

Design/Build for Engineers

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DEFINITION:

Design-build (DB) is a construction project delivery system where (in contrast to "design-bid-build"), the design and construction aspects are contracted for with a single entity known as the design-builder or design-build contractor.



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- The design-builder is usually the general contractor, but in many cases it is also the design professional (engineer or architect).
- This system is used to minimize the project risk for an owner and to reduce the delivery schedule by overlapping the design phase and construction phase of a project.



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- Where the design-builder is the contractor, the design professionals are typically retained directly by the contractor.
- Although the design-bid-build method of project delivery has been the dominant project delivery method in the US for the past century, design-build is a growing share of the market.



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- Under the design-bid-build project delivery method, the responsibility for design is primarily allocated to the design professional.
- Under the design-bid-build project delivery method, the responsibility of construction of the design is principally allocated to the construction contractor, including exclusive responsibility for construction means, methods, procedures, techniques and sequences.



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- The independent relationship between the design professional and the construction contractor creates a system of checks and balances that serves to protect the owner and the general public.
- The design-build project delivery system provides the owner single-point responsibility for both design and construction.




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- The design/build delivery system often cites the original "Master Builder" model used to build most pre-modern projects. Under the Master Builder approach, a central figure of the architect held total project accountability.
- From inception to completion, the master builder was the key organizational figure and strictly liable to the owner for defects, delays, and losses.




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- Under the design-build approach, the design professional (engineer or architect) may have the prime contractual relationship with the owner, thereby assuming frontline responsibility for both design and construction.




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- Under the design-build approach, the design professional (engineer or architect) may also enter into a joint venture with a construction contractor, thereby sharing the primary responsibility for design and construction.




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- Under the design-build approach, the design professional (engineer or architect) may provide design services as a subcontractor to the construction contractor who has frontline responsibility to the owner.




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- In those arrangements where the design professional is contractually responsible for both design and construction, the design professional may be subject to liability for warranties, guarantees, indemnification obligations of a construction contractor, strict liability, product liability and increased exposure under safety laws and regulations.




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- Importantly, the engineer or architect **does not** act as representative of the owner in any of the three roles (prime, joint venture or subcontractor) the engineer or architect may play under the design-bid project delivery system.



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- Related Issues:
 - Professional Competence
 - Adherence to the Requirements of Law
 - Bonding Capacity
 - Not Agent of Owner
 - Contractor Risk



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- Design-build focuses on combining the design, permit, and construction schedules in order to streamline the traditional design-bid build environment. This does not shorten the time it takes to complete the individual tasks of creating construction documents (working drawings and specifications), acquiring building and other permits, or actually constructing the building.
- Instead, a design-build firm will strive to bring together design and construction professionals in a collaborative environment to complete these tasks in an overlapping like fashion i.e. construction has begun while the building is still being designed.



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- Typically the hallmark of a design-build project is that one organization is responsible for both design and construction of the project. If this organization is a contractor, the process is known as "*contractor-led design-build*". If the organization is a design firm, the process is known as "*design-led design-build*".
- In either case, the organization employed by the owner rarely handles both aspects of design and construction in-house. In fact, the organization often subcontracts with on-site personnel (if design-led) as well as architects and engineers (if contractor-led).



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- Potential problems of the design-build process include:
 - premature cost estimating
 - a short-cut design process
 - decreased accountability by the service provider
 - correction of work



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- Premature Cost Estimating:
 - Cost estimating for a design-build project is sometimes difficult because design documents are often preliminary and may change over the course of the project. As a result, design-build contracts are often written to allow for unexpected situations, and the price of the completed project may vary greatly from the original estimate.
 - The uncertainty of the early estimate requires the owner to rely a great deal on the integrity, acumen, and competence of the design-builder. As the certainty of estimate decreases, the reputation of the design-build firm becomes more important. Estimates should be accurate, and reasonably verifiable in order to minimize risk.



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- A Short-Cut Design Process:
 - The short-cut design process may restrict regulatory review efforts to a potentially cursory overview.
 - Projects may be designed as they are built, thus providing those with the responsibility of oversight little to no time at all to review completed plans and specifications.
 - Projects completed before they may be reviewed can be forced into costly change orders to bring the project into compliance with regulatory requirements.
 - It may here be noted that the "design-bid-build" method frequently results in a trip "back to the drawing board" based on the tendency of many architects to lack familiarity with actual current costs related to the realization of a built project.



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- A Short-Cut Design Process:
 - The short-cut design process may also create an ill-defined scope of the work.
 - Since the purpose of the design documents is to describe the project's desired outcome, an abbreviated design process can result in leaving out some details of the quality, workmanship, and/or desired aesthetic attributes of the project, thus making it impossible to hold the builder accountable for the desired level of quality.
 - Once again, the owner must rely on the reputation of the design-builder for a satisfactory product.



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- Decreased Accountability:
 - The design-builder is given a great deal of control over the entire process, both of how the project is configured and how it is completed.
 - With no third-party observer such as an independent engineer or architect to administer the process, the unscrupulous design-builder may sacrifice the quality of materials and systems such as HVAC, lighting, plumbing, and even structural elements in order to pad profits at the expense of the owner.



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- Correction of the Work:
 - Since the owner may not have the expertise to evaluate the quality of portions of the work, he/she must trust the design-builder to properly design a facility that will meet the needs of the owner, and to execute the design properly, according to codes, and consistent with industry-standard specifications.
 - Unless the builder agrees with the owner's assessment of the situation, the owner may have no means to insist on correction of work done improperly but to go to some form of formal dispute resolution such as litigation, or arbitration.



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- Correction of the Work:
 - In exchange for the ability to save money, the owner assumes the risk and responsibility to review contract documents, such as plans, specifications, and agreements for services, and to hold the design-builder accountable to design and deliver a quality product.
 - By contrast, under the typical design-bid-build or negotiated project delivery system, the engineer or architect is in a better position to reject work not performed according to the standards he set forth in the plans and specifications.



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- Potential Benefits of Design-Build:
 - enhanced communication between the service provider and the client,
 - increased accountability by the service provider,
 - single source project delivery, and
 - a value based project feedback system



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- Enhanced Communications between Service Provider and the Client:
 - Because the design parameters of a project are being developed along with the budgetary goals - construction methodologies and budget conditions being weighed simultaneously - a project is more likely to be realized than with a pure design approach.
 - The owner has greater access to the project "team" as the project is being developed.



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- Increased Accountability:
 - Rather than "stove-pipe" allocation of responsibility in the classic design-bid-build, design-build provides an integrated solution for the owner or client.
 - This moves projects away from the "finger-pointing" that is often commonplace in contemporary construction projects, and allows the owner to look to one entity with any questions or concerns.



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- Single Source Project Delivery:
 - Instead of having several contractors and consultants, an owner has just one entity to deal with.
 - Design revisions, project feedback, budgeting, permitting, construction issues, change orders, and billing can all be routed through the design-build firm.
 - This single point of contact allows a certain degree of flexibility for the owner.
 - Most design-builders will leverage that flexibility for the owner's benefit by continually refining the construction program to maximize the owner's value at the completion of the project.



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- A Value-Based Project Feedback System:
 - Typically, in order for a contractor to bid on a project, very specific details relating to the methods and materials must be given to avoid any ambiguity and to make an "apples to apples" comparison of bids.
 - In a design-build context, the owner, the owner's other consultants, and the design-builder can work together to determine what methods and materials will maximize the owner's value.



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- A Value-Based Project Feedback System:
 - In instances where marginally more expensive materials, designs, or construction methods might yield a higher return on investment for the owner than those of lower cost, the owner is free to adjust the project's program without having to re-bid the entire project.
 - It is reported that almost 70% of traditional contracts end up over budget, compared to D&B which is only around 25-30% over budget.
 - The overage of a D&B project is generally owner driven, whereas the overage in the more traditional method tends to be a result of the budget disconnect to which many architects and other design professionals are prone.



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Discussion & Conclusions



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