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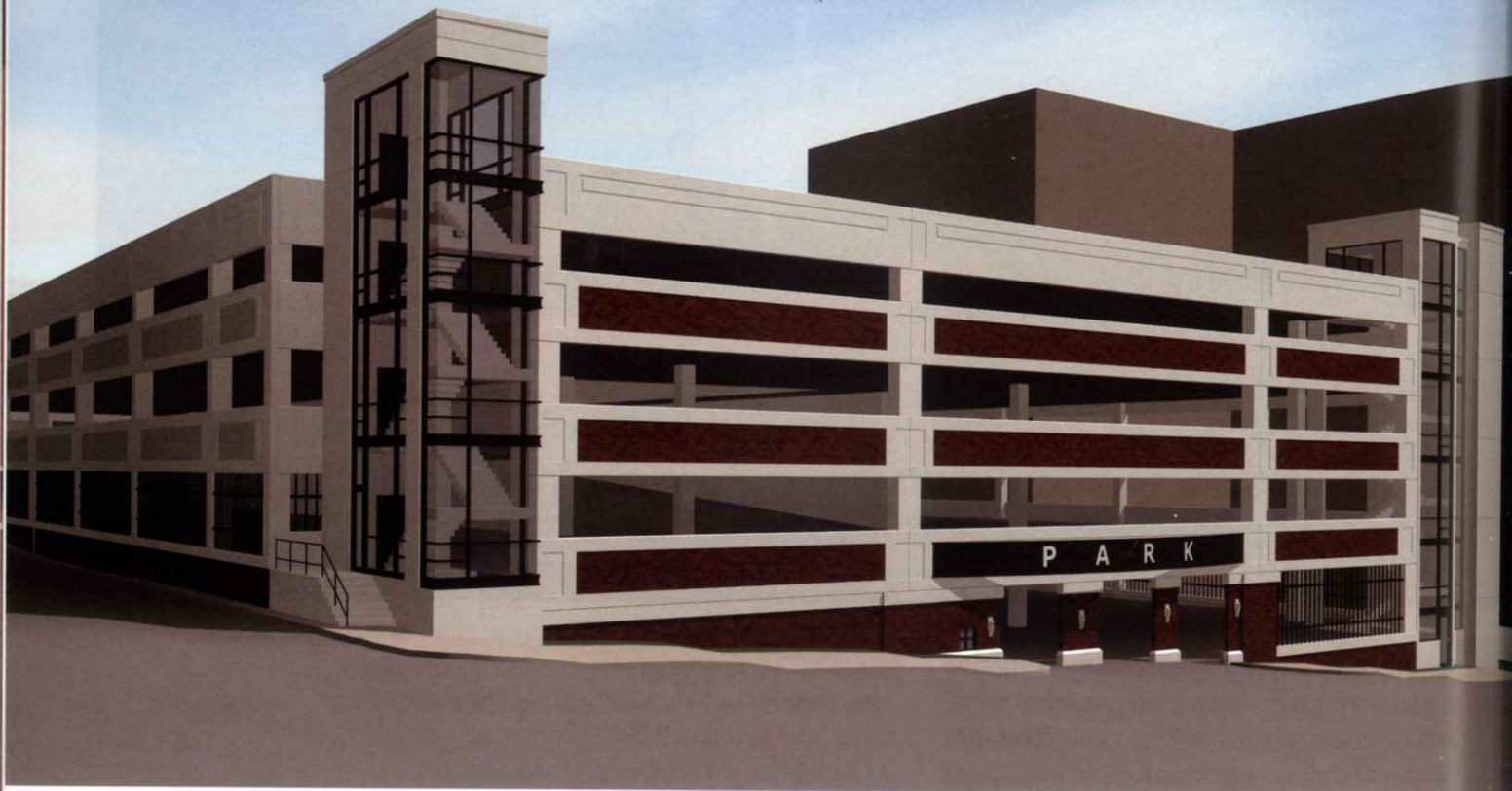
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Everything Old is New Again



By Barbara Darraugh

When the ancient Greeks envisioned their great temples, public buildings, and civil works, they sought out master builders to design and construct their buildings. The master builders accepted full responsibility for integrating design with functional performance and assumed full accountability for delivering the finished product.

Today, design/builders, like the master builders of old, want full accountability for architecture, engineering, and construction. They are delivering quality design for less money by offering streamlined processing and comprehensive services available through a single source.

For example, a new garage in downtown Pittsburgh, built by the Sports and Exhibition Authority, contains 1,321 parking slots and cost approximately \$28 million (\$21,196 per parking space) on a design/bid/build model. Another garage

built in Washington, Pennsylvania, not far from Pittsburgh, delivered 850 parking spaces at a cost of about \$11.8 million (\$13,882 per parking space). "The difference in cost had to do with the mode of delivery," David Monroe, president of Carl Walker Construction and design/build of the Washington Crossroads parking facility, said. In the downtown Pittsburgh garage, "design features drove the cost," he explained, while in the Washington garage, "cost drove the design features."

Defining Design/Build

Under the traditional design/bid/build (DBB) delivery system, the owner commissions the design through an architectural or engineering firm; and, once the design is complete, hires another firm to build the project after going through a bidding process. The architectural/engineering con-

tract is usually based on subjective criteria of the architect's qualifications and experience. This initial contract generally accounts for a relatively small portion of the project's total costs—5 percent to 10 percent. After detailed project plans and drawings are completed, a contractor is selected to perform the construction work. In most cases, the contract is awarded through competitive bidding.

A variation of design/bid/build is the design/bid/build with a construction manager. In this variation, the owner selects and contracts with the architect/engineer and a construction manager. The architect/engineer and the construction manager work

Figure 1. Design-Bid-Build Process

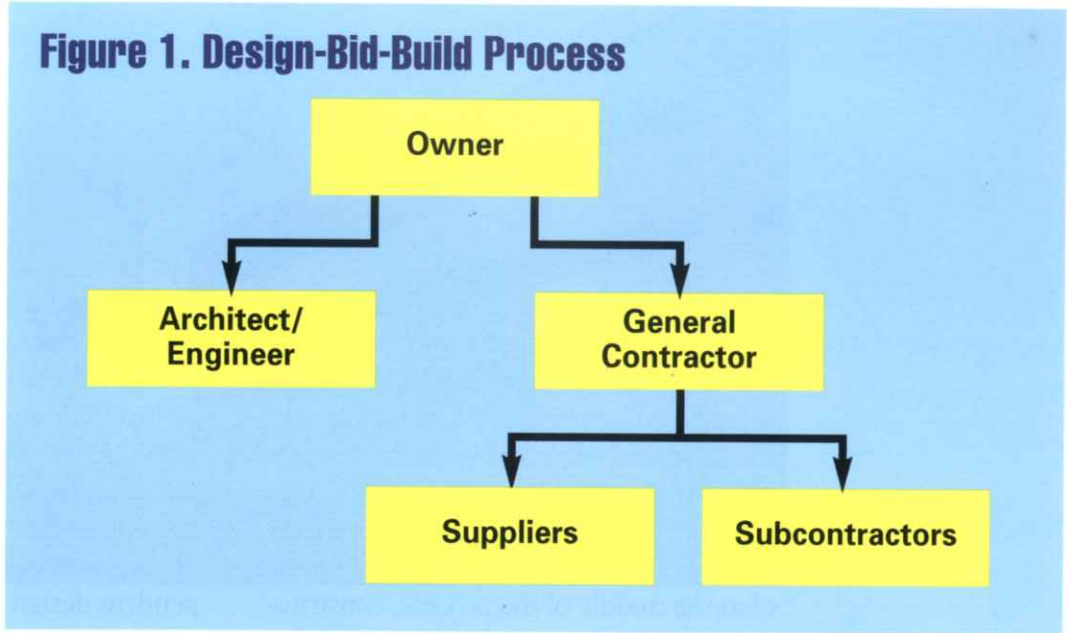
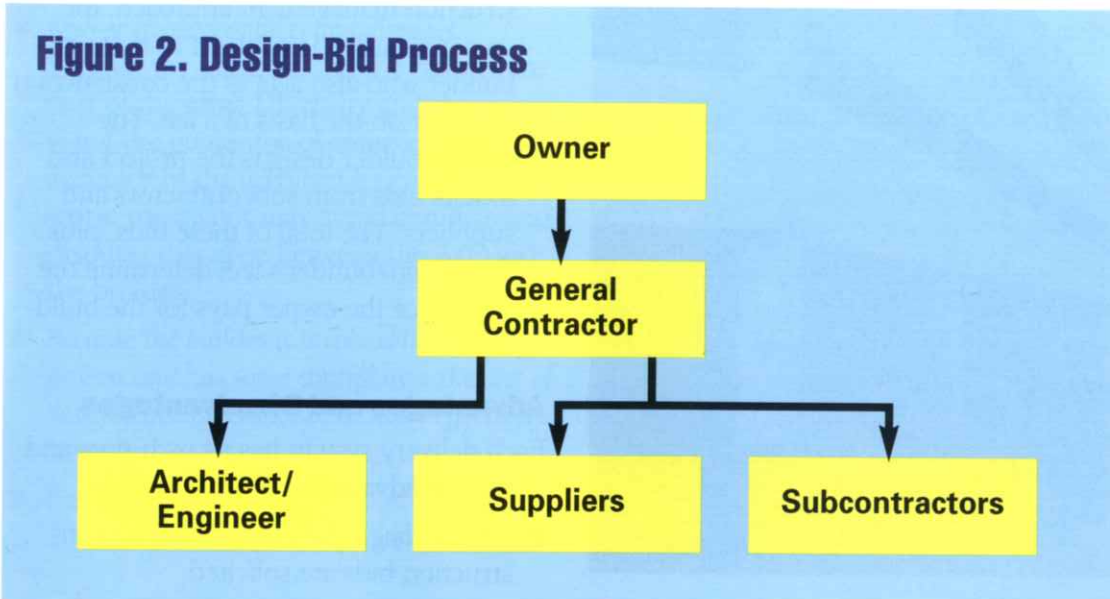


Figure 2. Design-Bid Process



together to define the project and prepare plans to meet the owner's specifications. The construction manager also sets the construction schedule and estimates construction costs. The construction manager then handles the bid process for the construction trades. By bringing the construction manager in on the "front end" instead of in the middle of the process, construction times be shortened.

In contrast, design/build (DB) is a project delivery system under which the design/builder forges a single contract with an owner to provide for architectural, engi-



neering, and construction services. The design/builder, serving as a general contractor, in turn subcontracts, through competitive bidding or otherwise, for an architect/engineer and various construction trades. Design/builders may have architects and engineers in house to provide the design services or may contract with independent design firms to provide these services in the same manner as other trades are contracted. In either case, the design/builder assumes the responsibility for the design as well as the construction.

Design/build delivery systems have a number of variations, but most fall into one of two categories:

- **Stipulated price.** Under a stipulated price contract, the owner specifies how much it will pay for the construction of a particular building. For example, the owner might provide only a programmatic description of the building it wants by specifying the size of the building, the types of spaces, and perhaps acceptable construction materials.
- **Construction management.** With a construction management approach, the owner awards the contract to a design/builder who also acts as the construction manager on the basis of a fee. The design/builder designs the project and solicits bids from subcontractors and suppliers. The total of these bids, plus the design/builder's fee, determine the total price the owner pays for the building.

Advantages and Disadvantages

Each delivery system has its own pros and cons. The advantages of DBB include:

- *The building is fully defined before construction bids are solicited.*



- *Competitive bidding may result in lowest costs for the project as defined.* Design features may drive costs up, however.
- *Quality control is defined.*
- *Contract award is objective.*
- *Small contractors have good access to the process.*

DB using a stipulated price model also has many advantages:

- *Price certainty.* Perhaps the biggest advantage of DB with stipulated price is that the owner has the best certainty of the cost of the project at its outset. This is because the price can be established before the owner solicits proposals for construction.
- *Owner avoids conflicts and disputes.* Because the designer and the builder are part of the same DB entity and the owner is not the guarantor of completeness and accuracy of the architect/engineer's work, the owner may avoid conflicts and disputes that arise between the A/E and the builder.
- *Because the builder is involved in the design process and has some control over the cost of design features, costs can be more effectively controlled.*
- *Faster project delivery.*

However, each delivery method also comes with pitfalls. For DBB work, they include:

- *Owner gets in the middle of disputes between the builder and the architect/engineer.*
- *Builder is not involved in the design process.*
- *Project completion may be slower.*
- *Project price is not certain until the construction bid is received.*

The DB system also has drawbacks:

- *Limited assurance of quality control.* Because the building the owner wants isn't defined in detail at the time it enters into a DB contract, there is limited basis for enforcing a contract and the owner may have little control over the quality of the construction work.
- *Subjective contract awards.* Contracts are usually based on subjective criteria, such as experience, qualifications, and best value.
- *Limited access for small contractors.*

Growing Trends

According to the Design/Build Institute (DBI), the interest in design/build in the U.S. has greatly accelerated, making this delivery method one of the most significant trends in the design and construction

Case Study: Washington Crossroads

The city of Washington, Pennsylvania, came into existence as, literally, the crossing of major roads. Today, it sits at the intersection of Interstate highways 70 and 79 and Pennsylvania Route 19. In recent decades, it has suffered from the malaise that has affected so many other small towns—the deterioration of the city's downtown area.

Millcraft Industries has come to the rescue. It is planning a \$100 million "revitalization" that will overhaul 14 blocks of the downtown area, eventually including a hotel, stores, entertainment venues, and an office complex that will create an estimated 900 jobs.

The development is split into three phases: Phase I will include the hotel, an office building that will house Nationwide Appraisal Services Corporation, a parking facility, an outdoor park and amphitheater, and a residential project. Phase II will include another parking facility, retail space, and 111 loft apartments and townhouses. Plans for Phase III may include mandatory façade improvements and more development.

Carl Walker Construction was selected by Millcraft to design and build the first garage in the overhaul. The garage will contain 850 new parking spaces. Millcraft put out a call for proposals, specifying that the garage should be approximately 360 feet by 200 feet, include 1,200 parking slots, and include the relocation of utilities and construction of an access driveway, all to be included for a price of \$14 million. Anyone bidding more than \$14 million would not be considered. The goal, according to David Monroe, was to get as close to the 1,200 parking slots as possible without exceeding the \$14 million budget.

Once the bids were submitted, Millcraft realized that it did not have \$14 million to invest in the garage. They then negotiated with Carl Walker Construction to construct a garage, with as many parking spaces as possible, for \$11.5 million. Carl Walker Construction then "value engineered" the project down, basically reducing the size of the facility from 1,200 parking spaces to 850 spaces, as well as eliminating some design features.

Construction of the garage began in April 2006 and is expected to be finished in February 2007, in time for the opening of Phase I of the Washington Crossroads project.

industry. The American Institute of Architects notes that the design/build approach is "attracting a lot of attention, because owners, including government agencies, are finding it attractive [for] complex and unusual projects, because it... eliminates some of the major seams in getting a project built."

DBI says that DB is currently employed in more than one-third of all U.S. nonresidential construction and will shortly become the predominant mode of project delivery. The method is becoming increasingly accepted for public works projects of all types, the Institute says, noting that, in 2004, 26 states had legislation making DB an acceptable means of project delivery and another 16 allowed for some type of DB delivery under special circumstances. Only 8 states still prohibit it entirely.

Several demographic and technological trends are driving the growing use of design-build projects in both the public and private sector. Richard A. Belle, a researcher for DBI, lists the five "key industry drivers":

- *Location of future design and construction work.* As recently as 1990, about two-thirds of infrastructure construction projects were in developed, industrialized countries. By 2020, he estimates that two-thirds of construction projects will be in developing countries, which "places a premium on flexibility and creativity," Belle notes.
- *Increased focus on energy efficiency.* Futurists believe that by 2015 about four-fifths of the world's largest cities will also be in developing countries. These countries usually have limited power generation capabilities, and those design/builders that can best use limited resources will have a distinct advantage when bidding on contracts.
- *Renewed emphasis on sustainability.* Careful attention to such areas as alternative fuels, dual-use technologies, and global warming makes integrated approaches to land use and project life-cycle essential, Belle says.



- *New construction materials.* High-performance concretes, fiber-reinforced polymers, geosynthetics, high-strength steels, so-called “smart materials,” and renewable materials will change the way buildings are constructed. Design/builders who adapt these materials to public and private garages will have a competitive advantage.
- *Democratization of information technology.* The “constantly accelerating” evolution of information, from video conferencing to 3-D image processing, provides an “unprecedented array of construction tools,” he adds. “It is often the small start-up company that is most sensitive to the range of possible applications.”

These trends will make an “integrated approach” to design and construction essential, Belle concludes. That approach must maximize opportunities to make effective use of the trends. Design/build project delivery permits owners and builders to “take far greater advantage of new materials and new technologies than ever before, because the emphasis is ultimately on project performance, and not on project process per se.”

A Successful Approach

DB models for construction begin at different places than DBB models, although they both end with a completed building. To be successful, DB models require:

- A well-defined and explicit scope of work;
- A specific range of responsibility for each team member and criteria for measurement;
- A knowledgeable owner who can make quick, sound decisions;
- Experienced, competent team members; and
- A cohesive team with members fully committed to the common needs and goals set by the owner.

To achieve success in DB, as well as DBB, synergy should exist between the owner, the general contractors, designer, and subcontractors. The synergy must include a great deal of trust, because decisions under the DB model often need to be quickly and be “win-win” solutions, which consist of the best balance among costs, efficiency, maintainability, and delivery date.



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Compromise and cooperation between all members of the team are required. The owner should assign a knowledgeable, decisive person as liaison, because without this “point man,” the process may stall. Such a “stall” would eliminate the “timeliness” advantage—one of the largest DB has to offer.

Project Costs

Carl Walker Inc., a national parking consulting firm, conducts an annual survey of the costs of construction of parking facilities across the nation each March. In 2006, the median cost—representing the midpoint of the range—was \$13,588 per space, or \$40.71 per square foot. These numbers, the study continues, represent construction costs including contractor fees, but do not include project “soft costs,” such as land and design fees.

“This is an increase of almost 20 percent over the past two years,” the report of the

study says, adding that the cost of parking has “increased at a higher rate than the overall construction market. Recent inflation in the prices of cement and reinforcing steel, two of the primary components of parking structure construction, are probably responsible for the increase.

Not surprisingly, the most expensive city in which to construct a parking facility is New York City, with a median of \$17,923 per space or \$53.70 per square foot. The least expensive is Charlotte, N.C., with a median cost-per-space of \$10,395 or \$31.14 per square foot. These costs are expected to increase over the next year.

With the continually rising costs, the design/build model of project delivery will become more and more attractive to owners who must cut costs while providing the premises for these necessary services. ^P

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