranties, value engineering
Summary and comments by the reviewer: This document is a compilation of the most current information provided from transportation agencies across the country on their experiences with D/B method of project delivery. The basis for this document is the Parsons Brinckerhoff 2002 report developed for the New York State DOT. It is a living document, in that agencies are encouraged to share information on their D/B procurement processes. All submittals are reviewed by the Task Force for applicability and inclusion on this website.

The participating organizations included 15 agencies, most of which were state DOTs providing information on D/B projects of different sizes, including the two mega D/B projects submitted by Utah and Colorado with price tags of $1.325 billion and $1.86 billion, respectively. Other projects included information from NAVFAC, FHWA, Utah Transit Authority, and others.

The website provides an excellent overview of the agencies' responses regarding:

- Criteria used to identify projects appropriate for D/B
- Procurement process including the low-bid, two-step process and variation on best value, industry review process, protests, negotiations, stipends
- Development of procurement package
- Contract issues
- Project management including level of oversight, design review, QA/QC processes, partnering, and disputes
- Payment and schedule
- Right of ways/utilities
- Risk allocations/change orders
- Warranties/maintenance
- Subcontracting/DBE/equal employment opportunity
- Insurance/bonds
- Environmental permits
- Value engineering

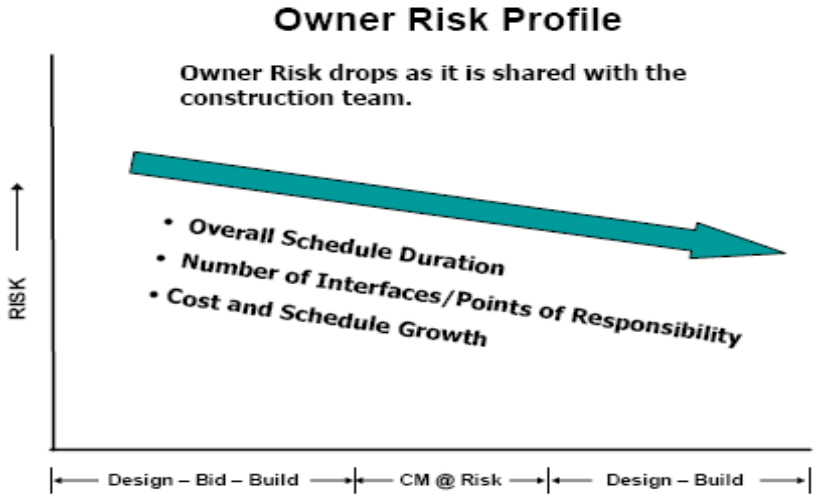
Title: Airport Owners' Guide to Project Delivery Systems
Author: Joint Committee of ACI-NA, ACC & AGC
Documentation type: White paper
Media type: Report
Date: October, 2006
Source: Joint Committee of ACI-NA, ACC & AGC
Keywords: project delivery system, CM@Risk, D/B, D/B/B
Summary and comments by the reviewer: This white paper presents a list of project delivery systems (PDS) and offers guidance in selecting the most advantageous PDS. The concepts and principles presented are applicable to capital projects of all sizes. Overall, the focus is on providing information and comparison on three basic project delivery systems: D/B/B,

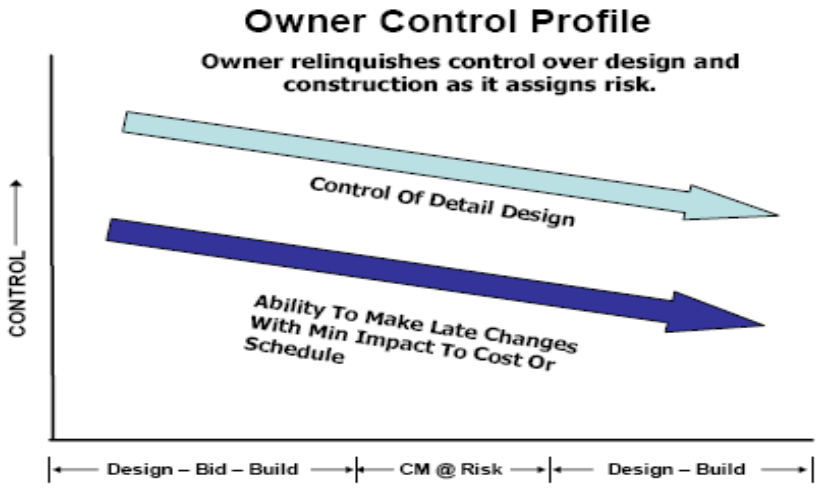
CM@Risk, and D/B. The paper provides a summary of how each delivery method works; however, as we have covered D/B/B and D/B in depth in preceding sections, the following is a brief summary of how CM@Risk works.

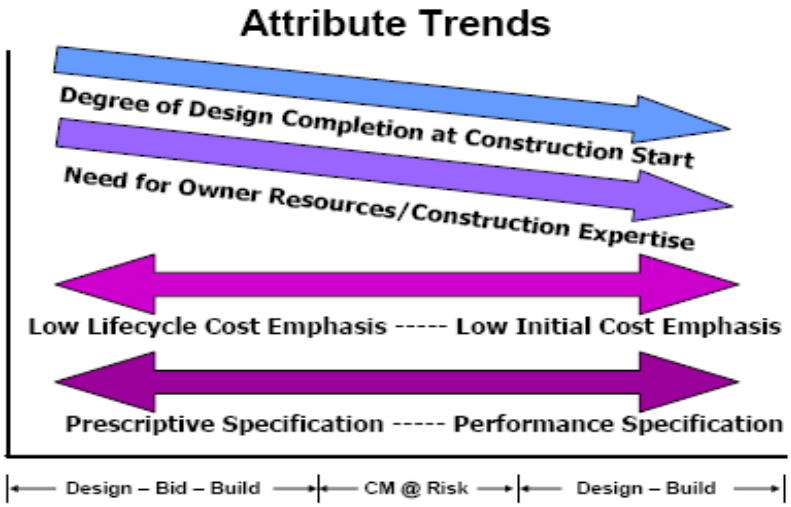
CM@Risk is gaining popularity for projects of all sizes. In this type of delivery, the CM@Risk is appointed by the owner to be directly and completely responsible for the construction of the project. There are differing opinions as when the CM@Risk should be appointed. Some owners believe the ideal time for engaging a CM@Risk is relatively early in the design process, but others have found the best time in hiring a CM@Risk to be at the same time or prior to hiring the design team. Some of main attributes of CM@Risk system are listed below:

- Transfer of responsibility and significant risk from the owner to CM@Risk, including subcontract administration, cost, and schedule
- The owner remains responsible to the builder for design errors
- The owner retains control of design quality
- The CM effort may add cost

The white paper graphically illustrates how these three methods of project delivery compare with respect to final cost, risks, claims, life cycle cost, schedule, and so on, as shown below:







The paper provides excellent suggestions for factors to consider in the selection of project delivery systems, including:

- Schedule/necessity to overlap phases
- Ability to define the project scope/potential for changes
- Owner's internal resources
- Desire for a single contract or separate contract; and
- Regulatory/legal or funding constraints

In addition, the paper elaborates on three types of contractual arrangements for the implementation of the chosen project delivery system:

- Firm fixed price or lump sum contract
- Reimbursable or cost plus contract
- Guaranteed maximum price

Title: Sources of Changes in Design/Build Contracts for a Governmental Owner
Author: R. Perkins
Documentation type: Research report
Media type: Report
Date: August 2007
Source: Robert A. Perkins, University of Alaska at Fairbanks
Keywords: D/B, D/B/B, change orders
Summary and comments by the reviewer: This research report examines the causes for construction phase changes in 14 D/B and 20 D/B/B projects. The records of these projects were obtained from both the southern and northern offices of the Pacific Ocean Division of the USACE in Alaska. The research examines the hypothesis that there is less construction cost growth and fewer change orders in D/B than the traditional D/B/B for governmental projects. It also examines and compares the causes of the change orders in D/B vs. D/B/B projects. In general, the data revealed that number of changes due to design error in D/B construction was significantly lower than in traditional D/B/B construction projects. This is to be expected, since the contractor in D/B project is responsible for the design. However, it is also possible to have design errors in D/B if there are discrepancies in the preliminary design submitted by the owner. For this group of projects, the D/B contract had less construction contract cost growth and fewer, less costly changes. The number of owner-requested changes was significantly greater in D/B contracts. The changes were categorized into 3 groups:

- Type 1, Engineering Changes
- Type 4, User Changes
- Type 7, Differing Site Conditions

Type 4 and 7 are considered uncontrollable changes, and type 1 is considered controllable. Most D/B projects had type 4 changes, while the majority of the D/B/B projects did not have any. More D/B/B projects had type 4 changes that reduced costs. The overall cost growth was 2.5-fold greater in D/B/B projects.

Title: Design/Build for the Private Sector (*10*)
Author: M. Loulakis
Documentation type: Textbook
Media type: Book
Date: 2003
Source: Aspen Publishers
Keywords: D/B, D/B/B, procurement and delivery system, program management, bonding and insurance
Summary and comments by the reviewer: This text provides an excellent reference and overview of D/B project history and challenges. Relevant chapters include:

- Public sector design/build: challenges and opportunities
- Procurement and delivery systems in the public sector: history and perspective
- Examining the performance of design/build in the public sector

- Procurement and contracting challenges on public sector design/build projects
- Effective use of design/build on state and local government projects
- Public-private partnerships: the public owner's perspective
- Design/build for roads, bridges, rail, mass transit, and airports
- Effective use of program management on public sector design/build projects
- Creative bonding and insurance approaches for public sector design/build projects
- Resolving disputes on public sector design/build projects

The text also provides an excellent summary of D/B legislation and case studies. This text is recommended reading for anyone interested in D/B projects.

Title: Guidebook for Design/Build Highway Project Development
Author(s): Washington State Department of Transportation
Documentation type: Guidebook
Media type: www.wsdot.wa.gov/NR/rdonlyres/46196EB8-F9D0-4290-8F55-68786B1DA556/0/DesignBuild_GuidebookJun2004.pdf
Date: June 2004
Source: Washington State Department of Transportation
Keywords:
Summary and comments by the reviewer: The guidebook was written by a technical team assembled by the Washington DOT and was based on the lessons learned from the state's D/B pilot projects, as well as the experiences of other agencies using D/B. The guidebook is intended to provide guidance to project managers and project engineers who are tasked with identifying, developing, and advancing projects using the D/B procurement method. The guidebook presents chapters on project selection, project development, contract development, design/builder selection, contract administration, and contract closure.

The guidebook notes that the most significant difference between D/B/B and D/B is that, rather than developing final plans and specifications, the requirement for D/B is to establish a clear scope of work that describes the final constructed project. A key consideration for the DOT is the identification and assessment of risk, and the appropriate allocation of risk to the party in the best position to manage that risk.

As noted in this guide, the Washington DOT uses the two-stage best value process for D/B procurement. The first stage is a qualification-based process that leads to a shortlisting of the highest ranked submissions. Final proposals that include both technical and financial submissions are then solicited from the shortlisted proposers. The proposal with the highest final score, a combination of the technical score and price, is awarded the contract.

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APPENDIX B

DETAILED CASE STUDY INFORMATION

PROJECT A

General Project Information: This project included the reconstruction of a runway.

- Year - 2008
- Why Design/Build Procurement - Time
- Expectations versus outcome - Pending
- Project Overview - One temporary runway 12,000' x 200' and one reconstructed runway 15,000' x 300'
- Bid Evaluation Methodology/Criteria - The owner received 4 proposals. Rated proposals on qualifications and cost and awarded on a total score of the two. All proposals were over their budget, so they issued numerous addenda to include deductive options and clarifications.
- Approximate Value - $110 million
- Commencement Date - September 2006
- Completion Date - Projected December 2008

Owner Interview Questions

1. How many times have you used the D/B method of project delivery? *Has been used 4 times.*

2. Reasons for using this method? *Upper management policy for projects to be delivered as D/B.*

3. Will you use the D/B method for your future projects? *Yes it is mandated.*

4. What would you do differently for future projects? *Getting ready to use D/B for two projects next year. Need to do a better job of writing a performance RFP. In the past, the performance criteria have been too prescriptive. Improving the RFP would foster innovation. Need to write the RFP to maximize innovation.*

5. How well does the D/B process foster partnering? *Works very well. Partnering is a key element to the success to design/build. Key to fostering good communications. Promotes the contractor's ability to come up with solutions. Shares risk.*

6. The proponents of the D/B projects claim the following advantages. Which do you agree with?

a.	- Lowering overall agency cost	Y
b.	- Reducing time	Y – 6 months ahead of schedule
c.	- Improved product	Y – Designer of record key
d.	- Promote innovation	Y – Forced contractor to innovate
e.	- Reduce claims	Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Higher level management is behind the power curve on how to use design/build. Need to review documents and methods and bring them up to speed. Need to get the RFP right. Need to carefully review the evaluation factors. Need to identify the risk the government is taking and the risk that is being transferred to the contractor.*

8. Does D/B lend itself to innovation? *Yes.*

9. What would you recommend to improve this practice? *See answer to Question 7.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Any project can be delivered using design/build. Works very well for vertical construction. There is still a lot of resistance for the use of design/build for runways.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes. Warranty clauses are typical 1 year. Think that 1 year is alright. Longer warranties may cost more.*

12. Do you believe value engineering has a place in D/B method of project delivery? *No. Works well for design/bid/build. For D/B, value engineering is primarily covered by contractor's innovation. Means, methods and products.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Needs to be completed by an independent third party. The contractor needs to have a good quality control plan.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Yes. It is equitably shared. Depends on what is in the RFP and how risk is identified and allocated.*

15. Is there a critical project size conducive to D/B projects? *No. Depends on the complexity of the project.*

16. What contracting methodology do you prefer? *Design/build.*

Contractor Interview Questions

1. How well does the D/B process foster partnering? *Depends totally on the attitude of the selected team and the owner (and owner's agent). It starts with the owner's attitude for initiating the process and their buy-in to using it. Then it is critical for the selected team to embrace a partnering attitude to commit to an integrated team and not act like a low bid contractor.*

2. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

   a. - Lowering overall agency cost Y
   b. - Reducing time Y
   c. - Improved product Y
   d. - Promote innovation Y
   e. - Reduce claims Y

3. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Without an integrated team, it just another low bid contract.*

4. Does D/B lend itself to innovation? *Yes, if the owner is engaged and the designer is allowed an equal say in the process.*

5. What would you recommend to improve this practice? *Require the proposers to present a team that gives the designer access to the owner and funding agent, without having to go through the construction contractor.*

6. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Yes. Relatively small projects may not get all of the benefits from D/B. Relatively simple projects that are not urgent may not be suitable. Some owners are not allowed legally to do D/B. Projects where the owner is committed to the process and dedicates staff to make it work with the authority to commit to budget and schedule changes.*

7. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes, performance specifications allow innovation.*

8. Do you believe value engineering has a place in D/B method of project delivery? *Yes.*

9. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Contractor can conduct QC and if needed, an independent firm working for the owner conducts QA.*

10. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *No*

11. Is there a critical project size conducive to D/B projects? *Yes*

12. What contracting methodology do you prefer?

Designer Interview Questions

1. What is your experience with the D/B method of project delivery? We have been a *subconsultant to a prime construction contractor and we have been a joint venture partner with a construction contractor.*

2. Will you participate in D/B projects future projects? *Yes*

3. What would you do differently for future projects? *Always be in a joint venture relationship and have an integrated team.*

4. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

   a. - Lowering overall agency cost Y
   b. - Reducing time Y
   c. - Improved product Y
   d. - Promote innovation Y
   e. - Reduce claims Y

5. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Major concern is when the designer is a subcontractor to the contractor.*

6. How well does the D/B process foster partnering? *Totally depends on the firms and people involved…right firm and people it works great.*

7. Does D/B lend itself to innovation? *Yes*

8. What would you recommend to improve this practice? *Require that the design has a direct relationship with the owner/funding agent.*

9. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Yes, see above.*

10. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes*

11. Do you believe that this method offers flexibility in the design and construction process? *Yes, see above*

12. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *See above.*

13. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Not in the past.*

14. Were the designers properly incorporated into the project? *No*

15. Is there a critical project size conducive to D/B projects? *Yes*

16. How do you incorporate subcontractors on your team? *Typically, in the design, use geotechnical and field survey firms during the design and they are team members.*

17. Do you feel pressure to comply with contactors construction requests? *Yes, if we are a subconsultant to them, we have a contractual relationship.*

18. What is the compensation method? Was payment timely? *Lump sum. Generally*

19. Did the contractor carry contingencies for design omissions? If not, were you accountable for additional costs? *Sometimes.*

PROJECT B

General Project Information

- Contract Award - $14,598,195 (design and construction)
- Design Started - July 15, 2007
- Design Complete - August 17, 2007 PH 1; September 14, 2007 PH IA
- RFP Issued to contractors - October 26, 2006
- Contract Awarded - August 20, 2007
- Owner provided information - Background CADD files and specifications
- Contract Completion Date - Runway opened November 19, 2007. The 500' intersection began in May 2008 and was completed in 1 month

Designer Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *Designer has used Design Build contracting procedures on a number of paving projects all with reasonably good success.*

2. Reason for using this method? *Time savings. The decision to use D/B was made by client which was the contracting agency. Immediately at the start of this project, the owner experienced unexpected but significant project setbacks regarding approvals. This setback was unrelated to D/B Team, but delayed the "notice to proceed" with work by 100 days. This delay compressed an otherwise normal 3-4 month project schedule into only a few weeks. Design this, the consultant successfully delivered, under a "fast-track" schedule, fully approved 100% designs for Phase 1 in 21 days and Phase 1A in 14 days.*

3. Will you use the D/B method for your future projects? *Yes*

4. What would you do differently for future projects? *See comments below*

5. How well does the D/B process foster partnering? *The D/B Team addressed this major scheduling challenge and ensured timely construction start-dates by first securing the cooperation of all key stakeholders. This included the various agency parties, and the Federal Aviation Administration District Office. Unlike the typical multiple 30- 60-100% submission process, the consultant submitted 100 percent designs for Phase I. These were reviewed and approved with minor comments at a single meeting with the agency experts. The team adopted a value engineering approach to find ways to minimize costs associated with the delay in start, culminating in its efficient "over the shoulder" approval process.*

6. The proponents of the D/B projects claim the following advantages. Which do you agree with?

a. - Lowering overall agency cost Y
b. - Reducing time Y
c. - Improved product Y
d. - Promote innovation Y
e. - Reduce claims Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *The D/B team has to make assumptions and sometimes qualify their bid because they have to submit their price prior to the design being performed. Expend more time and money up front without the assurance of even getting the job.*

8. Does D/B lend itself to innovation? *Yes. By having the contractor on board from the beginning, you can use the contractor's experience and expertise to design innovative solutions.*

9. What would you recommend to improve this practice?

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Fast track projects are definitely more suitable for D/B. Reconstruction projects are easily done. Building projects are also suitable for D/B. However, I suggest that if you are building a terminal or hangar, make the apron pavement a separate D/B contract with a pavement contractor, not the building contractor.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes. I can only speak of airfield paving projects, but the pavement, joint sealant, pavement markings should be warranted for a period of one year. Normally, problems with these items will surface within that time. Airfield lighting, signage and other electrical equipment should have the respective standard manufacturer's warranty.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Yes. Even though we submit up front not to exceed costs, if it is determined that the project can save money, then the owner should realize those savings. Saving on one aspect of the project may also lead to adding something to the project that the owner wanted but did not include due to budget constraints.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *The contractor should perform the QA with the owner's representative observing and witnessing the testing.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *The contractor has the most risk because the job isn't even designed when they submit their cost proposal. The designer has the next amount of risk and the owner has a relatively small amount of risk.*

15. Is there a critical project size conducive to D/B projects? *Not really.*

16. What contracting methodology do you prefer? *Design/Build if there is a well defined scope of work and preliminary plans up front. It can become a large effort (time and cost) to do a preliminary design so you can price the work and then not receive the contract.*

Additional Comments

The RFP showed the project taking 3 years. The D/B team submitted a proposal for doing the entire project in 1 year, which would have been accomplished had it not been for another contractor protesting the award, which delayed the project more than 100 days. This delay forced a winter shutdown and the 30-day intersection work to the following spring. Even so, this fast track approach saved the agency an estimated $2 million, and the airport was back to using its primary runway in less than 3 months.

PROJECT C

General Project Information: The project included the reconstruction/overlay of a parallel taxiway and widening of a second parallel taxiway. The D/B bid documents provided by the owner called for a 66/33 percent mix of overlay to reconstruction. Upon award, the D/B team undertook a separate geotechnical investigation that identified a different pavement section from that used for the bid. This necessitated revision to the overall design and revised profiles to limit additional construction costs.

All answers provided are based on the contractor's contract and their design and construction costs only.

- Programmed Amount (PA) - $31,920,000
- Award CWE - $33,817,000
- Final CWE – $33,817,000
- Initial Design Directive received – October 2005
- Design Started – October 2005
- Design Complete – February 2006
- RFP Issued to contractors – June 2005
- Contract Awarded – October 2005
- Owner provided information – 65 percent design
- Contract Completion Date – January 2007

Designer Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *This was our first airside design/build project.*

2. Reason for using this method? *Schedule driven to capture available FAA funding.*

3. Will you use the D/B method for your future projects? *Yes*

4. What would you do differently for future projects? *Develop stronger partnering with owner and hence trust.*

5. How well does the D/B process foster partnering? *There was still and "us and them" mentality. The partnering process undertaken at the beginning of the project was undermined to some extent by the fact that the facilitator appeared to favor the contractor.*

6. The proponents of the D/B projects claim the following advantages. Which do you agree with?

    a. - Lowering overall agency cost N
    b. - Reducing time Y

c. - Improved product Y Maybe
d. - Promote innovation Y
e. - Reduce claims Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Extensive coordination with owner employed quality assurance engineers was required. Mentality of owner as to application of responsibility did not match bid documents.*

8. Does D/B lend itself to innovation? *Yes.*

9. What would you recommend to improve this practice? *Recommend the engineer of the D/B team participate in a scope evaluation (risk) meeting with the owner/representative.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Fast track projects are definitely more suitable for D/B. Any project is suitable for design/build.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes. Base performance specifications should be required for the owner to dictate key scope items to match specific operational requirements. However, a balance must be met to ensure the D/B team is not prevented from developing a solution that maximizes the construction efficiency of the team.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Yes. Suggest an official submission process be included as part of the selection requirements to ensure that all ideas are fully evaluated.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *The QA of construction should be performed by the owner. Owner's staff or representative should be employed to work with the design team to ensure owner's requirements and goals are met.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *On this particular project, the owner and /contractor did not have previous experience with this delivery method. So, the allocation of risk during the project was emotional rather than contractual.*

15. Is there a critical project size conducive to D/B projects? *No.*

16. What contracting methodology do you prefer? *Design/Build.*

Contractor Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *This was the only contract thus far, although we're currently involved in the procurement process of two other projects.*

2. Reasons for using this method? *Time.*

3. Will you use the D/B method for your future projects? *We're pursuing additional Design/build work.*

4. What would you do differently for future projects?

5. How well does the D/B process foster partnering? *Very well with the right team.*

6. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

f.	- Lowering overall agency cost	Y
g.	- Reducing time	Y
h.	- Improved product	No significant change, Good or Bad
i.	- Promote innovation	Y
j.	- Reduce claims	Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *If the project has a fast-track design-construction schedule that forces the contractor to commence work prior to having sufficiently complete plans, significant problems will likely arise, notably re-work (when conflicts are discovered). Also, if the design is behind schedule, the contractor may be forced to construct a more costly product then they had bid.*

8. Does D/B lend itself to innovation? *Yes. It's very difficult to change (optimize) designs once they have been finalized. Often there is not sufficient time in the project schedule to generate, submit, review, revise, negotiate, and (finally) approve a proposed value engineering change.*

   Other times, considerable resistance is encountered when trying to bring about "Value Engineering" or "Cost Reduction Incentive Proposal" changes, primarily due to design engineers' "pride of authorship" with their original design. This is especially the case when there's a 3rd-party designer-of-record that won't share in the prospective savings. And if this 3rd-party designer is performing services that the owner's staff can do – there may be political undercurrents that prevent the owner and designer from working effectively together, as some of the owner's employees would rather complain throughout the course of the project about the "poor" plans then do anything that would fix them.

In a D/B job, the two parties most knowledgeable about building the project – the designer and the contractor – are on the same team. And they're "on the team" months before any construction occurs, providing time for input and innovation.

9. What would you recommend to improve this practice? *It's critical that the contractor devote sufficient upper-management attention during the design phase so that their wishes are communicated and if possible, incorporated into the design early in the process. The owner should allow phased design-submittals that recognize the need to finalize certain aspects of the design early to allow critical early construction work or procurement needs to start on time.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *I don't feel qualified to answer this (limited experience with D/B), but I would say that the more complex the project, the more D/B should be considered.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes, to a certain extent and with the following caveat. We recently submitted a quote to perform concrete paving on a D/B project in Utah. The documents generally required a two-year warranty, but this was extended to five years for the PCCP. As a subcontractor that had no control over the design nor the construction of the underlying base, we refused to include this 5-year warranty. This may be more an issue for the design/build team then the owner.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Yes (see response to 8).*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *I believe that the owner should always have QA oversight, even if the contractor is performing a full QC program.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Our experience is very limited, but on the project that we did, yes.*

15. Is there a critical project size conducive to D/B projects? *My opinion is that a minimum $20M project size is needed.*

16. What contracting methodology do you prefer? *I like the concept of design/build projects, and the one that we completed was reasonably easy to prepare. If all were as straight-forward as it, it would be a preferable methodology. But most D/B projects appear to require considerably more pre-bid work, which requires increased resources. Consequently, we will always be somewhat dependant on design-bid-build projects for the bulk of our workload.*

Additional Comments

From the contractor's perspective, it was a successful project. The project was completed on schedule, despite changed conditions and added work, and at a final cost less then the owner's bid estimated cost.

PROJECT D

General Project Information: This project included the construction of a new private airport facility for a remote development. Construction included a runway, taxiways, apron, airport building, maintenance facilities, and groundside roadways and parking areas.

- Programmed Amount - $ 10 million
- Award - $ 11 million
- Final Cost - $ 11 million
- Contract Awarded – March 2005
- Contract Completion Date – August 2006
- Actual Beneficial Occupancy Date – August 2006

Owner Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *We use design/build extensively for all of our work. We currently have over $ 300 million of projects on the go using design/build.*

2. Reasons for using this method? *The primary reason for using design/build for this project was schedule.*

3. Will you use the D/B method for your future projects? *Absolutely.*

4. What would you do differently for future projects? *Nothing.*

5. How well does the D/B process foster partnering? *Works very well. We tend to provide general requirements only and let the designers and contractors be innovative in meeting our requirements. The RFP spelled out the legal and performance requirements, runway length and width, lighting, size of the building etc. We invited 5 local contractors to bid.*

6. The proponents of the D/B projects claim the following advantages. Which do you agree with?

k.	- Lowering overall agency cost	Y
l.	- Reducing time	Y
m.	- Improved product	Y (*Same*)
n.	- Promote innovation	Y
o.	- Reduce claims	Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *No major concerns. We use this delivery method extensively.*

8. Does D/B lend itself to innovation? Absolutely. For this project, we provided the bidders with a 35 page document outlining our performance requirements with a very

preliminary airfield layout and terminal building. We provided the bidders with a preliminary engineering report and the results of geotechnical investigations. The pavement designs were not provided, just borehole logs.

9. What would you recommend to improve this practice? *The owner must take care of all property and easement requirements as well as any environmental reports.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Any project can be delivered using design/build.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes. We typically specify a 3 year warrant and feel that if there are any problems they will manifest themselves by then.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Absolutely. We count on it. In fact for this project. All of the costs came in over our budget and we interviewed the bidders to determine how we could get our costs down. All of the bidders were provided with new base requirements after the interviews and asked to rebid these new requirements. As a result, we substantially reduced the cost of the project.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *The design/build team should do their own quality control. We require a quality management plan to be submitted with the bid outlining quality requirements. We asked the designer to hire an independent construction materials quality inspection and testing firm and their results were provided to us for review. Inspection test forms were developed for the project and were required to be signed off by the testing firm, designer, contractor and owner. We also hired an independent design engineering firm to 'check' the designs put forward by the design/build team and to provide us with independent advice.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *There is more risk on the design/build team. Properly managed, there is very little risk to the owner.*

15. Is there a critical project size conducive to D/B projects? *No, we do the majority of our projects design/build.*

16. What contracting methodology do you prefer? *Design/build.*

Additional Comments

1. Pre-qualifying the teams is very important.

2. We require a team building/partnering workshop for all of our major design build projects. For this project, the workshop was facilitated by a University. We make it clear to all that we are interested in the results, are willing to pay for results and quality and are not there to nickel and dime anyone.

Contractor Response to Interview Questions

1. What is your experience with the D/B method of project delivery? *This was our first design/build project.*

2. Will you participate in D/B projects future projects? *Absolutely. We were very pleased with the results of this project.*

3. What would you do differently for future projects? *Very little. The key to these types of projects is the right team and experienced people.*

4. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

a.	- Lowering overall agency cost	N
b.	- Reducing time	Y
c.	- Improved product	Y
d.	- Promote innovation	Y
e.	- Reduce claims	Y

5. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Risk associated with quantities.*

6. How well does the D/B process foster partnering? *Very well. We had a formal partnering session that was well accepted by all.*

7. Does D/B lend itself to innovation? *Absolutely. It was though innovation that we were able to get the project in line with the owner's budget.*

8. What would you recommend to improve this practice? *We feel that this project went very well. Rapid approval of changes is important. The owner in this case was very knowledgeable and knew what needed to get done and did it.*

9. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Any project can be done using the design/build project delivery method. However for this project a stipend was not paid and we had to pay some engineering fees up front. For larger or more complicated projects, a stipend should be paid to all.*

10. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes, what project features

should be warranted and for how long? *Yes. This project included a 1 year warranty. No issues with this. Longer than 1 year is not reasonable.*

11. Do you believe that this method offers flexibility in the design and construction process? *Absolutely. Yes, there was significant flexibility for this contract as the owner only specified performance requirements. We were able to save money using innovation.*

12. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *The process used for this project was fine. We provided our own quality control and independent quality assurance was provided through our engineering firm. The quality management plan required by the owner spelled out all quality requirements.*

13. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Higher risk on the contractor in terms of time and quantities.*

14. How were designers incorporated into the project? *Integral part of design/build team.*

15. Is there a critical project size conducive to D/B projects? *No.*

16. How do you incorporate subcontractors on your team? *Exclusive to the team. We ensure that their subcontract agreements are very specific on time deliveries.*

Additional Comments

1. Design/build projects are difficult to run effectively. It is not something that we would give to a junior member of the firm. You need experience to run these types of projects.

2. For conventional projects, we believe that these are held up by the engineering firms expecting to ensure that everything is perfect before going to tender. For a design/build project, construction starts before 100 percent design complete and the team is able to make changes on the fly to ensure that the final product meets the owner's expectations.

3. Proper survey information is critical. We carry a significant amount of money to ensure that the survey requirements are met.

Designer Response to Interview Questions

1. What is your experience with the D/B method of project delivery? *Yes.*

2. Will you participate in D/B projects future projects? *Absolutely, but only with the right contracting team.*

3. What would you do differently for future projects? *We would hopefully be provided with some stipend to cover out design costs. We were paid $10k by the contractor to help*

cover our design costs which were much higher than that. An award fee was paid when we got the project to make up for this.

4. The proponents of the D/B projects claim the following advantages. Which do you agree with?

p. - Lowering overall agency cost	N
q. - Reducing time	Y
r. - Improved product	Y (Same)
s. - Promote innovation	Y
t. - Reduce claims	Y

5. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *No major concerns. For this project, we wished that the owner specified the pavement design as the pavement costs were the major component for the project and changes in the design could easily have lost us the project. As the contractor in this case had no design/build experience, we wrote more than 75 percent of the proposal and did all of the presentations. The contractor was not used to having to do detailed qualification statements, resumes and presentations which are common to our business.*

6. How well does the D/B process foster partnering? *Very well.*

7. Does D/B lend itself to innovation? *Yes, but in this case it was somewhat limited. The owner specifications didn't allow much but there was innovation in tweaking things like earthworks. By moving the runway over, we were able to provide significant savings in earthworks.*

8. What would you recommend to improve this practice? *Additional owner provided information such as geotechnical. While the owner did provide some basic information, we advanced 60 more boreholes to validate their information after we were awarded the contract. We carried the cost for this work and the owner could have just as easily have done that work in advance. The owner required 100 percent designs before any substantial construction took place. This slowed down the project.*

9. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *This project was perfectly suitable for design/build. It was a greenfield site so there were no underground utility issues. All property, easement and environmental approvals should be dealt with by the owner who is in the best position to do so.*

10. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes, what project features should be warranted and for how long? *Yes. This contract required a 3 year warranty which is perfectly reasonable for the pavement work. Any issues should manifest themselves within that period.*

11. Do you believe that this method offers flexibility in the design and construction process? *There was not that much flexibility for this project. It was relatively straight forward.*

12. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *The design/builder should be responsible for its own quality assurance. For this project, a comprehensive quality management plan was required to be submitted and approved by the owner. The project included requirements for Inspection Test Forms (ITPs). The ITPs required signoff from the testing company, design, contractor and owner. The contactor could not get paid until these were all signed off.*

13. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *No. More risk was shared by the designer and contractor. For example, from our standpoint, we were paid lump sum and had to estimate the amount of time we would have to be on-site during construction and as a result carried costs for this risk.*

14. Were the designers properly incorporated into the project? *Yes. The Engineer had direct contract with the owner which is desirable.*

15. Is there a critical project size conducive to D/B projects? *Greater than $ 10 million.*

16. How do you incorporate subcontractors on your team? *We carried the costs for the independent quality assurance inspection and testing. We made an allowance for quantities and carried this risk.*

17. Do you feel pressure to comply with contactors construction requests? *Not at all. We had to sign off on all quality related items or the contractor would not be paid.*

18. What is the compensation method? Was payment timely? *Lump sum. Yes, we were paid in a timely fashion.*

19. Did the contractor carry contingencies for design omissions? If not, were you accountable for additional costs? *We were not party to any contingencies carried by the contractor. However, the contractor and designer we pleased with the overall results.*

PROJECT E

Project Title: In-Field Development

General Project Information: This project included the construction of a 10-gate terminal, hanger capable of accommodating 3 747 aircraft, cargo buildings, smaller hanger, apron and associated taxiways, ground and airside roadway, and several support buildings. The project was part of an overall airport redevelopment project with a value of $4.4 billion.

- Programmed Amount - $ 400 million
- Award - $ 250 million
- Final Cost - $ 298 million (increase due to owner added work)
- Contract Awarded – August 1999
- Contract Completion Date – January 2001
- Actual Beneficial Occupancy Date (BOD) – January 2001

Owner Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *This was the first time that we used design/build but the project manager has been involved with design/build prior to joining the airport.*

2. Reasons for using this method? *The primary reason for using design/build for this project was schedule. The in-field development was a critical component of the overall airport redevelopment program. Cargo and passenger facilities needed to be relocated to permit construction of the new terminal building and airport felt that this was the best way to ensure the in-field project completion.*

3. Will you use the D/B method for your future projects? *Absolutely. Overall it was an excellent experience and not only was the project completed on-time and on-budget, the original estimates for the work were $ 400 million and the project came in $ 100 million under budget.*

4. What would you do differently for future projects? *Nothing. We spend a lot of time outlining our requirements and provided the bidders with five volumes of requirements. An honorarium of $ 150,000 was given to the losing bidders. We pre-qualified 3 bidders based on their team and qualifications. We looked at their experience on design/build projects throughout North America, specific airport experience, their capability to bond, safety, history. Due to the project complexity, all firms joint ventured. We used Standard Construction Documents for Design/Build Stipulated Price Contracts and added our own supplementary general conditions. We disqualified one of the bidders as non-compliance with the mandatory requirements. There was a base bid criteria and separate documentation and costing for value engineering alternatives. We decided after the contract was awarded if we wanted to take any of the value engineering ideas from all of the bidders. As we paid an honorarium to the losers, we kept the rights to the innovation*

ideas. Once the remaining two contractors we deemed to have satisfied the mandatory conditions, we opened the cost envelopes and the low bidder was awarded the contract. We retained a firm to independently cost all items to verify the pricing.

5. How well does the D/B process foster partnering? *It works well if the contract is designed to promote a collaborative team effort. The owner and contractor shared 50/50 with innovations that saved money for the contract.*

6. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

u. - Lowering overall agency cost	Y
v. - Reducing time	Y
w.- Improved product	Y (*Same*)
x. - Promote innovation	Y
y. - Reduce claims	Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *No major concerns. We feel that this project gave us exactly what we wanted. There is a minor problem with part of the apron pavement but given the size of this project, it is not significant. We had no issues whatsoever with the contractor hiring and paying the engineers and did not feel that here was any pressure for the engineers to do anything that they were not completely willing to do.*

8. Does D/B lend itself to innovation? *Yes. There was a great deal of flexibility in our contract. We provided the team with our requirements and left the team to design it. For example, we provided the width and length of the cargo facility and asked for a hanger that could accommodate a 747. For the pavement, we specified the utilization and aircraft mix and asked them to design it. The design came in 30 mm below the standard but was properly justified and so we now use it for all of our pavements at the airport.*

9. What would you recommend to improve this practice? *Have weekly meetings with the contractors and consultants. Meetings with the major trades every two weeks. Separate meetings with the compliance consultants (our consultant) weekly. Ensure that the meetings are short and to the point. None of our meetings went more than 2 hours and in most cases 1 ½ hours. We had several formal facilitated partnering sessions for the project and feel that these were well worthwhile.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Larger projects are more suitable but we feel that any project can be done using design/build. The simpler the project the better. For example, a runway construction/reconstruction project would be perfect.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project

features should be warranted and for how long? *Our warranties varied from 1 year for pavements to 20 years for some components, i.e. roofing and mechanical. A 2 to 3 year warranty for pavements seems appropriate.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Absolutely. We believe that value engineering saved us substantially on the original cost estimate for the project. The contract needs to stipulate what you want and left the designers/contractors design/build it.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Contractor does QC; Corps does QA. QC should be the responsibility of the design/build team. We retained independent engineering and construction materials testing consultants to occasionally check on the quality of the products. We paid these separately.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *More of the risk for the project is on the design/build team. But, they are also in the best position to manage that risk.*

15. Is there a critical project size conducive to D/B projects? *Not really but larger projects work better under D/B.*

16. What contracting methodology do you prefer? *We really liked the design/build procurement method as we were able to get the product that we wanted in the timeframe that we wanted. As a private organization, we are not bound to take the low bid approach.*

Additional Comments

1. It is important to get qualified people on the design/build team.

2. We gave the bidders concept designs, the master plan and design details that were about 10 to 15 percent complete. We feel that this was best to maximize innovation to get the project done on schedule and at a reasonable price.

3. There were 6 items that went to arbitration after the project completion. There was no disagreement on the validity of the items just the cost. Binding arbitration is a good way to deal with these types of items avoiding any litigation.

4. Do as much as possible to make the construction area ‘groundside’ during construction to eliminate security problems. We were very specific in terms of where the contractor could access the site. It is also very important to advise them of equipment height restrictions during construction. For example, they were told during the bidding that you can expect to be told to lower cranes at least twice a month for the duration of construction to minimize the impact on air operations.

Contractor Response to Interview Questions

1. What is your experience with the D/B method of project delivery? We have e*xtensive experience (more than 10 projects) with highway and large utility installation design/build with projects ranging from $ 10 million to over $ 1 billion. This was our first airport design/build but have since completed two other airport D/B projects.*

2. Will you participate in D/B projects future projects? *Absolutely. We look for these types of projects.*

3. What would you do differently for future projects? *Very little. The key to these types of projects for us is the right team and experienced people.*

4. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

   - Lowering overall agency cost N
   - Reducing time Y
   - Improved product Y
   - Promote innovation Y
   - Reduce claims Y

5. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Risk associated with possible design errors and issues with security and access to airside if project is 'inside the fence'.*

6. How well does the D/B process foster partnering? *Very well. Innovation is a key to our success with design/build projects.*

7. Does D/B lend itself to innovation? *Absolutely. Our key is to do as much as possible in-house with our own staff and utilize to the largest extent possible our own materials. That way we have complete control. For a recent major sewer pipe installation design/build, we sourced the pipe from another firm that build a facility to manufacture the pipe specifically for the project. The pipe quality was excellent but due to startup issues, it was late which caused significant scheduling problems.*

8. What would you recommend to improve this practice? *Ensure that you use top quality in-house and partner staff to maximize innovation early in the project. For teaming projects, set up various levels of authority and financial approvals to ensure rapid response to changes and issues. Deal with any financial issues immediately. Have monthly meetings with an executive board, review hardships and contingency items, ensure no surprises. Surprises lead to cutting corners which can affect delivery and quality. For large projects, hire an 'outsider' to act as a program manager who is looking out for everyone's interest and the good of the project. Ensure that the program*

manager has the authority to make decisions and not be undermined. Include binding arbitration to settle disputes without litigation. Subcontractors should be exclusive to the team.

9. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Any project can be done using the design/build project delivery method. However, the size should justify the expense of bidding it. A civil works value in the order of $20 million seems reasonable.*

10. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Yes. A 1 year warranty is not sufficient to protect the owner. A 2 or 3 year warranty would be more reasonable. If a longer than 3 year warranty is specified, we would carry money to cover it.*

11. Do you believe that this method offers flexibility in the design and construction process? *Absolutely. Design/build puts the onus on the team to innovate and do things in the best manner possible without having to wait for owner approvals which in some cases can take a long time and minimize the value of changes/innovation.*

12. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Quality control should be the responsibility of the design/build team. QC personnel should be given authority over all quality issues. Quality assurance should be outside of the design/build team and act on behalf of the owner.*

13. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Depends on how the contract has been set up. Risk should be equitably shared with all parties taking part in both the risk and reward.*

14. How were designers incorporated into the project? *Integral part of design/build team.*

15. Is there a critical project size conducive to D/B projects? *>$20 million.*

16. How do you incorporate subcontractors on your team? *Exclusive to the team. Try to minimize and do as much as possible in-house to ensure control.*

Additional Comments

1. We maintain a specific contingency and risk listing. High risk items on this list are typically, utilities, quantities and design errors. For airport projects, security and site access are large items. If the project requires security access, it is essential to quantify the number of security personnel and escorts.

2. We ensure that we utilize quality resources including people for design/build projects. They can be high risk but also high reward if run properly. We are particular with our

subcontractors and teaming partners to ensure that there is a good fit. We tend to use the same partners for design/build projects.

3. In terms of information provided to the design/build team, we feel that this should include only the parameters of what the owner wants. Supplied designs in the order of 10 to 15 percent would permit the highest level of innovation.

PROJECT F

General Project Information:

- Programmed Amount - $10,600,000
- Initial Design Directive received – 13 Jan 00
- Design Started – 21 Mar 00
- Design Complete / RTA – 31 Aug 01
- RFP Issued to contractors – 13 Nov 01
- Contract Awarded – 26 Feb 02
- Contract Completion Date – 10 Sep 03
- Actual Beneficial Occupancy Date (BOD) – 10 Jan 03

Designer Questions

1. What is your experience with the D/B method of project delivery? *This is the only project using D/B that I have worked. We prepared the RFP for the CoE to advertise the D/B project.*

2. Will you participate in D/B projects future projects? *If requested. Not actively pursuing any D/B projects. (Not many out there in the airfield pavements industry.)*

3. What would you do differently for future projects?

4. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

a.	- Lowering overall agency cost	N
b.	- Reducing time	N
c.	- Improved product	N
d.	- Promote innovation	Y
e.	- Reduce claims	Y
f.	- Reduce CMOs	Y

5. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *The RFP must be adequately prepared to clearly define the owner's expectations. A thorough geotechnical investigation must be completed during the RFP preparation to define existing soil conditions. It is worthwhile to choose a design subgrade support value (CBR or k) and include it in the RFP so that there is no argument over interpretation of the geotechnical investigation.*

6. How well does the D/B process foster partnering? *I believe that it can but of course it requires a strong commitment from the contractor, owner and construction manager.*

7. Does D/B lend itself to innovation? *Yes it can. For airfield paving, particularly in the paving lane layout and schedule aspects.*

8. What would you recommend to improve this practice? *Make sure the owners have a clear definition of their need (i.e. 6 parking positions vs. 5 parking positions) at the start of the project.*

9. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *I think the larger the project, the better the opportunity for cost and time savings using the D/B process. However, the need to clearly define expectations in the RFP is all the more important as the project gets larger.*

10. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *I think both extended warranties and performance specs are key to D/B projects. For airfield pavements, a minimum 5-yr warranty against cracks and spalls, joint sealant failure, and scaling seems appropriate. The tricky part is clearly defining in the RFP what constitutes a problem, and what type of aircraft traffic the pavement should be expected to experience in the warranty period.*

11. Do you believe that this method offers flexibility in the design and construction process? *Yes.*

12. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *I think the contractor should prepare and cure the test specimens (beams), but an independent lab hired by the owner should conduct the QA testing for strength. Contractor could complete smoothness, thickness, edge slump QC tests and submit documentation to QA for review and approval.*

13. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Not sure.*

14. Were the designers properly incorporated into the project? *Yes. We reviewed design submittals for the CoE during the D-B contract. Seemed like designer and contractor were working together, not opposed to each other.*

15. Is there a critical project size conducive to D/B projects?

16. How do you incorporate subcontractors on your team? *We used a subcontractor for geotechnical investigation only.*

17. Do you feel pressure to comply with contactors construction requests? *N/A*

18. What is the compensation method? Was payment timely? *Lump sum contract with CoE.*

19. Did the contractor carry contingencies for design omissions? If not, were you accountable for additional costs? *N/A*

Contractor Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *As construction team leader I have been project engineer on 3 other completed design build projects at the airport and he is currently managing other design build projects. I have also handled several design build projects overseas.*

2. Reasons for using this method? *Expedite delivery; potential cost savings; believe that D/B will likely give lower quality product.*

3. Will you use the D/B method for your future projects? *Our upper echelon has mandated to do a certain percentage of projects as D/B. The reasons are to replicate private sector methods, move away from old specifications and methods and take advantage of contractor innovations.*

4. What would you do differently for future projects? *Not much. RFP and the proposal make up the D/B contract. There needs to be a collaborative team with owner, end user, contractor and designer. Need regular meetings to review /revise.*

5. How well does the D/B process foster partnering? *It works well if the contract is designed to promote a collaborative team effort.*

6. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

   a. - Lowering overall agency cost Y
   b. - Reducing time Y
   c. - Improved product Y (*Maybe*)
   d. - Promote innovation * Y
   e. - Reduce claims Y

   * *Depends on level of detail in RFP; not just because it is a D/B contract*

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *Loss of control of the design. Not being able to pick up phone and talk with designers. The agency designers are advocates, not influenced by the contractor as might be the case with D/B.*

8. Does D/B lend itself to innovation? *Yes, if D/B team is provided opportunity through the contract. Suggest that the RFP should provide a 30 percent design. This project was at 65 percent.*

9. What would you recommend to improve this practice? *Ensure that partnering is accomplished for the start up; streamline processes; educate contractors on how D/B works.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Larger projects more suitable because they are generally more efficient whether they are D/B or not; small contracts generally go to smaller contractors who are less qualified to manage a contract. There are some types of projects that might not be suitable for D/B – these are specialized projects with unique design requirements; example is a Child Development Center with very specialized features.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *The contracts that we have done have a 1-year warranty but we have no experience with extended warranties. I believe that for extended warranty it is hard to prove the cause of defects.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Value engineering works well with D/B; usually results in savings to the contractor but not the owner. The exception is where RFP specifies the product, then any savings over the specified product goes back to the owner.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Contractor does QC; Corps does QA. The QA tests are currently contracted out, I would prefer to have in-house laboratory for QA tests. I feel strongly that the QA inspection and testing be under the agency's control to give adequate checks on quality.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? The c*ontractor is more at risk as he has to consider risk in his bid. I believe that a full geotechnical investigation should be completed by owner prior to submittal of proposal so contractors know as much as possible about existing site conditions.*

15. Is there a critical project size conducive to D/B projects? *Not really but larger projects work better under D/B.*

16. What contracting methodology do you prefer? *No preference. It all comes down to the team. Under D/B, the RFP and contractor's proposal make up the contract.*

Additional Comments

1. Best part of the project was ability to select a highly qualified contractor. The selection was not based on cost only. The selection methods are: (1) lowest cost technically

acceptable or (2) weighted factors with cost being one factor. The second method was used and the Contractor won at a higher cost but had higher ratings on technical factors.

2. Success is level of communication. We had weekly coordination meetings with all parties including the end user.

3. It is important to limit the number of design packages. For this project, there was a 3-phase design submittal. The first package needs to be adequate to get contractor started on construction. The agency had been requiring 30 days to review/approve drawings but have now reduced this to 14 days. I believe that the government review should be minimal.

PROJECTS G AND H

General Project Information: There were two separate projects at two different airports. The projects consisted of D/B procurement for major hangar and apron facilities. The building contractor subcontracted the pavement construction to a paving contractor.

- Programmed Amount - This $2 million apron project was also part of a hangar contract.
- Award Amount - $2 Million and $ 600,000 respectively
- Final Cost - Unknown
- Contract Awarded - 2004 and 2001
- Contract Completion - 2004 and 2002
- Actual Beneficial Occupancy Date - Unknown

The project was completed with some significant issues with these projects. Project G is performing reasonably well. Project H had significant performance problems and resulted in replacement of the pavement. The D/B team (in particular, the construction managers) had very limited airport experience, which led to some "issues" during construction.

Bid Evaluation Methodology/Criteria: Two-phase process with qualifications and shortlist for Phase I and qualified team cost for Phase II.

Owner Response to Interview Questions

1. How many times have you used the D/B method of project delivery? *These were the first and second times that D/B was used for our airfields.*

2. Reasons for using this method? *We were advised by our upper echelon that we were to use D/B for these two projects.*

3. Will you use the D/B method for your future projects? *Not likely unless we can remain in control of the final product. Our design work is done by head office and the construction is managed by a pseudo government agency who manages all of our construction. Once we established requirements, we were no longer in any control of the product. There were many negative aspects that we could have avoided had we been directly involved in the delivery of the project.*

4. What would you do differently for future projects? *We would absolutely not try design/build again unless we were afforded some control over the project.*

5. How well does the D/B process foster partnering? *Difficult to say. Were not directly involved but it appeared to me that there was no coordination between the hanger and apron pavement teams.*

6. The proponents of the D/B projects claim the following advantages. Which one do you agree with?

a.	- Lowering overall agency cost	N
b.	- Reducing time	Y
c.	- Improved product	N
d.	- Promote innovation	Y (Unknown)
e.	- Reduce claims	Y

7. What are your major concerns (adverse impacts or disadvantages) about the use D/B contracts? *In our particular case yes. If properly administered and using the right management, design and construction teams, I see D/B as being an excellent project delivery mechanism.*

8. Does D/B lend itself to innovation? *I don't know as I was not directly involved during construction.*

9. What would you recommend to improve this practice? *See question 7.*

10. Do you feel some types of projects are more suitable candidates for D/B projects? If so, which types? *Any project no matter how big could be done using design/build as long as you know what you want.*

11. Do you believe warranty clauses, performance base specifications should be incorporated into D/B contracts to improve project quality and reliability? If yes. What project features should be warranted and for how long? *Absolutely. One of the projects was a complete failure and the apron had to be replaced. We didn't do anything about it until after the 1 year warranty was up and were left holding the bag.*

12. Do you believe value engineering has a place in D/B method of project delivery? *Absolutely. Innovation and value engineering should be an integral part of D/B projects.*

13. What are your thoughts with respect to QA/QC processes? Who should be conducting the QA and why? *Ours obviously didn't work. It seems that it was all left up to the contractor and all of the project records have since disappeared. The owner should be responsible and complete QA.*

14. Do you feel that risks associated with the D/B process have been equitably shared by the owner, designer, and the contractor? *Not in our case. Seems like even with reasonable contract documents, we were left with a substandard project. I find that in the government sometimes, we tend to look away from any issues that would result in controversy and want them to just "disappear". There seems to be very little accountability.*

15. Is there a critical project size conducive to D/B projects? *No, I believe that any project can be done D/B if you know what you want.*

16. What contracting methodology do you prefer? *Currently, design/bid/build.*