Airport Owners’ Guide to Project Delivery Systems

The following document was developed in a joint effort among members of the Airports Council International-NA, Airport Consultants Council and the Associated General Contractors of America
# Airport Owners’ Guide to Project Delivery Systems

*Prepared by*
*The Joint Committee of ACI-NA, ACC & AGC*

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## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>3</td>
</tr>
<tr>
<td>Preface</td>
<td>3</td>
</tr>
<tr>
<td>Introduction – The Four Stops to Project Delivery</td>
<td>4</td>
</tr>
<tr>
<td>Ability to Use Alternative Delivery Methods</td>
<td>4</td>
</tr>
<tr>
<td>Establishing a List of Delivery Options</td>
<td>4</td>
</tr>
<tr>
<td>Project Management Options</td>
<td>5</td>
</tr>
<tr>
<td>Selection Methods</td>
<td>7</td>
</tr>
<tr>
<td>Defining Various PDS and Their Attributes</td>
<td>9</td>
</tr>
<tr>
<td>Overview of Project Delivery Systems (PDS)</td>
<td>9</td>
</tr>
<tr>
<td>Preliminary Comparison of the Primary PDS</td>
<td>11</td>
</tr>
<tr>
<td>Selecting the Appropriate Delivery Method</td>
<td>15</td>
</tr>
<tr>
<td>Factors to Consider in the Selection of PDS</td>
<td>15</td>
</tr>
<tr>
<td>Suggestions for the Selection of PDS</td>
<td>17</td>
</tr>
<tr>
<td>Additional Reference Material</td>
<td>18</td>
</tr>
<tr>
<td>Implementing the Chosen PDS</td>
<td>20</td>
</tr>
<tr>
<td>Contract Types</td>
<td>20</td>
</tr>
<tr>
<td>Contract Language</td>
<td>22</td>
</tr>
<tr>
<td>Management Execution</td>
<td>24</td>
</tr>
<tr>
<td>Financing and Delivery Methods</td>
<td>26</td>
</tr>
<tr>
<td>Appendix A – Industry Studies Comparing PDS</td>
<td>29</td>
</tr>
<tr>
<td>Appendix B – PDS Lessons Learned Questionnaire</td>
<td>33</td>
</tr>
<tr>
<td>References</td>
<td>35</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>36</td>
</tr>
</tbody>
</table>
Abstract

Those involved in airport construction and similar large construction projects are aware that there are challenges to providing safe, quality projects that meet tight budgets with short timeframes. Airport owners and operators, concessionaires and lessees, agency and governmental officials, design professionals and builders all have discussed, experienced, read, or overheard the challenges. Similarly, many have become aware of reports of the growing popularity of having multiple project delivery options available to them.

This white paper presents a list of the widely used project delivery systems (PDS) and offers guidance in selecting the most advantageous PDS. Though many airport projects tend to be significant in scope and cost, the concepts and principles shared in this paper are applicable to capital projects of all sizes.

In addition, we look at the basic options of how project oversight (Project Management Options) can be provided. Project oversight addresses how the owner can manage the work; project delivery addresses the options for designing and constructing the project.

This paper analyzes what conditions influence project success and discusses the types of project conditions for which each PDS is most applicable and offers the greatest potential to deliver a successful project.

Preface

This white paper was jointly developed in an effort among members of the Airports Council International-NA (ACI-NA), Airport Consultants Council (ACC) and the Associated General Contractors of America (AGC). The Joint Committee of ACI-NA – ACC – AGC offers this white paper, "Airport Owners’ Guide to Project Delivery Systems" for general industry use. The Joint Committee recognizes and appreciates that any guidance document should be the result of a broad collaborative effort so that the guidance offered considers and reflects the thoughts and practices of all parties who may be affected by that guidance.

The Joint Committee anticipates additional informational and offering guidance, products and seminars may be produced as a result of this new collaborative relationship among the three organizations. Readers are encouraged to provide feedback and reactions, both positive and negative, by contacting any of the sponsoring organizations included in the ACKNOWLEDGEMENT section at the end of the document.
**Introduction - The Four Stops to Project Delivery**

As an airport owner or facilities professional responsible for the delivery of capital projects, are you able to use alternative project delivery methods? Many airports are either looking for, or already headed down, the road towards using alternative project delivery for a variety of reasons as discussed below. After having observed many of them travel down this road, four distinct stops have become apparent:

Stop 1. **ABILITY/OPTION to use alternative project delivery methods.**

Stop 2. **DEFINITIONS of the alternative project delivery method options.**

Stop 3. **SELECTION of the appropriate project delivery method.**

Stop 4. **IMPLEMENTATION of the project delivery method chosen.**

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**Ability to Use Alternative Delivery Methods**

Only in recent years have publicly-owned airports had options other than design-bid-build for capital improvement projects. Legislation prompted by pressure from industry groups, a desire for change, project overruns and delays, and other factors have opened the door at the state, local and federal level. Revisions to FAA Advisory Circular AC150/5100-14D *Architectural Engineering and Planning Consultant Services for Airport Grant Projects*, dated 30 September 2005, identifies principal changes to the professional services procurement process that added Alternative Delivery Methods to the Federal Aviation Administration's formalized acceptance of a variety of PDS's. Major changes in state procurement laws and codes in states including Arizona, California, Florida and others have also provided options.

Experience has shown that most airport owners who get to Stop 1 (the ability to use alternative delivery methods), skip to Stop 3 and immediately start focusing on trying to select the most appropriate method. Most start out determined to select a project delivery method, but then quickly run into a wall of words with numerous meanings. With the absence of any industry standard, there is confusion and inconsistencies throughout the industry. Eventually, however, all go back to Stop 2 to establish some definitions of the delivery methods at least among their own organizations.

This white paper is focused on defining terms -Stop 2 – to ensure that all stakeholders are speaking and understanding the same language. In addition, this includes some key information required for Stop 3, selection of the most appropriate method for each project to get an airport owner started in its planning and development.

**Establishing a List of Delivery Options**

When the dynamics of an airport (i.e., constantly changing requirements and needs, airline agreements, federal regulations, security badging, state funding compliance, aircraft...
operations, rental cars/food and beverage concessions, etc.) are added to an already complicated development program, the types of approaches quickly multiply. This results in a determination by airport industry leaders that every airport project is unique.

There is no perfect project delivery system so every project should be looked at on a case-by-case basis to determine the most appropriate delivery approach for that project. This said, in this area of project delivery there is very little consensus beyond this point. There is no consensus on what the delivery method options are, which method offers airport owners the highest probability for success on a project, or even on what we mean by the term "project delivery." This white paper, in part based on AGC of America’s textbook, "Project Delivery Systems for Construction", offers one set of delivery options:

- Design-Bid-Build
- Construction Management at-Risk (a.k.a. CM/GC, CMR, CMc)
- Design-Build

These three delivery options are referenced in the FAA’s Advisory Circulars, and are most common in the industry, therefore definitions for each method are offered here. It is likely that some airport owners around the country will agree with the definitions provided, it is even more likely that some will disagree. This is not only understandable, but expected and considered to be a good opportunity for discussion.

The white paper, like the textbook, is offering definitions that airport owners can use as a starting point. The definitions can be a baseline that they can use to establish their own definitions at their own airports. It is expected that airports will choose terminology that is consistent with terms used in their locale or by their legislative bodies. Again, the goal of Stop 2 is to have a list and set of definitions. To do this it is recommended that each airport organization take the time to confirm its own set of delivery options and the definitions for each option.

The term “project delivery” in this white paper generally refers to the assignment of the responsibility for the design and construction services. The responsibility to "manage" the project, oversee the design and construction as well as coordinate all of the parties involved on the airport’s side, is referred to as the "project management”.

**Project Management Options**

**Delivery versus Management**

Before defining the project delivery methods, it is important to distinguish between the delivery and management aspects of project delivery. **Delivery** refers to the method for assigning responsibility to an organization or an individual for providing design and construction services. **Management** refers to the means for coordinating the process of design and construction (planning, staffing, organizing, budgeting, scheduling, and monitoring).

While this difference between Management and Delivery may appear subtle, it is nonetheless important to the understanding of the subject of project delivery methods.
Project Management usually falls into one of two types:

1. In-house
2. Outsourced

In public or quasi-public organizations such as airports, in-house could include resources from various agencies, or other parts of the airport. In-house options could include a variety of areas of expertise such as real estate, planning, design, engineering, construction or project management, or operations.

Common types of outsourced, third-party project management options include:

- Program Management (PM)
- Construction Manager as owner’s Agent (CM)

Program Managers are typically involved in multiple projects or all phases (real estate, financing, design, construction and occupancy) of a single project Construction Managers as the airport’s Agent (or adviser) is typically responsible for a single project and is primarily responsible for the design and construction phases on that project.

There is still quite a bit of confusion in the industry on the difference between a CM at-Risk versus a CM Agent. Based on the definitions offered here, CM at-Risk is a project delivery method and CM-Agency (or CM as adviser) is a form of project management. The quick litmus test to determine which one is being referred to is simply to ask the question, “Is the CM holding the trade contracts?” If the CM is holding the trade contracts, he is “at-risk” and is taking responsibility for the performance of the work (the “performance risk”).

**Leadership versus Administration**

Airport owners using an outsourced entity as an extension of their staff contemplates an administrative relationship between the owner and that entity that does not include a delegation of authority to the entity to bind the airport (although in practice, seconded staff may be viewed as having the same authority as owner personnel, such authority generally does not extend to the entity providing the seconded staff). Outsourcing to a third-party to provide project leadership contemplates an agency relationship between the airport and the third-party firm through which the third-party is delegated authority to legally bind the airport.

The caution offered to airport owners is to be certain when they are using outsourced project management, they know which one it is they are looking for, leadership or administration, and be sure they select accordingly. Too often, owners looking for leadership, often end up getting administrative support. Outsourcing of such responsibility and administration is an option that owners with limited in-house resources available to them may want to address on any project.

**In-house versus Outsourcing**

There are as many different management approaches to large public works programs in the US as there are differences in specific projects. Program management approaches are not only the subject of countless airport industry seminars and panel discussions, but is a topic of continual overall design and construction industry debate. The best approach is the one that is developed considering:
• service to the local community
• acceptance under the local political structure
• available airport (in-house) staffing levels and experience
• available consulting (outside) staffing levels and experience
• constraints of other agreements (airlines) that may impact the program
• cash flow and financial constraints of the various funding sources
• agency (federal and state) funding and regulation compliance

The best program approach is one that fits a given project at a particular airport considering available resources (or the lack thereof) at a defined point in history.

**Study Example**

The following are key factors that might be used by an airport in determining an appropriate management organizational structure for its program. Is there:

• an airline agreement in place at the time the program was initiated?
• airline approval of all project expenditures required?
• airline endorsed funding only available for conceptual design?
• uncertainty of world and US economic conditions that may affect financing?
• uncertainty of the stability of the airline industry?
• uncertainty of the timing of environmental permits?
• uncertainty with respect to federal and state funding commitments?
• extensive need for the application of grants funds to the program?
• a situation that the project is likely to be high-profile and get a lot of attention and public scrutiny?
• a need to rapidly progress the program due to airport passenger growth causing overcrowding of the existing terminal
• extensive executive and staff level experience within the airport organization with large capital programs?
• limited number of airport organization staff?
• benefit from outsourcing certain Program Components such as Financial, Concessions, Land Acquisitions, Design/CM, Grant Assistance?
• a need to maintain control of the overall program by retaining the Program Manager function in-house?

**Stop 3 - Selection Methods**

As movement from strictly D-B-B as “the” delivery system to multiple options has taken place, there has been a significant change to the selection processes utilized.

Historically, Design Professionals and others providing design or “consulting services” to public bodies have been hired on the basis of Qualifications Based Selection (QBS) where the basis of selection is solely focused on professional qualifications and experience. The choice for the Builder in the D-B-B methodology has been solely based on price.

As Construction Delivery has morphed into a “Professional Service” in CM@R and into a hybrid of Design and Construction in Design Build, the selection processes utilized have similarly had significant evolution
Following are commonly used approaches for selecting the builder in all Project Delivery Methods:

**Low bid:** The builder's final selection is based solely on lowest total cost.

**Best value bid:** The builder's final selection is based on some weighting of the total cost and other criteria such as qualifications.

**Qualifications-based selection:** Total construction cost is not a factor in the builder's final selection. Instead, the final selection is based on either Qualifications Based Selection (qualifications only, no element of price) or a combination of qualifications and fees (possibly including general conditions).

It is generally believed that a low bid often provides the most competitive initial construction cost as compared to a qualifications-based selection. However, it is also generally recognized that this primarily holds true for situations where the design and scope of work is well defined at the time of the construction contract. In such cases, the contractor or Builder is willing to assume the cost risk to construct the work as designed, and if all goes well, the owner is assured of a project delivered for the agreed price.

The services of design professionals under the DBB and CM@R methods are selected on a qualifications-based selection (QBS) system. The QBS system is mandated by FAA for the selection of design professionals where AIP funds are involved. Guidance can be found in Advisory Circular 150/510014D. Additionally, many states have what is called "Mini-Brooks" bills legislating the selection of design professionals for DB projects on a qualifications-based selection procedure. The ACC has created a document titled “ACC Consultant Selection Guidelines” which can aid in the selection of Design Professionals under both these Delivery Systems.

Since Design-Build can be implemented with any of the three selection types, it should be noted that the selection of the design professional could be part of a selection process that could include some element of price competition. For projects utilizing federal funding, FAA Advisory Circular 150/5100-4D states that contracting for design-build services can be done by two methods: QBS or Competitive Proposal Selection (CPS). CPS is a two step process whereby the design-build team responds to a solicitation and are short-listed using a QBS process. Then a design-criteria package is issued to the short-listed teams, who respond with separate technical and price proposals. The technical proposals are evaluated first on a numerical “points earned” system, then price proposals are opened and factored into the “points earned” system to determine final selection.
Defining Various Project Delivery Systems (PDS) and their Attributes

Overview of Project Delivery Systems (PDS)

This white paper provides a comparative overview of project delivery system approaches by describing those most widely used together with their primary attributes and strengths. In order to provide clear and unambiguous comparisons, we establish definitions for various project delivery systems and then describe the areas of commonality or difference among those systems.

For this presentation, we distinguish between project delivery systems and contract types. Contract Types are defined as the contractual arrangements by which the parties are compensated as discussed in detail later in this white paper. A project delivery system is defined as ‘the arrangement of relationships among the various parties involved in the design and construction of a project that establish the scope and distribution of responsibility and risk’; it establishes responsibility for how the project is delivered to the owner.

The project delivery system defines who is responsible for each of the various phases of the project (the conceptual design, the detailed design and the construction) and establishes the nature, timing and responsibility for work scope boundaries related to the various transitions and “handoffs” for each of these phases of the project. For example, in the design-bid-build project delivery system, the design and construction are generally performed by different entities and each phase is distinct in both scopes of work and schedule for hiring by the owner.

The project delivery system is the approach by which the project is delivered to the owner, but is separate and distinct from the contractual arrangements for financial compensation. While there exist a potentially infinite number of variations, most of the project delivery systems alternatives fall into one of the following three basic options.

- Design-bid-build (DBB)
- Construction Manager at Risk (CM@R)
- Design-build (DB)

Keep in mind that in all three basic forms of PDS, the Owner is still responsible for overall project management.

Design-bid-build (DBB)

Often considered as the traditional approach, in the DBB project delivery system the project owner or developer hires a design professional to design the project. Upon completion of the design, the design professional prepares a single or multiple packages of construction documents with which to solicit competitive bids for construction. Oftentimes the design professional’s involvement on behalf of the owner continues during construction in the form of administering the construction contract, managing changes, and ensuring general conformance with the contract documents.

Attributes commonly associated with a DBB project delivery system are as follows:

- The owner holds contracts separately with a designer and a builder.
- The design and construction are sequential, i.e. the design is generally completed prior to construction bidding. (A DBB project can be fast-tracked so that construction may begin before design is 100% complete.)
Design changes are easily accommodated prior to start of construction.
Little or no builder input in design, planning or value engineering (VE) is realized.
Procurement begins with construction.
Specifications are prescriptive.
Significant owner involvement and decisions are required.
While costs are predicted through the use of estimates during the design period, cost “surprises” – both good and bad- sometimes occur at the time of bid and award.
Responsibility for project delivery is shared between the designer and the builder.
The owner is responsible to the builder for design errors (via the Spearin doctrine where courts have established that the Owner warrants the adequacy of the plans to the builder).
The owner controls design and construction quality.
Low bid cost and numerous qualified bidders ensure a high level of competition.

**Construction Manager at Risk (CM@R)**

As an alternate to DBB, many projects use a CM@R approach where the construction manager is engaged by the owner to be directly and completely responsible for the construction of the project. The timing of the CM@R’s engagement, which occurs ideally relatively early in the design process has a large impact on his influence in the project. Some owners have found that there is benefit to selecting the CM@R at the same time as the designer, and even further, some have found benefits to hiring the CM@R prior to the design team. Under this arrangement, the CM@R, not the owner, holds the contracts for the construction subcontractors (or self-performs the construction) and so the CM@R is not only responsible for management of the construction, but also is at risk for the construction cost. The additional attributes commonly associated with a CM@R system as compared to a traditional DBB approach include:

- Transfer of responsibility and significant risk from the owner to the CM@R for the entire construction effort, “performance risk”, including subcontract administration and coordination, cost and schedule.
- The CM@R is responsible to each construction subcontractor for coordination, delay or impact on the overall construction effort.
- The owner remains responsible to the builder for design errors (Spearin doctrine).
- The owner retains control of design quality.
- The ability to gain the builder’s input to design, phasing, logistics and value management decisions is increased.
- Daily Owner involvement, required resources and control over the construction effort are less.
- The CM effort may add cost.

**Design-build (DB)**

The DB project delivery system differs from the DBB and CM@R approaches, as the project owner or developer hires a single entity to design and build the project instead of a separate designer and builder. A design professional is no longer directly engaged by the owner as the “designer of record” but rather functions typically as a subconsultant to the DB entity.
In general, the DB concept is not new, having its roots in the ancient "Master Builder" concept. In some instances, the owner may engage an design professional to assist in the development of a conceptual design and to prepare a clear specification of the functionality and performance requirements that the finished project must provide. This practice of having a conceptual design professional on DB projects is sometimes referred to as "bridging".

Design-Builders can be selected with any of the three selection types, low bid, best value bid or qualifications based selections. Since the resulting processes, procedures and contracts can vary considerably, airport owners new to design-build should seek assistance when choosing and implementing different applications of design-build.

Among the issues to consider with DB is that the size of the overall contract and the high bid preparation costs relative to DBB may reduce the number of qualified bidders and limit competition. Also, because the DB entity is responsible for design, the project owner should refrain from imposing design changes and preferences. All such requirements should be included in the performance specifications at the time of contract award. Finally, because the DB entity is often a builder, special insurance may be required to ensure the intended transfer of risk, e.g. for design professional liability or errors and omissions.

Attributes common to the DB project delivery system are as follows:

- The owner holds a single contract with the DB entity for the delivery of the entire project.
- The design and construction often have overlap where construction may begin before design is 100% complete, similar to a fast-tracked project.
- Procurement may begin prior to construction.
- Specifications are performance-based rather than prescriptive.
- A comprehensive and carefully prepared performance specification is required.
- Minimal daily Owner involvement, resources and decisions are required as compared to DBB and CM@R.
- Design and construction quality are primarily controlled by the DB entity as the emphasis is on cost and schedule control.
- Dependent on contract conditions and form, costs are generally known once the DB contract is awarded, and usually, though not always, are fixed no later than the midpoint of design when the scope is firm.
- Transfer of responsibility and most risk from the owner to the DB entity for the entire design and construction effort.
- The ability of the builder to influence design, planning, phasing and value management are maximized.
- Number of qualified bidders and high bid cost may limit competition.

Variations of the DB project delivery system include the terms Engineer-Procure-Construct (EPC) and Turnkey (TK) although, in reality, these variations are little more than differences in terminology among various industries.

**Preliminary Comparison of the Primary PDS**

Having described and defined the various project delivery systems and their respective attributes, differences can be summarized for ease of comparison and then used as criteria for evaluation of options. The comparison focuses on how each of the various project
delivery systems addresses owner goals and objectives and other priorities. Owner’s objectives are understandably consistent: low cost, high-quality, and the shortest schedule. Additionally, a low risk of cost and/or schedule growth is an important owner objective. These primary goals are grouped and summarized as shown below to facilitate the comparison.

- Final cost
- Lifecycle cost
- Schedule duration
- Owner control
- Need for owner resources/expertise
- Owner risk
- Claim potential
- Cost and Schedule growth
- Cost of design changes
- Degree of design completion at construction start
- Prescriptive versus performance specification
- Number of interfaces/points of responsibility

These general comparisons are presented graphically in the charts that follow. It is important to acknowledge that the illustrations on the following charts represent general trends of simple comparison from one extreme to the other. Specific or detailed comparison between each individual project delivery system is not intended by this presentation.
Observing the Owner Risk Profile chart, schedule duration, cost and schedule growth, and number of interfaces all decrease from left to right toward the DB project delivery systems. Consistent with those trends, owner risk also decreases. Necessarily, the converse is true at the DBB end of the chart where project schedule is longer, the number of interfaces greater, the degree of owner risk higher, and the potential for claims or cost and schedule growth is higher. Similarly, observing the Owner Control Profile chart, Owner control of design and quality, and the ability to make design changes with a minimum of impact to cost and schedule all decrease from left to right toward the DB project delivery systems.

Observing the Attribute Trends chart, the degree of design completion at construction start and the need for owner resources and expertise all decrease from left to right toward the DB project delivery systems. In the same direction, design emphasis shifts from low...
lifecycle cost to low initial cost and design criteria becomes less prescriptive and more performance based.

A note of caution to the reader is appropriate for all the above trend charts. While generalizations are helpful in understanding the different PDS, each project delivery system can be modified and tailored to enhance certain attributes or nullify what may initially have appeared as a disadvantage. Furthermore, the method of selection and form of contract also come into play and can alter the above general trends, as discussed later in this paper.
Selecting the Appropriate Delivery Method

Factors to Consider in the Selection of PDS

The next “stop” for airport owners is to determine which delivery option is the most appropriate for a particular project. The airport owner should consider the major factors influencing the project in question and then consider the requirements of the project in light of the unique characteristics of each of the various project delivery options. By applying these major factors, the airport owner should be able not only to recommend a delivery option, but also be able to answer the question, “Why am I recommending a particular delivery option?”

In selecting the appropriate delivery option, a thorough review of the potential risks and their allocation should be performed. Then, the airport owner should evaluate its ability and willingness to assume the risk inherent to the option selected. To accomplish this, each of the relevant factors should be reviewed and considered.

Even though there are a number of factors in making a decision concerning which option to recommend, experience has shown that by the time a few “major” factors are applied, it becomes apparent which options are most or least appropriate.

By the process of elimination, the most appropriate options can be determined. These major factors are divided into five categories as shown in the following table:

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<thead>
<tr>
<th>MAJOR FACTORS WHEN SELECTING AN APPROPRIATE DELIVERY METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Schedule/Necessity to Overlap Phases</td>
</tr>
<tr>
<td>Tight Project Milestones or Deadlines</td>
</tr>
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These Major Factors listed above are certainly not all that need to be considered, but addressing these key considerations will provide airport owners a guide for the selection of the most appropriate delivery option for each project. Furthermore, addressing these early in the project cycle during preplanning or predesign will increase the chances for a successful project.

Just selecting the “right” delivery option is not enough. There are numerous details to be addressed in the next step, implementation, in order to ensure the desired results are achieved. Requests for Proposals that clearly spell out expectations and match the right selection criteria with the right project delivery option are examples of the type of issues that must be addressed when implementing any project delivery option after one has been chosen. These are addressed later in the section, “Implementing the Chosen Project Delivery System.”

Among the most helpful guidance that might be offered to assist airport owners in considering and selecting the best delivery method for their particular project are the experiences and lessons learned by their peers who have already used a new or different project delivery method. To that end, the Joint Committee has initiated the survey and collection of these experiences and lessons learned with the intention of compiling this information and making it available as a supplement to this White Paper.

The Joint Committee has prepared a survey form or questionnaire for this purpose and has already collected feedback from several airport owners on their respective experiences in utilizing different project delivery methods. The Joint Committee is continuing with this process and respectfully requests readers of this White Paper to contribute to this effort by sharing their own experiences, both good and bad. Airport owners are asked to answer the survey questions attached to this White Paper as Appendix B and forward their responses to any of the sponsoring organizations included in the ACKNOWLEDGEMENT section at the end of the document.

**Suggestions for the Selection of PDS**

In selecting the appropriate PDS for a particular situation, the owner should have thoroughly considered the important factors just discussed and understand their relative priority in relation to project success. The owner should recognize the various trade-offs relating to cost, time, quality, control and risk, and select an PDS approach with the proper balance.

The selection process should strive to match PDS strengths to the major factors and project goals and match PDS attributes to the important issues which must be effectively addressed and managed to enhance successful project delivery. The analysis is not so much a question of advantages versus disadvantages but rather to select the PDS whose strengths and attributes best match or align with the factors and goals of importance. A PDS may have attributes viewed as advantageous for one specific project while those same attributes may present a disadvantage for a different project.

To meet this challenge, owners are encouraged to consider and use the understanding gained from this white paper as an aid in evaluating and selecting the PDS most appropriate for their project. Adhering to the following suggested steps will assist owners in their endeavor to select the most suitable PDS to maximize project success.

- Identify and define what goals and objectives are most important to project success for your specific circumstances.
• Identify and define the special or unique issues that must be addressed.
• Recognize the limits of resources and expertise of your owner organization.
• Select the PDS that most effectively can meet or achieve those requirements.
• Recognize and acknowledge the trade-offs made in your selection of a PDS.

For example, in considering the use of DB, the tendency is for an early construction start before design completion in order to shorten schedule. However, once construction begins, changes typically are more costly because they impact a design for which both procurement and construction are underway. The trade-off for the shorter schedule often achievable using DB is higher costs for any design changes that occur. Therefore, if DB is used, owners should freeze the design criteria as early as possible and avoid changes thereafter.

Similarly a trade-off is apparent relating to bid competition. Because the cost and complexity of bidding DB projects is high compared to DBB, the number of qualified bidders and the level of competition often decreases. Therefore, if an airport owner’s procurement rules require a minimum number of bidders or a requirement for significant work to be awarded to small or local builders, the use of DB may not satisfy such criteria.

Other relationships and tradeoffs are apparent. For example, we have recognized the reduction of owner control of design and construction quality in going from DBB to DB (as emphasis shifts from low life cycle cost to low initial cost). Additionally, one should recognize that as more cost and schedule risk shifts to the CM@R or DB contractor as compared to a DBB approach, those risk pressures also may negatively affect design and construction quality.

DB is not a panacea and another word of caution is necessary. Although PDS trends presented in several industry studies show DB to generally exhibit a lower potential for claims and disputes over the design, there have been several very substantial claims arising from disputes about the “design intent” of the owner in regards to issues of quality and functionality. This fact and the other various trade-offs are the essence of an owner's challenge in selecting the PDS that achieves the best balance for the specific project at hand.

Additional Reference Materials

In addition to the above suggestions, the reader is directed to the references at the end of this analysis, for example, to the publications of the Associated General Contractors of America such as their book on Project Delivery Systems and their guides and checklists. Other resources include the Construction Industry Institute’s Research Summary 165 titled Owners Tool for Project Delivery and Contract Strategy Selection dated June 2001 and the associated Implementation Resource 165—2 titled Users Guide dated September 2001. Also available as an aid to the selection process is the Design/Build Selector Tool found at the University of Colorado civil engineering web site.

The result of a study that has been mentioned often in similar discussions has been added to the end of this paper for reference. Appendix A presents the results of a survey performed to identify available industry performance data comparing project delivery systems. A number of references were identified that present the results of existing studies, reports, assessments and similar evaluations by industry groups, universities, and business and industry professional comparing the performance of various PDS. Those results are generally consistent with the trends and comparisons presented herein, but do include some interesting perspectives and insights in that several of the studies may tend to reflect industry group positions. It is valuable to review the opinions of others, but it should
be noted that the control audience was not airports, as such, the findings may not be not directly applicable, but we believe are valuable as a comparison of previous experiences with various PDS.
Implementing the Chosen Project Delivery System

Contract Types

Regardless of the type of project delivery system selected, the contractual arrangement by which the parties are compensated also must be established. This is part of the Owner's overall Project Management responsibilities, separate from, but related to, selection of the project delivery system. The basis for compensation is dependent and conditioned upon, and so must be consistent with, the project delivery system selected and its associated distribution of risk and responsibility between the owner and those delivering the finished project.

The basis of compensation type relates to this financial arrangement among the parties, as to whether the designer or builder is to be compensated for their services at a set amount, i.e. firm fixed price (lump sum), on a reimbursable basis for the cost of time and materials plus overhead and profit, on a reimbursable basis up to a guaranteed maximum amount, on an incentive or award fee basis, or any number of variations of these general contract types. The three primary or common types of compensation approaches include:

- Firm fixed price (a.k.a. lump sum) (FFP, LS)
- Reimbursable (a.k.a. cost plus) (CP)
- Guaranteed maximum price (GMP)

A firm fixed price or lump sum contract is an arrangement where the builder agrees to construct the defined scope of work for a set price. The builder assumes the risk of cost overruns in the construction, realizes any cost savings as profit, and expects to be paid extra for any changes outside its control. In this type of contract, the owner's risk of cost overrun is minimal (assuming no changes, design errors or external impact events like fire or flood, etc.). The builder has incentive to be efficient and lower cost because it can both be more cost competitive at bid time, and also can increase its own profit during construction. The owner does not share in the construction cost savings (unless the contract includes other incentives).

At the other end of the spectrum, a reimbursable or cost plus contract is where a schedule or list of fees, unit prices, rates and markups are established under which the builder performs the work as requested and defined by the owner during the course of the project. The owner assumes the risk of cost overruns in the construction (excluding builder mistakes), the owner realizes any construction cost savings, and the builder is necessarily paid for any changes outside its control. In this contract type, the owner's risk of cost overrun is somewhat greater, however at least the cost for changes is somewhat controlled by the pre-established unit prices and rates. The builder has little incentive to be particularly efficient or save cost for the owner unless specific contract incentives are defined.

Between the firm fixed price and reimbursable contract types is the guaranteed maximum price contract where the builder and owner agree on a target or maximum price for the construction. The builder assumes the risk for cost overruns and the owner realizes any savings if the work is completed for less than the target price. Oftentimes in a GMP contract, the construction initially proceeds on a reimbursable basis using an incomplete design. Once the design is complete, a negotiated maximum price is established. In this case, the cost risk of the incomplete design is managed by the owner, yet the overall construction completion cost risk is finally assumed by the builder, hopefully resulting in the
lowest overall final cost to the owner. In a GMP, much of the cost benefit is to the owner as the cost to the owner is capped and the owner also pockets any construction cost savings.

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Cost Risk to Owner</th>
<th>Construction Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm fixed price</td>
<td>Capped</td>
<td>To the contractor</td>
</tr>
<tr>
<td>Reimbursable</td>
<td>Not capped</td>
<td>To the Owner</td>
</tr>
<tr>
<td>GMP</td>
<td>Capped</td>
<td>To the Owner</td>
</tr>
</tbody>
</table>

These three primary contract types can be modified in any number of ways to best suit a specific project situation and use each type’s strengths to best advantage. Each of the above may be competitively bid or negotiated as this is more a matter of selection type than contract type. Each may be modified through the use of incentives or award fee arrangements to promote certain benefits or manage risk more effectively for the owner. For example:

- Bid or negotiated firm fixed price or lump sum with incentive/award fee (FPIF, FPAF, LSIF, LSAF)
- Bid or negotiated reimbursable or cost plus with incentive/award fee (CPIF, CPAF)
- Bid or negotiated guaranteed maximum price with incentive/award fee (GMPIF, GMPAF)

Furthermore, each type may be competitively bid or negotiated (as this is more a matter of selection type than contract type).

As discussed earlier in how to select the best project delivery system for your specific project, the type of contract and the compensation approach similarly should be selected to best suit the project situation and the needs of the owner and its various design and construction service providers. While use of a specific project delivery system does not mandate use of a specific contract type, the selection of contract type should be consistent with the allocation of risk and responsibility defined in the selected project delivery system. For example, a DB project delivery system can be executed using a LS, GMP, or other similar type of contract, but may not make as much sense with a cost plus financial arrangement.

With a lump sum contract, if the design or scope of work is not well defined or complete at the time of the contract, there is risk that the cost to construct the work may increase significantly. Who assumes that risk and how it is allocated is an important consideration in selecting the type of contract. If an owner still attempts to transfer that risk to the builder, the lump sum price will likely be higher cover the builder's cost risk for the incomplete design. Additionally, an Owner may still face costly change orders for final design elements not reasonably inferred from the incomplete design documents. Here we see that a lump sum contract may not result in the lowest final total cost to the Owner or be the best option. In such instances, a cost plus reimbursable, guaranteed maximum price (GMP) or other type of contract could be considered.

The following graphic provides some guidance in this regard.
Additionally, the selection should strongly depend on factors such as the degree of design completion and scope definition at the time of the contract and the parties' tolerance for cost risk.

The various tradeoffs to consider in that regard revolve around overall cost risk, the cost of changes, and the incentives to control those costs. A lump sum contract is generally beneficial when the design is well defined and a cost plus when it is not. Incentives can be used to enhance the risk management benefits of cost plus contracts.

Other cost risk factors to keep in mind relate to how each contract type may promote cost control. By its nature, a lump sum contract incentivizes the builder to control cost because the builder reaps the savings and can offer more competitive pricing to the owner. However, because the builder also assumes the cost risk for overruns, changes to the design or other changes to the work may be costly for the owner. On a cost plus contract, the owner’s cost for such changes may be lower because the builder is not at risk, however, without separate incentive clauses, the builder is less motivated to be efficient in its work.

**Contract Language**

The purpose of the formal Contract is to memorialize the agreement of the parties regarding the selected project delivery system approach, the allocation of work scope, responsibilities, and risk, the arrangements for financial compensation, and similar aspects of the project. It is important to ensure that the terms and conditions of the contract reflect the goals, objectives, issues and expectations for the project and memorialize all the various understandings in that regard.

Often by definition within the basic document, a Contract typically includes several separate documents including a basic agreement of general terms and conditions, additional or special conditions unique to the project, and the terms for payment, PLUS all other supporting documents necessary to further define the nature and extent of work such as the
schedule, the drawings, specifications and any other technical requirements for the work. Generally these supporting documents represent deliverables prepared by the design team.

The basic Contract often begins with the Owner’s standard contract terms and conditions, if such a document exists. In lieu of an Owner’s form, there are several readily available general contract forms such those prepared by the American Institute of Architects (AIA), the Associated General Contractors (AGC), and the Engineers Joint Contract Documents Committee (EJCDC). These basic starting documents should be carefully reviewed and edited to tailor them for consistency with the specifics of the project and with the various agreements discussed above. The resulting Contract and all its supporting documents should be read and reread to exclude conflicting language and requirements, ambiguous language and requirements, and exculpatory language that is inconsistent with the agreed upon allocation of risk and responsibility.

The Contract should clearly describe the various agreements with specificity, because generality becomes ambiguity and ambiguity is a major source of dispute in construction matters. Specificity is beneficial to dispute avoidance. Specificity also requires one to think through the various components of project execution, a valuable exercise that exposes conflicts, omissions, and misunderstandings regarding the roles and responsibilities of the parties. This exercise promotes recognition of the practical ramifications of what the parties are about to agree to in terms of their execution risks and responsibilities. And from that risk perspective, exculpatory language, which sometimes is used to transfer unreasonable risk to the other party, should be reconciled with the risk allocation intended by the selected PDS and the related agreements.

Of particular note regarding contract language when specifically using a DB approach concerns state rules governing the practice of architecture or engineering which may preclude a construction firm (not also licensed as an architect or engineer) from leading a DB team or executing a DB contract. Similar concerns relate to professional liability E&O insurance coverage exclusions for design firms participating in DB projects and the potential inability of the DB firm, with whom the Owner’s contract is written, to obtain its own E&O coverage.

Furthermore, all parties need recognize that disputes over scope, quality and other issues may still arise, particularly in today’s complex fast-paced projects. Consequently, it is important that the Contract define how such disputes will be handled in a manner to minimize disruption and cost/schedule impact to the project. One method is to consider the use of alternate dispute resolution (ADR) approaches such as Project Neutral®, dispute review boards, or other approach focused on quick problem resolution. For example, if changes during construction are anticipated, the contract language should define how those changes will be managed and their cost and schedule impact minimized.

Finally, Owners can consider engaging legal assistance by those attorneys experienced in construction matters for crafting effective contract language. Additionally, an internal or external independent review by construction or dispute resolution experts can be beneficial, i.e. by someone who has done it before successfully or, perhaps of more benefit, by someone who has seen how not to do it.
**Management Execution**

As discussed earlier, Management refers to the method by which the Owner coordinates and oversees the planning and execution of the overall project including conceptualization, budgeting, scheduling, design and construction, and major decision-making. In short, it refers to how the owner carries out its responsibilities as compared to how the design and construction firms carry out their collective responsibilities.

At the time the Contracts for design and construction are about to be executed, it can be beneficial for the Owner to take a brief step back from among the trees and view the forest again. Review the selection criteria that drove the choice of project delivery system, including those relating to Owner involvement, ability to manage and oversee the work, staff availability, staff experience, desired degree of involvement in design decisions, and desired level of construction oversight.

Effectively communicate to your various team members (design professionals, CM’s, contractors and consultants) the goals, objectives and issues that drove the selection of project delivery system. It is important they understand and commit to an owner’s expectations. Consider holding a reconciliation meeting with the selected construction contractor to confirm everyone’s understanding of roles, responsibilities, risks and expectations and to ensure they are clearly defined and measurable. Walk through the project and how project interactions will be managed on a daily basis. Such meetings have proven effective in exposing potential misunderstandings, problems and disputes.

Define any review and approval processes, the turnover and acceptance process, handoffs and transitions of responsibility, and similar interfaces. Take the time to iron out the details and tough spots as to how it’s all supposed to work. Avoid easy deferrals like “we’ll deal with that if it happens”. It’s significantly better to thoroughly plan how the project delivery will be managed and how problems will be managed proactively and not reactively. Assess potential risks and plan how you will manage the overall program, internally or via a program management consultant.

Equally important as having an Owner’s implementation and management plan is to recognize that the plan may have to be significantly different from an Owner’s traditional or typical management approach depending on the project delivery system selected. For example, if an Owner's internal design and engineering staff typically participate in detailed design reviews, material and equipment selection, or dictate construction quality and requirements, AND the Owner is undertaking its first design-build project, a change or adjustment in management style is imperative to project success. Design-build should not be considered business as usual, and adjustments to philosophical and behavioral attitudes within your own organization may be appropriate.

By selection of the design-build approach, the Owner delegates or assigns responsibility AND authority for many of those reviews, approvals and decisions to the design-build entity in return for contractually promised reductions in project cost and schedule. If the Owner continues to manage and interject itself into the project as if it is a DBB project, the benefits and success of the DB process likely will be compromised. Commit to the appropriate level of owner involvement, e.g. support a planned heavy Owner involvement with timely and informed decision making so as to not delay or impact the project. Conversely, avoid imposing owner changes or controls on DB contracts.
Remember, the Owner’s job is not done once the selection of a PDS is made. In fact, it is just beginning as other management actions and commitments are necessary to ensure project success.
Financing and Delivery Methods

Airport owners choose a delivery method with the same methodical approach it uses when determining the appropriate funding source for a project; projects that the airport wants the most control over will be funded by airport revenue sources, and those projects that can be regulated heavily by the federal government will use federal funding.

Similarly, the application of a delivery method should include consideration of its funding source.

Although there is a broad spectrum of financing options for airports, and more options evolve as needs and opportunities arise, typically, airports have relied on four primary sources of financing: federal assistance (FAA and now TSA), passenger facility charges (approved by the FAA), bond sales, and capital expenditure of airport revenue.  

Federal Funding

Consider first federally compliant financing, meaning that receipt of the funds mandate that accounting procedures be in accordance with Federal Acquisition Regulations, commonly referred to as being “FAR compliant”. Most FAA funding of Capital Improvement Programs or Airport Improvement Programs is allocated in “grants” - not needing to follow FARs for accounting-, but recently some of the Memorandums of Understanding from the TSA for security upgrades have been somewhat unclear on the regulatory expectations relative to accounting. If FAR compliance is required, it means a significant amount of documentation is required by the owners and its consultants. Therefore the selection of the proper delivery method, and the selection of firms that an airport can rely on to meet the procedural requirements, are important. There are rules associated with government audited overhead rates, fee allowances, etc , so “FAR-compliant” projects should be limited to those that lend themselves best to government audit and government accounting procedures, like security work with security contractors. The delivery system might be best determined based on simplicity, rather than complexity due to the serious risks of non-compliance.

In addition to FAR compliant funding, the federal government (FAA) authorizes federal grants to approved projects. This funding is often part of a long-term project, but must be requested annually. Therefore, cash flow and compliance with an FAA approved schedule is important. There are other ‘strings’ tied to federal grant monies, all identified as guidelines in the FAA Advisory Circulars, like competitive pricing of construction services, compliance with Davis Bacon laws, and good faith efforts to include disadvantaged business enterprises. Recognizing the airport owner is ultimately responsible for all compliance associated with its grants, owners must ensure all expectations are clearly written into the contract. Particularly when a design/build or construction management at risk delivery method is employed, owner should identify appropriate checks and balances since much of the “control” is transferred to the builder during construction.

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1 Private developer funds have been used at some airports for major capital programs, but most developer-led projects are tied to ancillary facilities where design aesthetics and owner control is non-critical. Generally speaking a developer-led delivery system is typically design/build since the developer is bringing the financing; it is given leeway to manage all facets of the project.
State Funding

In addition to federal funding, many states offer grant assistance for capital improvement projects through various programs. The state programs provide matching resources or some fraction thereof towards resources provided by the federal program. Other types of dispersion provides for state funding to an airport as the sole funding source. As with acceptance of federal funds, the receipt of these state funds, restrictions and/or "strings attached" may be placed upon the sponsor (airport) with regards to pre-approval of project related expenditures or other incurred related obligations.

Furthermore, the sponsor upon receipt of state funding, may experience limitations such as not being allowed to execute any contract or to obligate itself in any manner requiring disbursement of the State’s funds without the agency’s prior approval. These assurances could apply to third party agreements such as consultant, construction or purchase of commodities contracts or amendments thereto. Failure to comply could jeopardize the State’s intended payment to the airport. Some states, for example, reserve their right to review the qualifications of any consultant or builder and to approve or disapprove the employment of the same.

Similar to the obligations under a federally funded project, state assistance can also add another layer of compliance such as the following: competitive pricing of construction services, auditing and monitoring rules, required project record retention, involvement by the state in the airports selection process of professional consultant services, compliance with Equal Employment Opportunities, Davis Bacon laws, Civil Rights Acts, American with Disabilities Act, and good faith efforts to include disadvantaged business enterprises.

Grant acceptance agreements for state funded programs, similar to those providing federal assistance, recognize the airport owner as the entity to be ultimately responsible for all compliance associated with its grants. This burden positions the owner to incorporate all such requirements within the respective contracts to protect eligibility and reimbursement of project costs.

Bond Funding

For an airport to buy bonds, (revenue, special purpose, city-backed, etc.) for a project, investor confidence is very important. Project definition, cost analysis and budget commitment, as well as delivery schedule are critical. No authority wants to buy too many bonds, too few, too early or too late. And investors want assurances that not only is the data accurate at the time of the sale, but also that there is confidence in the team that is going to implement the project. That team might include the bond rating (or at least the reputation) of the city, the airport and possibly even the designer and builder. The distribution of leadership could affect a bond sale or rating. In addition, highly complex projects with significant "unknowns" are the weakest candidates for bond funding due to the inherent risks of the jobs.

Airport Cash and Revenue Funding

Airports that are cash rich or have consistent revenue streams are in the best position to choose any delivery method without outside concerns influencing or being influenced by the method of delivery. That is not to say that controls, accuracy, quality consulting firms and meeting commitments are any less important. The greatest risk when funding a job through airport revenues is the volatility of airlines, airline operations and lease...
agreements. Although airports have initiated very short term leases and shared use facilities to maximize flexibility in dealing with the airlines, the down-side to flexibility is inconsistency. When a multi-year program requires significant funding, and the funding needs to be in place as the work proceeds, inconsistency can be a challenge. Therefore, although revenue funding may not affect a delivery method, it may affect the type of project that it funds. For instance, smaller projects of shorter durations might lend themselves best to cash funding, and those are also ideal criteria for design build delivery.
Appendix A

Industry Studies Comparing PDS

The strengths and comparisons presented up to this point in this white paper were developed based on experience based subjective intuitive assessments of likely trends given the nature and definition of the structure, relationships, and responsibilities of the parties for each of PDS evaluated. For example, as the number of interface points increases it was considered to follow that the potential for problems, disputes, and resulting cost and schedule impacts would also increase. Similarly, owner control was considered to necessarily decrease as the contractual responsibilities for design and construction transferred to other entities.

As a result, these trends and comparisons reflect gut judgment and intuitive logic of cause-and-effect, which necessarily begs the question “what is the actual performance record of these PDS?” To answer that question, a survey was performed to identify industry performance data available in existing studies, reports, assessments and similar evaluations by industry groups, universities, and business and industry professionals. A number of good references were identified that present the results of studies comparing the performance of various PDS. Those results are generally consistent with the trends and comparisons presented herein, but do include some interesting perspectives and insights.

For example, the University of Colorado published the results of a study in 1997\(^5\) that found that:

...owner's most frequently select design-build to shorten schedule duration. Owners expect that the single point of responsibility and the ability to fast-track design and construction inherent in the design-build process will shorten the delivery process.

Also in 1997, at the Design-Build Institute of America's annual conference, the Construction Industry Institute presented findings from a national study (Research Summary 133 -- 1)\(^6\) which evaluated three project delivery systems, DB, CM, and DBB. The findings are summarized on the following three graphics from that study which found DB to have the lowest cost and schedule growth and the shortest schedule duration followed by CM and lastly followed by DBB.

![Figure 2.1. Design and Construction Cost Growth](Ref. 6)
In November 2002, the National Institute of Standards and Technology\(^7\) compared DB and DBB by measuring the impacts of the delivery system on project performance. In performing the study the researchers solicited opinions from both owners and from builders. While the results are generally consistent between the two, some disparity was identified indicating a difference in perspective between owners and builders as to which project delivery system outperformed the other.

The findings indicate the use of the DB project delivery system tended to outperform DBB for projects submitted by owners, exhibiting better performance in terms of cost, schedule, changes, and rework. The results were not as clear cut for builder-submitted projects where DBB projects outperformed DB projects in schedule, although DB projects had better performance in changes and rework.

**Table ES.1 Summary of Overall Performance and Practice Use Outcomes**

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Schedule</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Owner</td>
<td>Contractor</td>
<td>Owner</td>
</tr>
<tr>
<td>Overall</td>
<td>DB(^1)</td>
<td>--</td>
<td>DB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Changes</th>
<th>Rework</th>
<th>Practice Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Owner</td>
<td>Contractor</td>
<td>Owner</td>
</tr>
<tr>
<td>Overall</td>
<td>DB</td>
<td>DB(^1)</td>
<td>DB</td>
</tr>
</tbody>
</table>

\(^1\) Observed difference, not statistically significant

\(--\) No difference in performance

**Bold** indicates significant difference, \(p \leq 0.05\)
The details of the study also are quite interesting in highlighting deviations from the above summary level findings based on the specifics of the project type, size and complexity and whether the project is grass-roots or renovation/modernization.

Among the most comprehensive and informative assessment is a study published in April 2002 by the State of Illinois\(^8\). The study evaluated single prime versus multiple prime and design-build versus design-bid-build, compared the project outcomes and opinions of various agencies, owners and builders, and further surveyed the practices and opinions of half of the 50 US states and several major cities. The particulars of the survey responses are most informative in highlighting the perceived relative advantages and disadvantages of the PDS studied. Again, a difference in perspective was noted between builders and owners and particularly between general contractors and specialty contractors.

In comparing a single prime versus multiple prime contract management approach, the study found that the multiple prime project approach cost 10% more than single prime, and that the multiple prime approach results in higher bid costs, increased administration, more change orders, and poorly coordinated work. It was noted that single prime general builders are skilled and experienced in coordinating the various subcontractors and suppliers, and further provide a single point of contact for responsibility to the owner. The use of the single prime project delivery system can be expected to decrease design cost, change order cost, and litigation cost with no significant increase in construction cost. The study reported the results of a survey wherein 26 states of 32 states contacted responded they primarily used the single prime project delivery system and only five use multiple prime.

The Illinois study reported the findings of other studies that preferences and opinions regarding single vs. multiple prime seem to be driven largely by the particular interest of the party, i.e. general contractor, specialty contractor, or owner. For example, New York City reported that single prime is less expensive while the Illinois Mechanical and Specialty Contractors Association concluded that multiple prime is less expensive.

<table>
<thead>
<tr>
<th>OVERALL CONCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYC – Single is less expensive.</td>
</tr>
<tr>
<td>North Carolina – Single and multiple both cost the same.</td>
</tr>
<tr>
<td>IMSCA – Multiple is less expensive.</td>
</tr>
<tr>
<td>Electrical Contractors – Multiple is less expensive.</td>
</tr>
<tr>
<td>Peoria – Single is less expensive.</td>
</tr>
<tr>
<td>CII – Design/build is less expensive</td>
</tr>
<tr>
<td>Washington – General contractor as contract manager is less expensive.</td>
</tr>
</tbody>
</table>

(Ref. 8)

The study also compared to DB versus DBB reporting that over 80% of the states that responded to the survey had used DB although such use was often reserved for uncomplicated projects or projects that needed to be completed quickly. Federal government agencies such as the GSA use DB for approximately 10% of their projects. The DB approach was found to require early and clear definition of project scope and functionality requirements by the owner because later changes are more expensive than for
DBB. This was viewed as a disadvantage by owners who anticipate requiring design changes late in the project. It was generally reported by most of the states using DB that project delivery was quicker and required less owner resources to manage. The reporting states also noted their reduced ability to provide owner input and control, so clearly there are trade-offs.

In summary, the findings of all of these various reports, studies and surveys reviewed herein appear to corroborate the trends and comparisons presented on the charts subjectively and intuitively developed in this analysis. The referenced reports and studies do include significant detail and report performance results actually experienced by private and public sector owners across the US providing important insights for consideration when selecting a PDS. Nonetheless, the selection process remains a challenging one for owners and developers given the myriad of considerations discussed in this analysis and in the referenced reports.
Appendix B

PDS Lessons Learned Questionnaire

Have you ever used the Design Bid Build Method (if no, skip to question 11)?

1. How many times have you used this delivery method on a construction project?
2. Why did you choose this method?
3. What were the actual benefits of using this method?
4. What were the drawbacks?
5. What challenges/obstacles surfaced as a result of this method?
6. Will you use this method again?
7. If so, what will you do differently?
8. What management approach do you prefer to use when implementing this method?
9. What contracting methods do you prefer to use?
10. What selection method do you prefer to use?
11. If you haven’t used this delivery method:
   - Why haven’t you?
   - What do you perceive the benefits to be?
   - What do you perceive the drawback to be?

Have you ever used the CM-at-Risk Method (if no, skip to question 11)?

2. How many times have you used this delivery method on a construction project?
3. Why did you choose this method?
4. What were the actual benefits of using this method?
5. What were the drawbacks?
6. What challenges/obstacles surfaced as a result of this method?
7. Will you use this method again?
8. If so, what will you do differently?
9. What management approach do you prefer to use when implementing this method?
10. What contracting methods do you prefer to use?
11. What selection method do you prefer to use?
12. If you haven’t used this delivery method:
   - Why haven’t you?
What do you perceive the benefits to be?
What do you perceive the drawback to be?

Have you ever used the Design Build Method (if no, skip to question 11)?

3. How many times have you used this delivery method on a construction project?
4. Why did you choose this method?
5. What were the actual benefits of using this method?
6. What were the drawbacks?
7. What challenges/obstacles surfaced as a result of this method?
8. Will you use this method again?
9. If so, what will you do differently?
10. What management approach do you prefer to use when implementing this method?
11. What contracting methods do you prefer to use?
12. What selection method do you prefer to use?
13. If you haven’t used this delivery method:
   • Why haven’t you?
   • What do you perceive the benefits to be?
   • What do you perceive the drawback to be?
References


2. "Project Delivery Systems for Construction“, Associated General Contractors of America, 2004


Acknowledgements

The writers wish to thank the ACI-NA, ACC and AGC for the privilege to serve on the Joint Committee charged with the preparation of this white paper and for the opportunity to work with a team of dedicated, knowledgeable and experienced professionals. Our charge to prepare this “Guide to Project Delivery Systems” was accepted with the understanding that such an assignment is never truly completed and any resulting white paper is never finalized. As new permutations of existing delivery systems are developed and other forms of project delivery attempted, and as lessons learned from both project success and failure are factored into the selection and implementation process, guidance documents must be updated and modernized.

That philosophy is central to this Joint Committee. Such knowledge gained will be incorporated into updates and revisions to this white paper “Guide” and the Joint Committee members all welcome the participation of all interested parties in such future efforts.

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