EMGT 835 FIELD PROJECT

Design Build:
Should the U.S. Army Corps of Engineers-Kansas City District Continue to Use this Form of Project Delivery Method?

By

Eduardo H. Fernandez

Master of Science

The University of Kansas

Spring Semester, 2008

An EMGT field project report submitted to the Engineering Management Program and the faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Science.

Name	**Date**
Committee Chair	
Chick Keller	

Name	**Date**
Committee Member	
Annette Tetmeyer	

Name	**Date**
Committee Member	
Dr. Robert Zerwekh	

Table of Contents

List of Figures

Acknowledgments

1. The Fernandez family for putting up with spending many nights and weekends alone due to my pursuit of higher education - my wife Bobbie, oldest son Nicholas, daughter Jessica, youngest son Jake, and two identical twins due to arrive in June 2008.
2. The University of Kansas- Engineering Management Staff. For their continuous support of my studies whether here at home or in the middle of Fallujah, Iraq.
3. The U.S. Army Corps of Engineers-Kansas City District. In particular Mr. James Turner (Civil Design Branch Chief), Mr. John Cichelli (Construction Division RMS Chief), for without their insight and support this paper could not have been completed.

Executive Summary

Design Build (DB) is a system in which the contractor is solely responsible for the design and construction of the project. The DB system differs from the Design, Bid, Build, (DBB) system in which the owner contracts with a design professional for design services, and once plans and specifications are complete, would allow contractors to competitively bid on the construction services. However, the DB approach does not come without disadvantages. This paper will highlight these disadvantages as they directly relate to the USACE-KC District. Disadvantages ranging from legality issues, to higher costs or "cost growth" as shown by data collected for USACE-KC District military specific construction projects.

This paper addresses from the viewpoint of the U.S. Army Corps of Engineers-Kansas City District (USACE-KC), the viability of DB in regards to whether it should continue to be a project delivery method of the District. According to data taken over a seven year time period, DB projects were completed sooner than DBB projects, however on average, DB projects tended to have a higher cost growth (3.99%) than DBB projects.

DB is clearly a form of delivery system that will continue to be a mainstay in the public and private sectors for many years to come, however, in light of the many legal issues and significant higher cost to USACE-KC, it most certainly should not be the preferred delivery system for USACE-KC District to implement on a consistent basis; but rather one only reserved for limited specialized projects where the traditional form would not be suitable.

Acronyms (or Abbreviations)

Term/Phrase	Definition
EMGT	Engineering Management
DB	Design Build
DBB	Design, Bid, Build
UASCE-KC	U.S. Army Corps of Engineers-Kansas City District
RMS	Resident Management System

1 Introduction

In October 2003, I began my professional career as a Civil Engineer working for HNTB Inc., an Architect/Engineer consulting and design firm in Kansas City, MO. After two and half years of service, I accepted a position as a Structural Engineer with my current employer the U.S. Army Corps of Engineers-Kansas City District. In my relatively short period of time working as an engineer, the term Design Build (DB) has come up on one or more occasions. Other than receiving short explanations from the senior engineers in my office, I still was unsure about what the DB term meant. DB essentially relies on the notion that a project could be delivered to the customer quicker, at a lower cost, and still within quality standards.

At the onset, this approach makes sense logically, but as this author learned in EMGT 813 Design Project Management, when applying the Triple Constraint of scope, schedule, budget (See Figure 1: Triple Constraint), when one constraint is emphasized more than another, than typically the other two constraints suffer and ultimately so does quality.

Figure 1: Triple Constraint

The significance of this report lies in the fact that many in the Architect/Engineering (A/E) community are touting the benefits of DB, whilst the negatives of this delivery approach appear to be swept swiftly under the proverbial carpet. This report will attempt to examine, from the viewpoint of the USACE-KC District, the advantages and disadvantages of DB, the legal issues surrounding DB, and whether the benefits asserted by the proponents of this delivery system can be substantiated and are in the best interest of the District and ultimately the American Taxpayer.

Now that we have introduced DB and DBB the more traditional delivery method, let us delve into what others have researched on this topic.

2 Literature Review

In Singapore, Yng Ling et al. (2004) were the first to form a model that could predict which projects DB or DBB would be the preferred delivery method. The model was constructed to analyze DB and DBB projects on 11 areas, using project specific data

collected from 87 building projects. Robust models were developed to predict delivery speeds of DB and DBB projects. It was found that gross floor area of the project is the most significant factor affecting speed. Besides this, for DBB projects, contractors' design ability, and adequacy of plant and equipment would ensure speedy completion of the projects. For DB project, if the contract period is allowed to vary during tender evaluation, this would slow down the project. Robust models to predict turnover and system quality of DB projects are also constructed.

In the United States, Ibbs et al. (2003) conducted a comprehensive study of 67 global projects (mostly in the U.S.) from the Construction Industry Institute's database, which shows that DB project delivery projects may not provide all the benefits to project performance. The study found timesavings was a definitive advantage of DB project delivery, but the positive effects of cost and productivity changes were not convincing. Based on the results of the study, the project management and experience of the contractor may have a greater impact on project performance outcomes than focusing on project delivery strategy only.

In Massachusetts, Peterson (2007) studies "The Big Dig", Boston's Central Artery Project, which initially had a project budget of $2.6 billion in 1983 and now has soared to over $14 billion. In his report, Peterson researches whether The Big Dig would have benefited from the DB method. He concluded that DB is well past an experimental project delivery method, but it is not appropriate for all construction projects; and would not have been the appropriate method for The Big Dig.

The author of this field project concurs with all three literary reviews, particularly the review of the Big Dig conducted by Peterson (2007). The end result of the review is that

DB may be a suitable alternative to the traditional design-bid-build product delivery method, but should be chosen wisely by the owner to prevent the boondoggle the Big Dig has become.

As the study conducted by Ibbs et al (2003) shows, Design Build greatly increases the likelihood that a project will be completed much quicker, but referring back to the triple constraint of scope, schedule, and budget, by completing the project quicker cost and quality tended to suffer. The end result, also confirmed by the study Yng Ling et al (2004) concluded, is that contractor experience (e.g. design, plant and equipment, etc.) plays a significant role in whether DB will be a success or failure.

Now that we have a better understanding of what others have to say with regard to DB and the more traditional DBB method, let us see what the advantages and disadvantages of DB are as purported by industry groups.

3 Advantages and Disadvantages of Design Build (DB)

In order to understand the DB delivery method, it is important to seek out the policy statements of the professional organizations on DB. The National Society of Professional Engineers (NSPE) policy statement #1726 on DB contracting method can be found at http://www.nspe.org/govrel/gr2-ps1726.asp. In addition to the policy statement, the advantages of the DB system over the DBB product delivery system are stated as follows:

- Project costs may be lowered because of the close working relationship between the designer and the constructor, who are on the same design-build "team." This

may lead to the incorporation of more economical design features and the application of cost-saving construction methods.

- The project may proceed more efficiently because designers and constructors are members of the same team. The interface between designer and constructor, often adversarial within design-bid-build systems, may become more open and foster a cooperative exchange of ideas to produce a profitable project.
- Construction efficiency may be improved because design efficiencies can be woven into the entire construction process and because the designer, as a member of the design-build team, can participate directly in resolving design issues that surface during construction.
- The owner may have more design options to choose from.
- The owner may gain the ability to fix total project costs earlier in the process than with other project delivery systems.
- The project may be completed more rapidly because the procurement of design and construction services is consolidated into a single selection process and because "fast-track" procedures may be implemented more readily. Fast-track procedures allow certain elements of construction to proceed in step with the design process. Design-bid-build, on the other hand, usually requires completed plans and specifications before the construction process (including bidding) can commence.
- The owner's administrative burdens may be reduced because the procurement of design and construction services is consolidated into a single selection process.

- The owner establishes a single point of contact for communicating its goals, objectives and scope of work.
- The burden on the owner to mediate disputes between the designer and the constructor is eliminated because a sole design-builder may be held contractually accountable and responsible for the entire project.
- The owner will no longer need to monitor the designer/constructor interface. The design-bid-build project delivery system, on the other hand, requires the owner to be concerned about loss of communication and misunderstanding between designers and constructors, which may create legal and liability issues, as well as additional costs.

The disadvantages of the DB system are as follows:

- The project cost may be greater because of extra costs or claims incurred when delays occur in the construction phase, due to the need to resolve permitting and environmental issues or to solidify owner preferences. The design-bid-build project delivery system, on the other hand, generally allows for resolution of these issues during the less-expensive design phase.
- Higher costs may be incurred if the owner chooses to employ a separate entity to oversee the design-build process. In the design-bid-build system the designer who has prepared the project plans and specifications, or another professional, typically provides oversight of construction to assure the owner that the project is properly constructed. When using design-build, some owners have found it necessary to engage an independent design and/or construction professional to

review the work of the design-build team to assure that the project has been satisfactorily executed.

- The project may require longer completion time, particularly if the scope of work or permitting issues is unresolved. If a design-build project is awarded with an incomplete scope (including project specifications), if the scope is modified in process, or if permitting and environmental issues are unresolved after construction is commenced, projects can be delayed.
- The design-build project delivery system may be more labor intensive and technically demanding for the owner than is design-bid-build. Design-build projects require the owner itself to carefully prepare a scope of work that defines its requirements in detail. In design-bid-build, consulting designers may provide additional definition for project requirements, thus requiring less labor and expertise on the owner's part. The designer's plans and specifications are then reviewed with the owner prior to bidding the project.
- The owner may lose direct control over design. Design-bid-build provides for periods of consultation with the design professional serving as faithful agent or trustee for the owner. The design-build system, on the other hand, places the designer as more accountable to the design-build team, of which he or she is an integral part, than to the owner.
- Design decisions may be determined or inappropriately influenced by team members other than the designer. This is more likely to occur when a non-designer is the lead on the design-build team. The leader may pressure designers

to reduce self-imposed quality criteria or design standards to minimum levels in order to maximize profit.

- The direct relationship and line of communication between the owner and the designer is altered. When the designer and the constructor form a single contractual entity, the owner loses the benefit of the designer's independent construction oversight and monitoring on the owner's behalf. Consequently the owner loses its ability to assure project quality through a system of "checks and balances" between the designer and the constructor, such as exists under the design-bid-build process.
- The designer's ability to properly project and design for the project's life-cycle costs and make appropriate adjustments may be hindered because of restraints imposed by budgets and emphasis in the selection process on "low bid."
- The designer may be selected on the basis of price rather than qualifications, potentially compromising the public health, safety, and welfare.
- The design-build project delivery system may discourage competition. Fewer entities have the inherent capacity to provide design-build services. As a result, larger full service entities will be able to dominate the procurement process to the detriment of small designers or constructors. If the requirements for design-build submittals require the design-builder to prepare an extensive technical proposal, the development of such a detailed submittal without the promise of compensation may make participation in the submittal process prohibitive for some entities. It is important to note that the public sector in Europe has

experienced a shift to a reduced number of bids on design-build projects to principally a few, large, full service design-builders.

- The magnitude of liability risk to the designer may discourage participation by highly qualified designers. Given the relatively small percentage of the overall project that his or her services represent, the risk may far outweigh the potential return. As a member of the design-build team, the designer is linked to the construction process to a greater degree than under design-bid-build. Consequently the designer faces liability exposure to construction-related issues such as job-site safety and construction methods, as well as responsibility for losses should the project fail to meet expectations for any reason.
- The owner should possess special management and procurement capabilities such as the ability to make judgments on a "best value" rather than "lowest price" basis, to select design-build offerors, to develop project requirements, to assess project progress and quality, and to monitor payments. Under the design-bid-build system, the designer performs many of these tasks. Potential legal, political, and business practice barriers also exist that impede the use of design-build.
- Guaranty/Warranty provisions that are often a part of design-bid-build construction contracts could void a designer's professional liability insurance if such provisions are carried forward to a design-build contract.
- Project financing, insurance, and bonding for design-builders may be unavailable or difficult to obtain.
- Bonding and insurance providers are uncomfortable with the long-term guarantees and warranties which may be incorporated into the design-build

contract. Consequently, process guarantees (which guarantee a result from process equipment installed for a given purpose), if required, may be difficult, if not impossible, to insure.

- The owner should have both design and construction funds in hand at the outset of the project.
- Many current laws do not allow for free and effective use of design-build.
- Design-build may conflict with state licensing and procurement laws.
- Owners, designers and constructors may lack the special communication, organizational, and business skills to effectively manage and administer the design-build system.

Now that we have discussed the advantages and disadvantages of DB, we can now address the key legal issues facing DB within the United States.

3.1 Key Legal Issues

Design Build is fast becoming the lead product delivery method for both private and public entities across the United States. DB is the concept or belief of a "Master Builder, where a single source has absolute accountability for both design and construction." (DBIA, 2007). DB is not a new approach to construction; in fact some say its origins date back to ancient civilizations. Under DB, the contractor carries the responsibility of design A/E and building function of the prime contractor, and the owner does not assume the risks of design errors because the owner did not furnish plans or specifications (Appendix 2).

In the more traditional approach or Design Bid Build (DBB) system (Appendix 1), liability is more easily discernable as compared to DB. In DBB, the owner and its project A/E, not the prime contractor and its subcontractors-bear the risk of design. Under federal contract law this is referred to, as the Spearin Doctrine, which essentially states that if the contractor receives plans and specifications prepared by the owner, then the contractor is not held liable for defects. The Spearin doctrine is widely recognized by both state and federal courts. These laws, enacted to protect the public, may not be appropriate when applied to DB. For this reason, public agencies are sometimes restricted from using design-build by statutes and regulations written with the DBB project delivery system in mind. Therefore within the public sector, DB is only used as a specialized project delivery system on certain limited situations.

3.1.1 Relationships and loyalties among the parties

DB changes the relationship and loyalties between the owner and design professional. . The owner relies on the contractor to be competent to undertake the contract "The owner who has no particular expertise in the kind of work contemplated; furnishes no plans, design, specifications, details or blueprints; and tacitly or specifically indicates his reliance on the experience and skill of the contractor" (Circo, 2005). Under the DBB system, the owner contracted with a design professional to oversee the project and "look out" for the interest of the owner during design and construction. Under the DB system, the design professional is part of a DB team in which the contractor employs him/her creating a conflict of interests. The design professional has contractual incentives to further the DB team's goals that are not necessarily in step with that of the owners. Therefore, there is a disincentive to point out problems with the construction work to the

owner, and costs and contractibility tend to take precedence over specialty design characteristics the owner may prefer.

3.1.2 Design Professionals Standard of Care

Traditionally, the design professional operates under a Standard of Care that essentially states, “the engineer is only held responsible for exercising the degree of skill that the average similarly situated engineer employ, and does not ordinarily warrant or guarantee successful outcome for his services.” (Friedlander, 2002). Concerning a DB contract, the courts tend to view the design builder as a contractor who warranties the work to be complete and free of defect. This can reflect not only in substandard work but also in excessive payments being made early in the project or in slow payment or nonpayment of subcontractors. There is no system of “checks and balance” between the contractor and designer for project quality as found in the DBB system. Therefore, since the contractor employs the design professional, the courts view this form of warranty standard as incorporating the design services. However, this formality can be addressed contractually between the contractor and design professional at the onset of the agreement by including a provision that ensures the design services are consistent with the industry Standard of Care.

3.1.3 Licensing Issues

More so in the private sector than the public sector, licensing laws tend to be more of a concern. Every state in the country regulates and restricts the practice of professional

engineering and architecture, establishing educational, testing and organizational requirements. “Under Missouri law, a contractor who did not have an architect’s license could not recover for work performed under a DB contract, even though the architect it used was licensed” (Sweet and Schneier, 2004). Even though the D/Builder may have in house licensed design services or contracts it out to licensed professionals, many states forbid business corporations from performing A/E services. As a result, many DB contracts have been challenged in court. There is some movement to address and revise these laws to ease this restriction on D/Builders. Oddly enough, there is no federal law that supersedes these restrictive state laws. As a member of the design team, the design professional is linked to the construction process. As a result of this relationship, the design professional is exposed to greater liability than under the DBB contract. The liability insurance/bonds of a design professional generally exclude construction services and worked performed by others. Conversely, the insurance/bonds of the contractor generally exclude errors and/or omissions caused by the design professional. This disparity can cause problems for the for the design professional since he is employed by the contractor. In particular, the general liability insurance that a contractor may obtain carries a small or no deductible, whereas professional liability policies carry a large deductible.

3.1.4 Conflict with competitive bidding process

This is typically an issue that arises in the public sector. In the public sector there is a requirement that construction work be competitively bid. In the DBB system, once the design is complete, plan and specifications are disseminated for contractors to bid.

Usually, selection is based on the lowest bidder. In the DB system, plans and specification cannot be distributed out to contractors to effectively bid the work. "Although the DB system can be used competitively, it does not fit comfortably with the requirement that the competitive bid process be used to award construction work" (Sweet and Schneir, 2004). In some states, only construction services are required to be competitively bid upon and not design services. Some public entities use this "loophole" to not "bid out" the work competitively, even though a majority of the work is construction services not design.

Because of the increased use of DB in federal contracts and as a means to curtail potential legal problems with DB contracts, Congress enacted the Federal Acquisitions Reform Act of 1996 (FARA). The law authorizes a two-step system in which the first step looks at the competence and qualification of the bidders. Once the most qualified are chosen, the second step involves pricing and negotiating of the contract for work. Still many public agencies are struggling with the perception that DB contracts shows favoritism in the selection process. In fact, "if the requirements for design-build submittals requires the design-builder to prepare an extensive technical proposal, the development of such a detailed submittal without the promise of compensation may make participation in the submittal process prohibitive for some entities. It is important to note that the public sector in Europe has experienced a shift to a reduced number of bids on design-build projects to principally a few, large, full service design-builders" (http://www.nspe.org/govrel/gr2-ps1726.asp. In my view this a powerful statement, because what essentially the DB system does is disallow the opportunity for the smaller firms to compete with the larger firms on a level playing field because of the large

amount of financial expense required (pre-award) without the assurance of compensation in the future.

4 A Comparison of Design Build and Design, Bid, Build Projects Completed for the U.S. Army Corps of Engineers- Kansas City District

On November 3, 2006, Headquarters U.S. Army Corps of Engineers issued a memorandum to its subordinate commands, instructing them to implement Military Transformation (MT) (Appendix 3). A major component of MT is the Model Request For Proposal (RFP). The Model RFP is based on an Army Standard, Army Standard Design, and/or a Standard Criteria that has been published. The intent of the Model RFP is for the Army to achieve a cost savings "by not specifying the "how to" in the solicitations, the contractors can use industry best practices to meet the scope requirements within the cost limitations." (HQ-USACE Memorandum, 2006). What this quote is essentially saying is that no longer will Army military construction be designed and built for sustainability or longer life cycles, as traditionally has been the case. Contractors can now use more efficient means or cost cutting methods that are typically done in the private sector.

In addition, Model RFP's are to be managed by Centers of Standardization (COS) within USACE, geographic Districts that are to be responsible for administering the RFP (i.e. design, contracting, etc.). Unfortunately, USACE-KC District was not selected as a COS, so in order for the District to keep a technically proficient staff of engineers, soliciting of the COS's for meaningful design work occurs on nearly a monthly or quarterly basis.

Obviously, one can see the writing on the wall for all USACE Districts, the Army is searching for ways to cut costs on military construction projects. Therefore, from the Army's viewpoint, the traditional DBB method, whether conducted by an A/E or by In House Design, is slowly being less frequently used. Although not entirely used as a delivery method for all projects, DB and other forms of non-traditional deliver methods, for example Early Contractor Involvement (ECI), Design Build Operate Transfer (DBOT), and Construction Management (CM) at Risk, seem to be the natural progression toward meeting the Army's cost saving goals. But is the Army really achieving a cost savings by using the DB approach on its projects?

HQ-USACE may be surprised to find that DB in most cases does not measure up or meet the expectations of the hype it has created. According to data obtained from the USACE-KC RMS (Resident Management System), RMS is a comprehensive construction management computer program that allows Corps of Engineers field office personnel, and contractors the detail and flexibility to manage all portions of a construction project. Construction contractors are required to populate a database module of the RMS program, which is in turn is submitted to the government.

Numerous fields can be populated involving many types of construction projects. Fields such as original contract award amount, pre priced options, total contract award, etc. to name a few. Additionally, RMS can break down reports by project delivery method (e.g. DB or DBB). RMS's ability to segregate data from awarded and completed contracts, would prove to be crucial to the investigation into the merits of DB verses the DBB method.

It should be noted that RMS segregates DBB projects as either completed through an Architect/Engineer (A/E) firm that USACE-KC District contracts with for the project, or In House Design, as the name implies, all design work is completed within the District and then bid-out to perspective contractors for construction.

After requesting and obtaining the needed RMS data from the USACE-KC District RMS representative, a clearer picture into this investigation could be achieved. This author requested from that representative, a report breakdown of KC District awarded DB or DBB contracts that met the following criteria:

- Projects with an actual completion date between 12/3/2000 and 1/31/2007
- Total award days greater than 180 days
- Contract amount greater than $250,000
- Military construction contracts only

From the aforementioned criteria, the query resulted in (a) nineteen A/E DBB projects totaling $205, 291, 292, (b) sixteen DB projects $168, 268,305, and (c) ten In House Design DBB projects totaling $142,305,093.

A request was made for the following fields to be populated in the report for both DB and DBB contracts to compare the Total Cost Growth for each method. (1) Name of Project, (2) Fund Type, (3) Original contract award amount, (4) Pre priced options ($), (5) Total controllable modifications, (6) Percent controllable modifications, (7) Total

uncontrollable modifications, (8) Percent uncontrollable modifications, (9) Total cost growth, and (10) Percent total cost growth.

Cost growth is a significant factor for comparing whether the merits of DB can be substantiated. One reason is that proponents of the DB system continually pontificate that DB constructed projects can be done for less money. Naturally, in order for the author of this report to determine if that were true, a comparison of the previously mentioned RMS report would be necessary.

Advocates of DB continually assert that DB projects cost less to construct then DBB, because the contractor and designer work in concert with each other to discuss design feasibility and constructibility matters in the early stages of the project. The two major components that affect cost growth, controllable and uncontrollable modifications, were measured for both types of delivery methods.

A controllable modification denotes modifications and/or changes that occurred during the initial contract period that were caused by the neglect and/or omission of the contractor or designer respectively, which resulted in a change or a “mod” to the contract. This “mod” in-turn resulted in additional monies to be awarded to complete the project.

Conversely, an uncontrollable modification denotes modifications to the initial contract that could not be controlled by the designer and/or contractor. Uncontrollable modifications can be caused by: weather, natural disasters, licensing and permit requirements, or the needs of the owner change. The delays caused by these components also results in additional monies to be awarded to complete the project.

The below chart shows a side by side comparison of average cost growth caused by controllable modifications for DB and DBB contract delivery methods (Remember that A/E Design and In House Design = DBB):

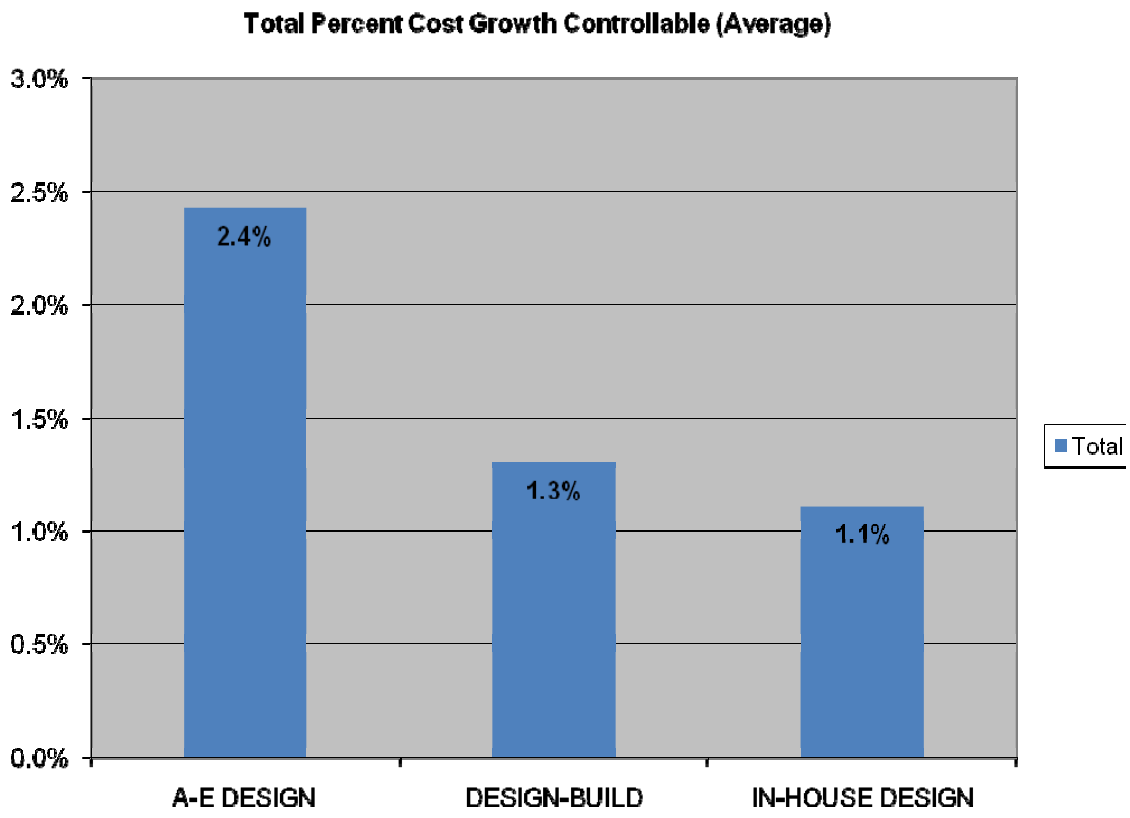


Figure 2: Total Percent Cost Growth Controllable (Average)

The chart shows that on average DBB projects did have a higher cost growth due to controllable modifications only when contracted out to A/E firms (2.4%). But when DB is taken in comparison with DBB projects completed by In House Design (i.e. Corps of Engineers design team), the chart shows a slightly higher cost growth for DB.

The below chart shows a side by side comparison of average cost growth caused by uncontrollable modifications for DB and DBB contract delivery methods:

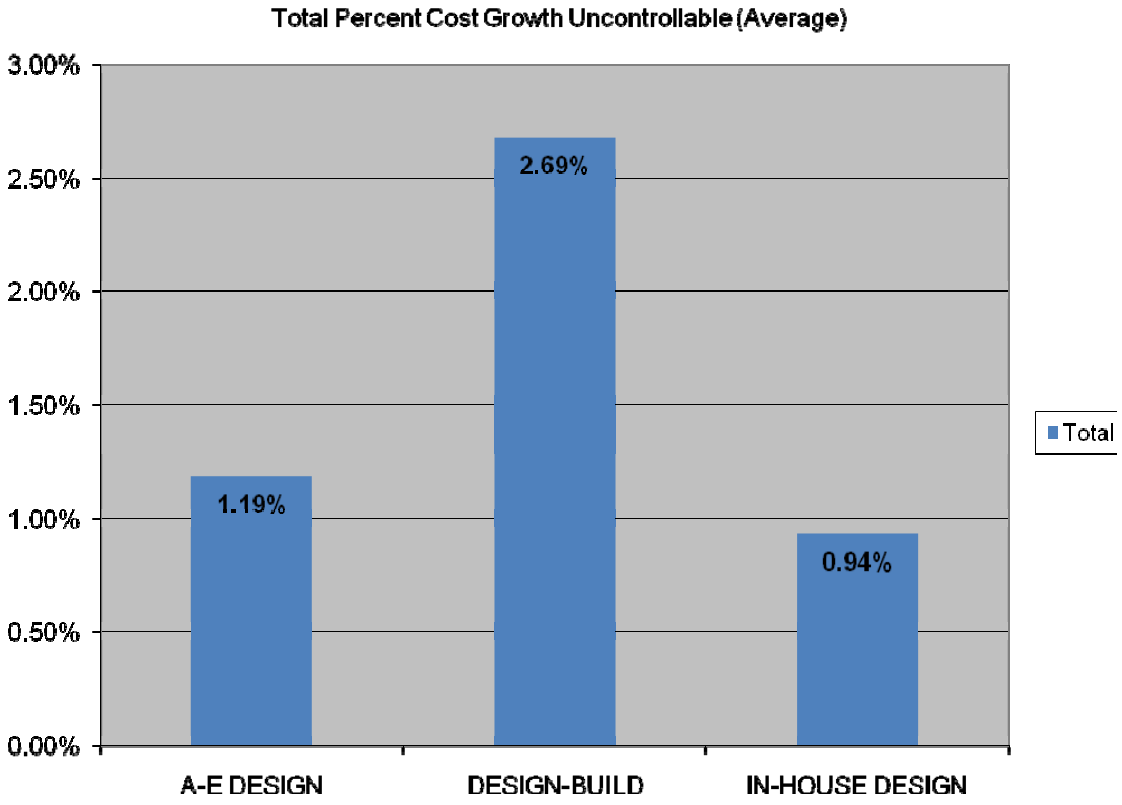


Figure 3: Total Percent Cost Growth Uncontrollable (Average)

The above chart shows that on average DB projects had a higher cost growth due to uncontrollable expenses. The reasoning for this is not totally discernable at this time and may require further investigation.

The below chart shows a side by side comparison of average **total cost growth** caused by both controllable and uncontrollable modifications for DB and DBB contract delivery methods:

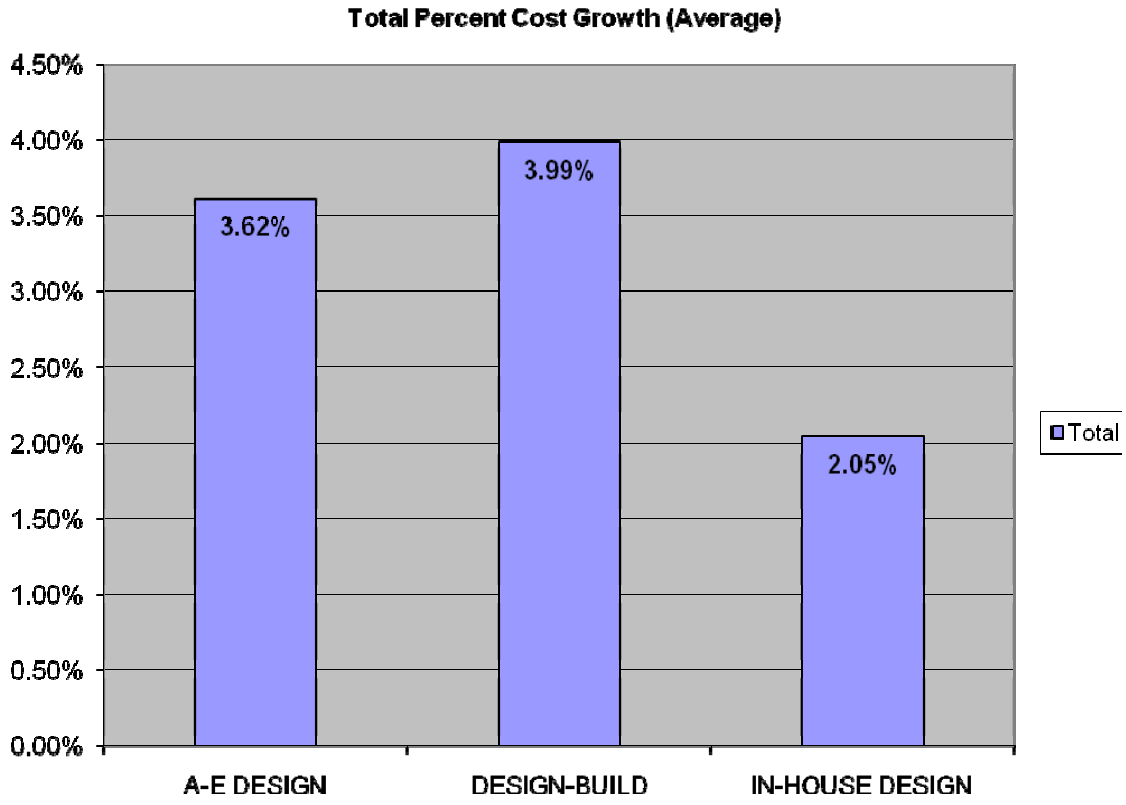


Figure 4: Total Percent Cost Growth Controllable and Uncontrollable Modifications (Average)

The chart above shows that on average DB projects tended to have a higher total cost growth (3.99%) for both controllable and uncontrollable modifications. This result seems to contradict the cost savings that HQ-USACE predicted in the June 2006 memorandum.

Another reported benefit proponent's claim is that DB projects were completed sooner than DBB projects. In order to determine whether these assertions were legitimate, a comparison between the DB and DBB for project Time Growth was required. Therefore, a request for the following fields from RMS was necessary to compare Time Growth: (1) Project name, (2) Fund type, (3) Notice To Proceed (NTP) Date, (4) Contract completion date, (5) Original contract duration, (6) Pre priced options (days), (7) Total contract days, (8) Total time growth controllable modifications (days), (9) Percent controllable

modifications, (10) Total time growth uncontrollable modifications, (11) Percent uncontrollable modifications, (12) Total time growth days, and (13) Percent time Growth.

The comparison made for time growth was conducted similarly to that of cost growth. The two major components that affect cost growth also affect time growth, controllable and uncontrollable modifications. These two components affected the time a contract was completed from its original Notice to Proceed (NTP) date.

The below chart shows a side by side comparison of average time growth caused by controllable modifications for DB and DBB contract delivery methods (Remember that A/E Design and In House Design = DBB):

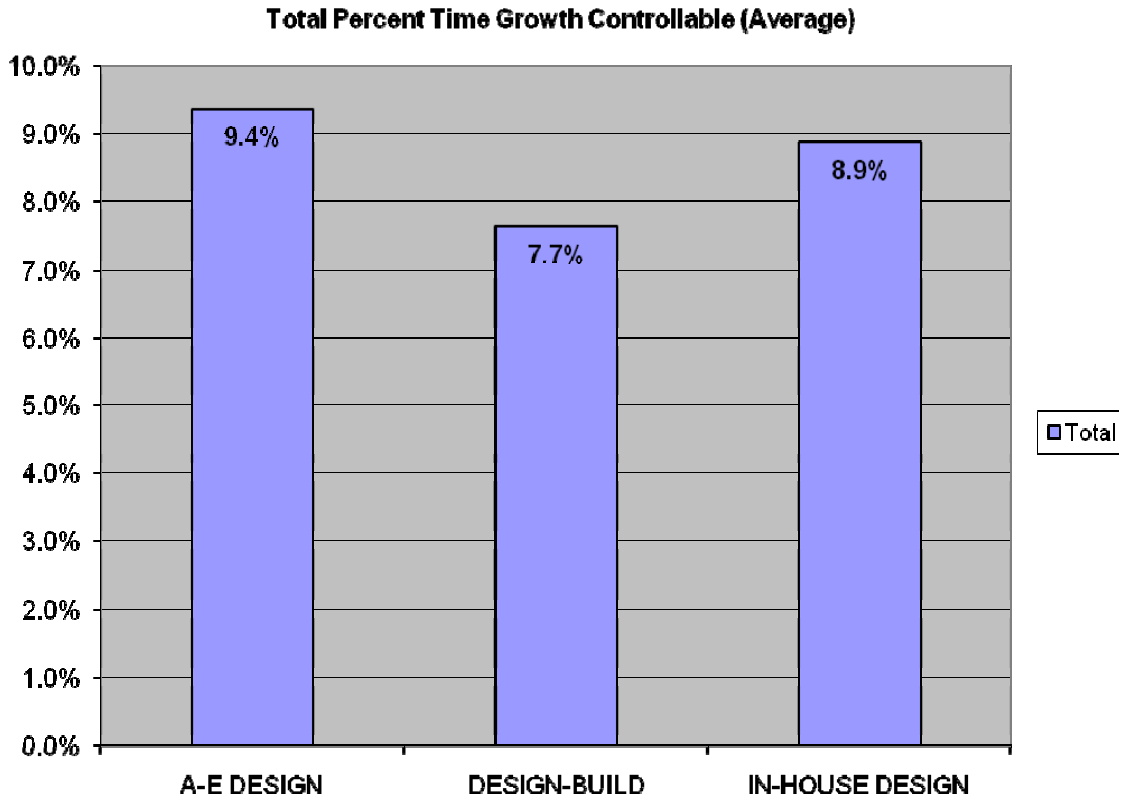


Figure 5: Total Percent Time Growth Controllable (Average)

The chart indicates that on average DBB projects for both A/E and In House Design combined, tended to have larger time growth caused by controllable modifications.

The below chart shows a side by side comparison of average time growth caused by uncontrollable modifications for DB and DBB contract delivery methods:

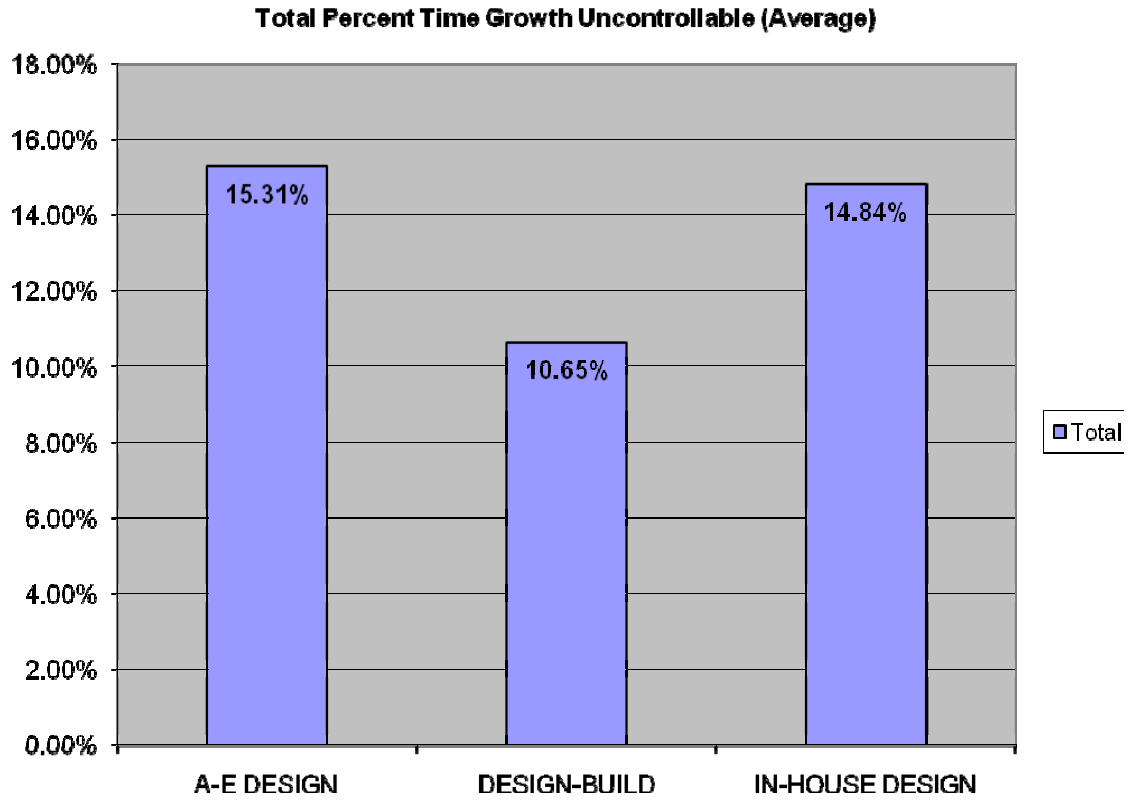


Figure 6: Percent Time Growth Uncontrollable (Average)

The chart again indicates that on average DBB projects for both A/E and In House Design combined, tended to have a larger time growth caused by uncontrollable modifications.

The below chart shows a side by side comparison of average time growth caused by both controllable and uncontrollable modifications for DB and DBB contract delivery methods.

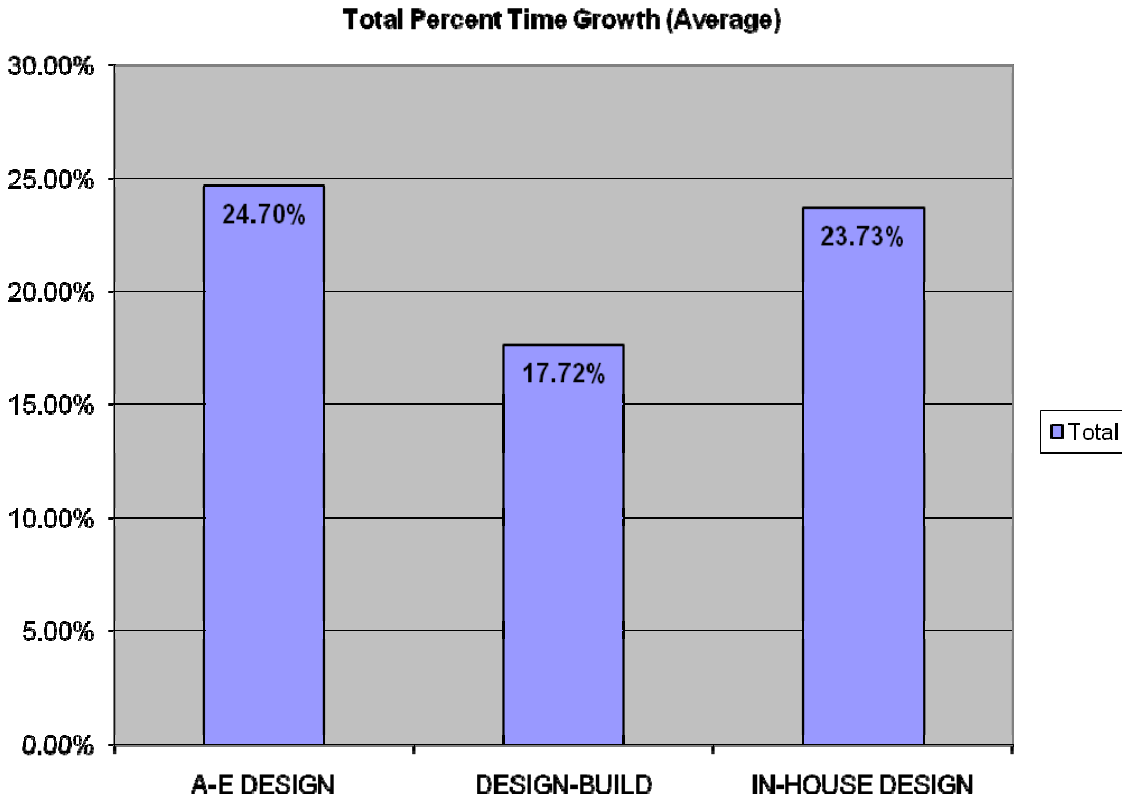


Figure 7: Percent Total Time Growth for Controllable and Uncontrollable Modifications (Average)

The chart clearly indicates that on average DB projects, tended to be completed sooner than DBB methods. The results confirm statements made by advocates of DB that indeed point to quicker delivery of projects to customer.

The chart below summarizes the findings of both cost and time growth inputted data. The bolded number indicates the largest percent for the labeled row:

Summary of Findings	A/E(DBB)	In-House (DBB)	D. Build
Cost Growth % Controllable (Avg)	**2.4**	1.1	1.3
Cost Growth % Uncontrollable (Avg)	1.19	0.94	**2.69**
Cost Growth % Total	3.62	2.05	**3.99**
Time Growth % Controllable (Avg)	**9.4**	8.9	7.7
Time Growth % Uncontrollable (Avg)	**15.31**	10.65	14.84
Time Growth % Total (Avg)	**24.7**	23.73	17.72

5 Recommendations for Additional Work

Recommendations for additional work should include other aspects related to cost growth and time growth (e.g. quality, etc.). As the triple constraint implies, when one constraint is focused on more than another, the other constraints tend to suffer. Directly related to that is quality. Unfortunately at the present time, quality was not a measurable in the RMS system. In the future, once quality control data is available and updated in RMS, it would be interesting to see how DB projects that were completed quicker than DBB faired in terms of quality related issues that occurred during and after construction. It would b worth looking into why DB projects tended to have a higher cost growth for uncontrollable modifications as well.

6 Conclusion

In conclusion, this field project attempted to address the advantages and disadvantages of DB, the key legal issues surrounding DB, and finally to determine if the DB method is a

benefit to the USACE-KC District and American Taxpayer to continue to use in the future.

After reviewing the collected data and comparing the two forms of project delivery methods side by side for cost growth and time growth when subjected to both controllable and uncontrollable modifications, it is in this authors view that DB should most certainly not be considered the preferred method of the USACE-KC District to employ. DB does live up to some of the hype that advocates suggest DB projects will bring such as quicker deliver times, but in terms of costs (the bottom line) in which we all in business (big or small) associate with success, DB was clearly outperformed by its more traditional and less volatile method of project delivery DBB.

Therefore, in light of the many legal issues and significant higher cost to USACE-KC District, DB most certainly should not be the preferred delivery system to implement on a consistent basis, but rather one only reserved for limited specialized projects where the traditional form would not be suitable.

7 References

1. *Design Build in the Public Sector (#1726)*, Retrieved October 15, 2007 from http://www.nspe.org/govrel/gr2-ps1726.asp
2. Circo, C.J. (2005). *When Specialty Designs Cause Building Disasters: Responsibility for Shared Architectural and Engineering Services.* University of Nebraska Law Review, Lincoln, Nebraska. Retrieved October 15, 2007 from http://www.lexisnexis.com.www2.lib.ku.edu:2048/us/lnacademic/results/docview/docview.do?risb=21_T2571227987&format=GNBFI&sort=RELEVANCE&startDocNo=1&resultsUrlKey=29_T2571228200&cisb=22_T2571227999&treeMax=true&treeWidth=0&csi=12496&docNo=5
3. Flanagan, T. (2007). *The Design/Build Contracting Method*. EMGT 813 Design Project Management. University of Kansas, Overland Park, Kansas, United States
4. Friedlander, M. (2002, September/October) Legal Issue Unique to Design Build, Construction Accounting and Taxation, Retrieved on October 15,2007 from http://www.schiffhardin.com/PDFs/legal_issues_design_build.pdf
5. Ibbs, C. William, Young H. Kwak, Tzeyu Ng, and A. Murat Odabasi. "Project Delivery Systems and Project Change: Quantitative Analysis." Journal of Construction Engineering and Management (2003): 382-387. CE Database.
6. Ling, Yean Y., Swee L. Chan, Edwin Chong, and Lee P. Lee. "Predicting Performance of Design-Build and Design-Bid-Build Projects." Journal of Construction Engineering and Management (2004): 75-83. CE Database.
7. Peterson, Jason H. "Suffolk University Law Review." Rev. of The Big Dig Disaster: Was Design-Build the Answer?. 2007: 1-997.

8. Sweet, J., & Schneir M., (2004) *Legal Aspects of Architecture, Engineering and the Construction Process* (7th ed.). Toronto: Thompson

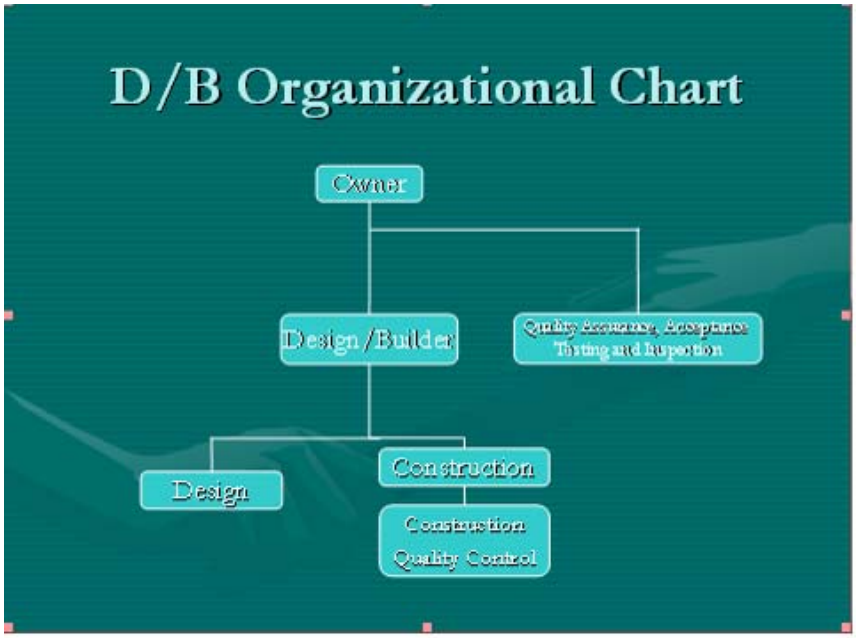
9. *What is Design Build?* Design Build Institute of America. Retrieved October 15, 2007 from http://www.dbia.org/about/designbuild

Appendix:

1.


D/B/B Organizational Chart
Owner
Designer
Builder
Quality Assurance, Acceptance Testing and Inspection
Construction
Construction Quality Control

2.


D/B Organizational Chart
Owner
Design /Builder
Quality Assurance, Acceptance
Testing and Inspection
Design
Construction
Construction
Quality Control

4. USACE Memorandum

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

3 Nov 2006

CEMP-IS (415)

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: USACE Policy on Applicability and Use of the Military Construction Transformation (MT) Model Request for Proposal (RFP)

1. The Army faces significant resourcing shortfall in providing permanent facilities to support a transforming Army at war. The Vice Chief of Staff of the Army (VCSA) has directed that standard facilities will be constructed to meet Warfighter functional and operational capabilities. Senior Army leadership is committed to providing equitable delivery of projects within the Army's Total Obligation Authority (TOA) to meet both mission and quality of life requirements.

2. In order to meet these challenges, the Army is implementing MT. A key component to successfully implementing MT is the Model RFP. Its required use, as a transition tool in FY06 and FY07 is provided in Annex C (MILCON Transformation) to OPLAN 2006-03. The RFP is especially critical for those facility types for which an Army Standard, Army Standard Design, and/or Standard Criteria has been published. It can also serve as the foundation for projects that are not currently addressed by a standard, standard design, or criteria. In today's construction environment, the use of the Model RFP, because of the emphasis on performance criteria, can make a difference in acquiring a contract for the full scope of the project within the established construction cost limits. By not specifying the "how to" in the solicitations, the contractors can use industry best practices to meet the scope requirements within the cost limitations.

3. In the execution of the FY06 MCA and BRAC 2005 program, the MT Model RFP has been utilized on projects with standard facility types. Early indications are that we are on the right track to achieve our cost savings goals with the use of the Model RFP. In the execution of both the MCA and BRAC 2005 FY07 programs, all projects for facility types that have an Army Standard, Army Standard Design or Standard Criteria published and managed by a Center of Standardization (COS) shall use the MT Model RFP. No edits to the Model RFP are allowed beyond those specifically noted as options within the document. Geographic Districts will coordinate with the assigned COS to ensure the RFP used will meet Army standards and criteria prior to review by the National Review Team (HQUSACE). Projects not addressed by a facility type assigned to a COS are encouraged to use the Model RFP as their model for their solicitation. The RFP can be viewed and downloaded from ftp://ftp.usace.army.mil/pub/hqusace/MILCON%20Transformation.

For Instruction 7

CEMP-ZA
SUBJ: USACE Policy on Applicability and Use of the Military Construction Transformation (MT) Request for Proposal (RFP)

4. MILCON Transformation concepts must be applied to all Army construction projects. Cost and time savings can be achieved with use of the Model RFP. Before geographic districts/centers deviate from the policy requiring the use of the Model RFP, HQUSACE approval must be obtained. All waiver requests are to be submitted to CEMP-ZA. At a minimum, waiver submissions shall include the rationale and justification for deviation: description of the acquisition method to be used: performance metrics used to ensure compliance with published Army Standards and criteria: endorsement from the appropriate COS and a discussion on how the alternative acquisition method meets the tenets of MILCON Transformation. HQUSACE staff review, to include at a minimum Director of Contracting, Counsel, etc., will consider whether the request meets: Army objectives and priorities; functional, operational and contractual needs established by Army standards and criteria: and , if the project can be executed within approved scope, cost and delivery timelines without impact on MILCON TOA. No request will be reviewed if such action adversely impacts the construction completion and facility occupancy dates.

5. Use of the Model RFP has been approved by the Office of the Chief Counsel (CEEC) and the Office of the Director of Contracting (CEPR). Points of contact for this headquarters for clarification or submission are Messrs. Albert Young, CECW-EC-D, 202-761-7419, and Howard Moy, CEMP-IS, 202-761-8736.

FOR COMMANDER:

Waivers will be considered, but they must be the exception rather than the rule in FY 07 and beyond.

MERDITH W. B. TEMPLE
Brigadier General, USA
Director of Military Programs

DISTRIBUTION:
COMMANDER
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER
U.S ARMY ENGIENER DIVISION, MISSISSIPPI VALLEY
U.S. ARMY ENGINEER DIVISION, NORTH ATLANTIC
U.S. ARMY ENGINEER DIVISION, NORTHWESTERN
U.S. ARMY ENGINEER DIVISION, PACIFIC OCEAN
U.S. ARMY ENGINEER DIVISION, SOUTH ATLANTIC
U.S. ARMY ENGINEER DIVISION, SOUTH PACIFIC
U.S. ARMY ENGINEER DIVISION, SOUTHWESTERN
U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE