stages of design completion. The owner then structures the DB RFP to require the DOR to schedule the design progress in a manner that complies with the progressive permitting process, and the design-builder is required to schedule the construction in a manner such that it never exceeds the authority furnished in the intermediate permit. When the design is totally complete and found to be in compliance with the permitting agencies' requirements, the agencies then issue final permits that release the builder to build the project that has permitting constraints. Thus, the owner has shared the schedule risk associated with the permitting process with the design-builder.

The second question speaks to the DBB mentality that attempts to place as much risk on the contractor as possible. Agencies that issue environmental permits are notoriously fickle because the rules that govern the issuance of these types of permits are broad and subject to local interpretation. If the owner is unable to strike a deal to allow progressive permitting on a DB project, then the owner has no choice but to separate the design and construction phases of the project in the RFP, with a permitting phase of indeterminate length. Attempting to shed this schedule risk by inserting a clause in the RFP that makes the design-builder responsible for obtaining all the necessary permits will probably not effectively transfer that risk because the design-builder can no more control the timeliness of the permitting process than can the owner. This type of clause will merely force the competitors to insert additional time in their schedules and additional money in their price proposals to cover the impacts of the unknown aspects of this process.

Public endorsement becomes the next risk management issue in the RFP preparation process. There are really only two ways that this can be handled in a typical transportation project. First, the same routine, required process can be followed to satisfy environmental and statutory issues as could be followed in a traditional project. This approach leaves the end result in question and probably serves to needlessly extend the time period before which construction can begin. The other method would be allow the process to be conducted by the design-builder during contract execution. Bear in mind that the public endorsement process often entails the risk of political consequences that might delay the start of construction. Certain specific risk-sharing mechanisms can be incorporated into the DB RFP that would equitably distribute that risk. One such method would be to ask that a specific amount of money be included in the price proposal as a contingency to fund unforeseen scope and schedule changes that arise from the public endorsement process.

Interagency and third-party agreements are important considerations in managing the project risk during RFP preparation. The owner can best manage this risk *before* advertising the project. To do so, the owner must coordinate with all outside parties and formally define in the RFP all anticipated interagency and third-party involvement with the design-builder. Next, the RFP should define the decision-making process, authority, and responsibilities of each of the parties. Ideally, design-builder interfacing with third parties during DB project execution of the design-build contract should be minimized to coordination efforts

only, and the RFP should be clear as to what responsibilities the design-builder has with regard to these types of coordination efforts.

Railroad and utility agreements are probably the major hurdles that must be cleared in a large transportation project. Managing these types of risks in the DB process demands that the owner invest a great amount of effort to nail down the constraints that will be imposed on the project by these third-party participants. In some cases the owner will have the ability to negotiate better terms than those normally imposed by railroad and utility companies. Therefore, before publishing the RFP the owner must ensure that these terms are explicit in the solicitation and that the constraints imposed on both the design and the construction are clearly articulated so that the design-builders can account for them in their price proposals and schedules.

The above discussion of risk management in DB was focused on transportation projects. The same approach can be applied to building projects and engineered projects such as water treatment plants. The idea shown above boils down into looking carefully at the given project and all its components and identifying those areas in which control over the component of work passes from the hands of the owner and the design-builder into the hands of another party that is outside the contract. When the impact of that loss of total control is assessed, responsibility for the risk associated with the possible loss of control is assigned to the party who can best manage it, and that responsibility is articulated in the RFP. This leads the discussion of RFQ/RFP development to the topic of the contracting strategy that will be employed to deliver the project.

Contracting Strategy

The contract is the vehicle that actually distributes the risk among the parties in a DB project. Developing a comprehensive strategy for the contracting portion of the project's life cycle is essential to the success of the project. The contracting strategy consists of the following six elements:

1. Contract vehicle itself,
2. Best-value award method,
3. Advertisement and award process,
4. RFQ/RFP content,
5. Evaluation plan and process,
6. DB team composition.

Each of the above elements is essential to creating a strong and fair contractual framework within which to complete the project. They are all interrelated and are not listed in any particular chronological order. They form a checklist to ensure that the contractual process has been completely analyzed and its various parts synchronized with each other to form a strong foundation of reference for all parties during project execution.

Contract Vehicle

The contract itself can take many forms, from standard contracts sold by professional societies and trade groups, such as the list of standard contracts offered by the EJCDC in Appendix 3, to contracts customized for specific projects. Public agencies often have their own contract formats, and the federal government uses contracts based on the Federal Acquisition Regulation (FAR). Regardless of the contract's format and boilerplate, the owner must visit each project individually and ensure that the standard form and boilerplate actually fit the given project to avoid the creation of ambiguities between the general and special provisions of each contract.

The next step is to select the contract vehicle itself. The contract vehicle basically defines how the contractor will be paid by the owner for accomplishing the specified scope of work. Knowing how payments will be calculated influences the way the price proposal is formed. Owners, designers, and construction contractors in the architectural and engineered project areas will be familiar with lump-sum contracts, whereas those in the transportation industry will be more familiar with unit-price contracts. Private owners and those in the process industries will have experience with cost-plus contracts.

Regardless of the owner's past policy for contract vehicle selection, the needs and characteristics of the project at hand should drive the selection of the contract vehicle. Each contract vehicle inherently distributes cost risk by its very nature. A firm-fixed-price contract puts all the cost risk for the scope described in the contract upon the design-builder. Thus, the design-builder must be able to price the project to a reasonable degree of accuracy without a final design. If this is not possible, the owner must anticipate that the price proposals will be higher than expected for those design-builders that are truly competent and able to fully understand the prescribed scope of work. The danger for the owner comes when one price proposal comes in significantly lower than the rest and it is the only one that falls inside the project's budget. The owner must then determine if that offeror indeed understood the total scope of work and, if so, did not make a mistake in preparing the price proposal.

It is important for the owner to satisfy itself that the level of design development that will take place in the RFP will be sufficient to allow the proposers to accurately develop a price that does not contain excessive contingencies to cover the potential cost of design decisions that must be made after DB contract award. Unit-price contracts are typically used to share the scope risk between the owner and the contractor. In transportation projects, this is done because it is impossible to prepare a precise quantity survey before the project is bid due to the inherent variation in soil characteristics, actual lengths of friction-bearing piles, and other difficult-to-quantify pay items. Thus, the owner commits to paying for actual quantities to avoid creating a situation where the construction contractor would have no choice but to bid the worst-possible case in each pay item if a lump-sum bid was required.

Delivering these types of projects using DB in no way alters both parties' ability to quantify actual quantities before the contract is awarded. In fact, it probably

makes it more difficult because final construction documents are not available upon which to base a price. Thus, projects that would have used a unit-price contract in DBB will also probably find that the unit-price contract is still applicable in DB, although the methodology for determining allowable over- and underrun percentages becomes much more abstract because the design-builder, not the owner, will develop the engineer's estimated quantities along with the design documents. As of this writing, the industry is still grappling with the resolution of this issue. There seem to be three possible solutions emerging:

1. Do not allow overrun or underrun percentages. The design-builder gets paid for actual quantities and the owner is protected by a guaranteed maximum price established at either award or design completion.
2. Split the contract between lump-sum for the scope of work that is reasonably well-defined with regard to quantities of work, and unit-price for only those quantities that are impossible to quantify.
3. Use statistical models in unit-price contracts to determine quantity variations that exceed some specified normal variation.

Cost-plus contracts place the scope risk squarely on the owner and reduce the price proposal to merely competing the design-builders' fees and costs of general conditions (also called overhead or indirect costs). These types of contracts are often used when it is impossible to quantify the scope of work after the design is complete. For example, an emergency DB contract might be required to remediate petroleum-contaminated soil because it is difficult, if not impossible, to accurately determine the extent of the subsurface contamination and, hence, the amounts of contaminated soil that must be removed, the amounts of backfill that will be required to replace it, as well as the amount of time that must be allowed to complete the project. In such a case an owner that advertised a lump-sum or unit-price contract would find itself paying a huge premium to distribute the scope risk to the design-builder. Therefore, it is better to retain this risk and merely compete the design-builders' percentage markups or lump-sum fees.

Best-Value Award Method

Once the contract vehicle is selected, the remainder of the selection and award process must be determined to ensure that the requirements outlined in the RFQ/RFP actually support the owner's decision-making process. Seven generic categories for public project source selection procedures are available and are proposed here. Adhering as much as possible to Design-Build Institute of America (DBIA) terminology, they can be termed

1. Low Bid DB
2. Adjusted Bid DB
3. Adjusted Score DB
4. Weighted Criteria DB

5. Quantitative Cost–Technical Trade-off
6. Qualitative Cost–Technical Trade-off
7. Fixed Cost–Best Proposal (Gransberg and Molenaar 2003).

The details of the award algorithms that support each of these award methods are contained in Chapter 6 of this book, and the reader is referred there to gain further information on them. However, it must be stressed that the owner should have determined which award method is going to be used *before* the RFQ/RFP is written because the award method will establish the level of detail that must be articulated in the solicitation documents. This will permit the owner's evaluation panel to fairly rate each proposal and develop the output necessary to identify the proposal that represents the best overall value to the owner.

Advertisement and Award Process

Given the award method, the owner can now establish the process by which it will advertise the contract and reach a point where the award decision can be made. Often this process is driven by the schedule requirements of the project itself. A project that must be awarded or completed by an unmovable deadline will require a more abbreviated process than one that has no hard milestones. Generically, there are really only four options for the owner to select a procurement process:

- Fixed-price, sealed bidding
- Sole source, negotiated
- One-phase, competitively negotiated
- Two-phase, competitively negotiated

Figure 4-1 illustrates the continuum from the sealed bid on one end to sole source procurement on the other. The sole source method merely involves contacting a design-builder who appears to have the requisite capability and experience and attempting to hammer out an agreement that is acceptable to both parties to complete the project. It really has no formal structure that can be described in general terms; it will rely mostly on the owner's internal policies and procedures for capital project delivery. Obviously, this method will be found more often in private, commercial projects than in public works. However, most public agencies have the ability to utilize sole source procurement when certain sets of circumstances apply.

The difference between one-phase and two-phase selection processes is as follows. One-phase selection requires the design-builders to submit qualifications, technical approach, schedule, and price simultaneously. Two-phase selection consists of a Phase 1 RFQ where only qualifications are submitted and evaluated. A shortlist of the best-qualified offerors is then issued the Phase 2 RFP that details the technical approach, schedule, and price in its response. The decision whether to use one or the other is critical for most projects. The advantage to

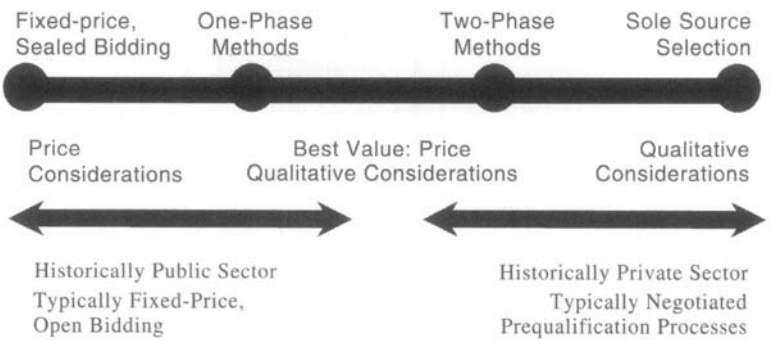

Figure 4-1 Design-build selection process continuum.

industry in the two-phase process is that only those offerors who are truly qualified and therefore competitive are required to undergo the expense of preparing the much more detailed and expensive technical and price proposal. The advantage to the owner lies in the relatively low cost to industry of preparing a statement of qualifications that increases the level of competition. Short-listing also makes those firms on the list feel as though their chances of winning are higher when they are competing with only two or three others. Many highly qualified design-builders pass on one-phase DB projects because they are unable to accurately gauge their chances of winning in a larger field.

The other risk from industry's perspective of the one-phase method is that a less competent competitor will submit an extremely low price proposal, either through ignorance or incompetence, and make it extremely difficult for the owner to award to a higher-priced, more competent competitor. Research has shown that the two-phase selection process is preferred by both owners and design-builders (Molenaar and Gransberg 2001) and that it provides the following benefits:

- Ensures quality of design-builders' credentials.
- Enhances innovation.
- Keeps proposal preparation costs to a minimum.
- Increases competition.

One-phase DB procurement should be reserved for those projects that are either very simple and require very little design development in the proposal, or where the owner does not have sufficient time to invoke the two-phase process due to a hard deadline, such as the end of a fiscal year. Figures 4-2 and 4-3 illustrate process charts of each process from two typical state departments of transportation.

Proposal evaluation is the next step in the selection process and must be outlined before the RFQ/RFP can be written. In fact, the evaluation plan itself is so important to the process that it should probably be completed before either the RFQ or the RFP is released. This is because the RFQ/RFP must support the evaluation

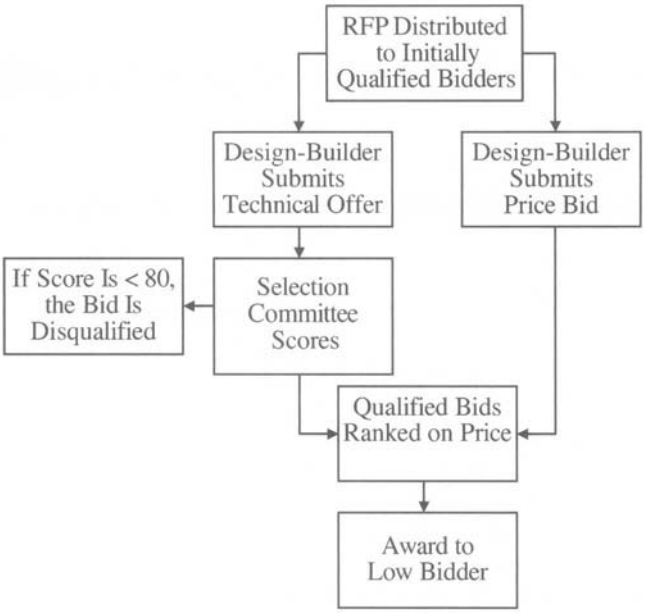

Figure 4-2 Indiana Department of Transportation's one-step selection process (*Molenaar and Gransberg 2001*).

plan. Everything that will be evaluated must directly correlate with a published RFQ/RFP requirement that tells the design-builders exactly what products to submit for evaluation. Additionally, the act of drawing up the evaluation plan forces the owner's DB team to establish standards and performance criteria against which the proposals will be rated. Publishing these in the RFQ/RFP makes the selection process transparent and actually helps the offerors to make their proposals as responsive as possible to the owner's requirements. This is because the owner's requirements are clearly stated, their relative importance is known, and the formula that will be used to select the winning proposal can be evaluated in a manner that causes the proposal to emphasize those aspects that are most important to the owner. A paper by written by a construction industry attorney emphasized this issue when it recommended:

> Clearly state the evaluation criteria and the weight given each item and ensure the [evaluation] team uses them. Clearly state the requirements of the RFP including what will be considered to be a non-responsive proposal. (Parvin 2000)

Chapter 6 of this book provides a detailed explanation of DB evaluation planning. Once the evaluation is complete, the owner must decide if it will use a procurement technique referred to in the federal sector as discussions. Discussions

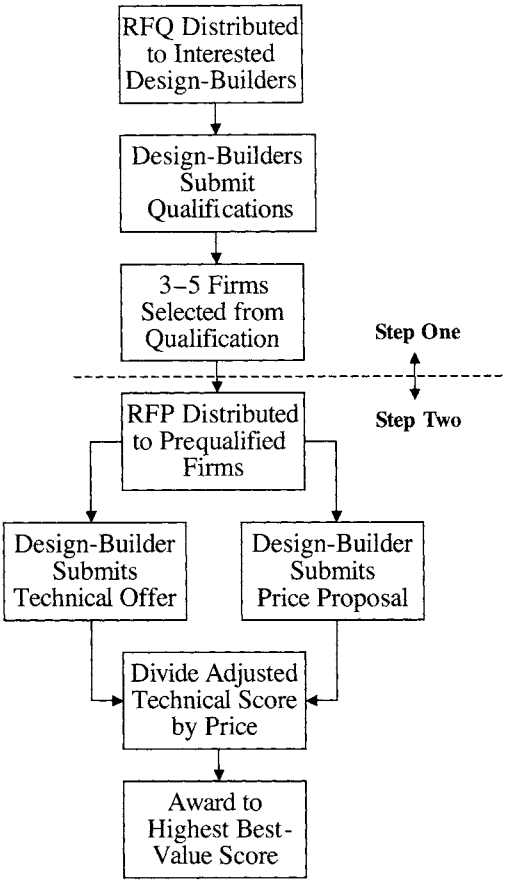

Figure 4-3 Washington State Department of Transportation's two-step selection process (*Molenaar and Gransberg 2001*).

are a key part of a competitively negotiated procurement process. Their use springs from the assumption that most proposals will have at least some minor deficiencies that will need to be corrected. Because both the RFQ/RFP and the winning proposal form the technical basis for the contract, it is prudent and in the best interest of the owner to allow all competitors a period in which to make corrections and submit a revised proposal. Thus, the discussion period consists of the following elements:

- Telling each offeror which deficiencies exist in its initial proposal.
- Asking each offeror to clarify those portions that may have been unclear or confusing to the evaluation panel.
- Defining, if necessary, those portions of the proposal that may not be changed.

- Allowing a reasonable period of time to make corrections and changes.
- Establishing a deadline for the submission of the corrected proposal.

The owner can always reserve the right to award the contract without discussions if it finds one proposal that is totally responsive and in need of no corrections. Discussions also allow the owner an opportunity to correct mistakes and ambiguities contained in the RFQ/RFP and ask the offerors to revise their final proposals accordingly. The corrected proposals are often called the Best and Final Offer (BAFO) or the Final Proposal. An owner can then determine if it will allow a second iteration of corrections to be made if the first set of corrected proposals does not yield a fully responsive proposal. Once this decision is made, the owner can then determine the steps by which it will make a best-value award decision and the procedures with which it will award the DB contract.

Request for Qualifications/Request for Proposal Content

The first question that must be answered with regard to what goes into the RFQ/RFP deals with the level of design that will be portrayed in the solicitation documents. In essence, the RFP constitutes a design problem that the owner describes and the DB proposals comprise individual, differing solutions for the same problem. By selecting DB project delivery, the owner is reaping the benefit of being able to evaluate different solutions for the same problem and selecting the solution that promises, though its innovation and creativity, to offer the owner the best value for this given project. Thus, from the owner's perspective, the level of RFP design content is a function of three things

1. Design constraints for which there is only one technically acceptable solution,
2. The owner's ability to adequately describe the scope of work in performance terms,
3. The time available to award the contract.

As previously discussed, design constraints are inherent in every project and must be clearly articulated in the RFP. They form a portion of the RFP's design content when there is only one technically acceptable solution. For instance, a large university may have selected a single supplier of HVAC equipment for every building on its campus to minimize the requirements for repair parts stockage and training for its in-house technicians. Thus, a DB RFP for a project to construct a new building should contain a design constraint that requires the design-builder's mechanical engineer to design the new system using this specific brand of equipment. By narrowing the field of design options to a single supplier, the owner then assumes a modicum of risk that the final system will not be as efficient or as cost-effective as one designed using another supplier's equipment.

In order to receive reasonable and realistic price proposals, the owner must define the DB project's scope of work as clearly as possible while attempting to stay in the performance realm as much as possible. This is a difficult balancing act. At times it will be impossible, and in those instances the owner must design a given feature of work to a level where its technical scope can be adequately understood by those preparing the DB proposal. Therefore, a useful rule of thumb for RFP preparation can be stated as follows:

> If the only way you can satisfactorily describe the technical requirements for a feature of work is to design it yourself, then do so knowing that you will be assuming the risk for its ultimate performance.

Finally, the time available to the owner to advertise, evaluate, and award the DB contract often puts a functional cap on the amount of design the owner furnishes in the RFP. As the available time period grows shorter, the owner's physical ability to conduct pre-award design decreases. A very common example of this principle deals with the timing of the geotechnical study within a DB project that is sited on land on which there has been no previous construction. The only reasonably reliable way that an owner can characterize a project's subsurface conditions in a manner that permits the design-builder to price the cost of the foundation without a large contingency is to conduct a preliminary subsurface investigation and include its results in the RFP. In DBB, this is normally done during the design phase. However, in DB this can occur either before or after award of the contract. If the owner has the time to complete such a study, it will reap the benefits of more competitive price proposals, while assuming the risk that the preliminary study was not representative of the actual conditions found on the site. However, if the time to do the study is not adequate, the owner will have no choice but to shift that risk to the design-builder and accept that the actual cost of the foundation to the design-builder may be less than the amount that was quoted in the price proposal.

Figure 4-4 shows the conceptual relationship between the amount of owner-furnished design that is contained the RFP and its impact on risk distribution between parties to the DB contract. One can easily see that as the level of owner's RFP design content increases, the owner's risk also increases, and the opposite is true for the design-builder. Now, the figure is merely a conceptual graphic and was not developed using any calculation. What it shows is that for every project there will be a point where the design content and the risk are equitably distributed, and that point is the place where to the two curves cross. This break-even point is where the owner has adequately described all the salient performance aspects of the project while leaving as much room as possible for design-builders to exercise design and construction innovation and creativity through generating their own solutions to the owner-described design problem.

Figure 4-5 relates the level of RFP design content to commonly used terms-of-art for various types of DB contracts. The first type, called Direct Design-Build, occurs when the owner is able to award the contract with very little self-performed design. In commercial development the owner may actually hire the design-builder