

A.1 Design-Bid-Build

What is it?

Design-bid-build (D-B-B) is the traditional and most commonly used method of delivery for roadway construction projects. When using D-B-B, a sequential process begins with the STA designing, or retaining a designer, to furnish complete design services, and then advertising and awarding a separate construction contract based on the completed construction documents. In D-B-B, the STA “owns” the details of design during construction and as a result, is responsible for the cost of any errors or omissions encountered in construction (1, 2).

Why use it?

The D-B-B delivery method is the most widely-used and well-established project delivery method (3). Some of its advantages are (4):

- STA controls design and construction,
- Design changes can be easily accommodated before start of construction,
- Design is complete before construction award,
- Allows for a fixed cost at contract award ,
- Low bid costs allows for maximum competition among contractors, and
- STA controls design/construction.

What does it do?

The main characteristic of this delivery method is that the design and construction phases of a project are completely sequential to one another and do not overlap. The STA lets the bid only when the design is fully or nearly completed and detailed. The underlying assumption behind D-B-B is that any qualified construction firm will produce the same product from a given set of plans and specifications, especially when plans and specifications are complete and properly written (5).

How to use it?

D-B-B is a sequential process to deliver a roadway project. First, the STA completes the project design to 100% or near 100% complete internally or with the use of a 3rd party design firm. Once the design is completed, the bidding stage begins where the design is released to interested firms. After the bids are received and the lowest priced and responsive bidder is awarded the project, the construction or build portion begins.

When to use it?

D-B-B is useful for projects that can be designed to or near 100% complete. Typical and common projects will benefit the most from the use of D-B-B as the delivery method. Projects that involve high risk and many unknowns as well as projects that have a limited amount of time to complete the project will not achieve the benefits of D-B-B and another delivery method might be a better choice.

Limitations

Although D-B-B is the most used delivery method in construction, there has been questioning regarding the efficiency of this method (3). Some of the identified risks and disadvantages of D-B-B are (4):

- Requires significant owner expertise and resources,
- Shared responsibility for project delivery,
- STA bares the risks for design errors,
- Sequential design and construction results in longer schedules than with other methods,
- Construction costs unknown until contract award, and
- No contractor input in design or planning.

Who uses it?

All state transportation agencies across the United States has extensive experience using design-bid-build.

Example

Design-bid-build is the most common delivery method and all STAs have used D-B-B extensively. As a resource, a project completed by the Washington Department of Transportation (WSDOT) used D-B-B to provide bridge improvements to the Wenatchee River crossing near the city of Wenatchee, WA (6). The SR 285 George Sellar Bridge was originally built in 1950. The capacity before construction was only one westbound lane and two eastbound lanes that carry 50,000 to 60,000 vehicles a day.

The scope of the project included expansion of the existing bridge deck from 54ft to 61ft to accommodate five 11ft wide lanes, a 2ft wide median, and 2ft wide shoulders. Additional scope included:

- Removal of the sidewalks on either side of the roadway to make way for a fifth lane
- To carry the increased load, significant strengthening of 100 truss members was required involving either the addition of steel plates or replacement of the members
- The truss strengthening required the removal of 10,000+ rivets near active lanes of traffic and the installation of 35,000 high strength bolts

- The parabolic portals on either end of the bridge had to be cut and strengthened to raise their clearance height to accommodate truck traffic further from the centerline of the bridge
- Sway frames at either end of the bridge had to be removed and replaced (this was performed without bridge closure)
- Construction of a 10 foot wide cantilevered pedestrian and bike pathway on the south side of the bridge
- Construction of a tunnel below the East side approach to accommodate the nearby Apple Capital Recreational Loop Trail
- Widening of the bridge approaches on both sides of the bridge and modification of three approach/exit ramps in addition to general civil site work
- Construction occurred above an active BNSF railroad line (30+ trains/day) on the West end of the bridge and maintained four open lanes of traffic during the day.

Due to some of the complexities of the project, for example the strengthening of truss members, WSDOT determined that design needed to be fully completed by the agency before putting the project out for bid. By completing the design in-house, WSDOT proceeded with the project using D-B-B. Further, at the time of this project (2009-2011), WSDOT projects that were budgeted at less than \$20 million were all completed using D-B-B.

The bridge project was completed successfully in 2011. The project was delivered late, but that was due to the unforeseen complexity in strengthening the truss members along with the fact that WSDOT authorized 57 change orders that lengthen the initial schedule. However, the project was completed under budget and had minimal disruptions to the traveling public. One key aspect of this project was the acknowledgement of the project organizations for achieving a high level of teamwork and communication that existed throughout the construction of the project. This example then provides evidence that the traditional D-B-B delivery method can provide ideal results and D-B-B should still be considered for delivering a project along with the other alternative contracting methods mentioned throughout this guidebook.

References

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