

Value Engineering (VE) and Design/Build - New Jersey's Experience

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Conceptually, the use of Value Engineering on Design/Build highway construction projects might seem redundant. A key benefit of Design/Build is the innovation it spawns. Owners advertise projects very early in the plan development stage to encourage innovative designs. Bidders view the creative freedom as an opportunity to maximize their potential for profit. A pure Design/Build environment can thus create a win/win situation for both owner and builder without the need for Value Engineering.

However, some states are bound by procurement statutes which require them to award all of their highway construction contracts to the lowest responsible bidder. Such statutes do not permit highway departments to build any qualitative or quantitative assessment criteria into the bidding process. Instead, the owners of potential Design/Build projects must either trust the process to Providence, hoping that the lowest bidder will be reputable and experienced in Design/Build techniques; or they must establish a level of comfort by developing their plans further than they otherwise would before they let a project out to bid. If the owner opts for the latter, it limits opportunities for the builder to become creative. It is in such an environment that Value Engineering can make a difference.

In 1996, New Jersey embarked on a pilot Design/Build program. It has tested the concept on twelve widely varied projects; including a new highway alignment, major bridge replacements, small bridges, noise barriers, access ramps and a new interchange. The New Jersey Department of Transportation (NJDOT), the owner of these facilities, decided that plans must be developed to at least the thirty percent level before such projects could be advertised. In reality, the level of design varied widely, ranging as low as thirty percent for a new highway alignment to as high as ninety percent for an interstate access ramp in a heavily urbanized area. Although both the state work force and New Jersey's contractors were inexperienced in Design/Build delivery techniques, the NJDOT decided that the experimental pilot program was worth the risk. Projects could be built faster, because of concurrent, rather than sequential design and construction activities. Value Engineering would be the one means available to the builder to foster innovation and creativity and it would be built into the contract specifications.

Value Engineering thus became a formal means to introduce changes to Design/Build projects, but not until the NJDOT convinced a skeptical contracting community to buy into the concept. This was no easy task, for New Jersey contractors had become accustomed to traditional Design/Bid/Build construction practices and protections. Ultimately, the parties agreed to share the cost savings brought on by new innovations on a 50/50 basis. If a contractor could offer a product which was equal to or greater than the state's desired goal, the firm would receive one half of the contract savings. The state

would be rewarded because it would receive cost savings which reduced the contract price, but it would still maintain control of the contract plans and specifications.

Value Engineering has worked best for projects which have been let for bid before their plans are extensively developed. It has worked best on New Jersey's first Design/Build project - The Hightstown Bypass - which was offered for bid when the plans were approximately 35% complete. This 4.4 mile new highway alignment was awarded in April, 1996 for \$57 million. When offered as a traditional project, the highway was expected to be completed in 2001. Once converted to Design/Build, the completion date was set for December 1999. Now it is expected to be completed no later than August 1999.

Prior to advertisement, the state conducted its own Value Engineering analysis of the design. This yielded a savings of \$5.6 million and it reduced wetlands impacts by 3.2 acres. The improvements included a new service road to eliminate an overpass, a shoulder reduction from twelve feet to ten feet and a ramp relocation to improve traffic patterns and reduce structure costs.

After advertisement, the state accepted an additional \$3.1 million in contractor proposed innovations. It allowed the contractor to substitute spread footings for driven piles, pre-stressed concrete bridge girders for steel girders, "T-wall" pre-cast concrete wall units for conventional cast-in-place bridge abutments and wing-walls, and pre-cast double span arches and wing-walls for poured-in-place abutments and a superstructure with multiple girders. It also allowed the elimination of deck joints on most of the bridges and allowed a reduced median width between opposing roadways to reduce embankment fill. The NJDOT obtained a better product and used its \$1.55 million in savings to offset some unanticipated cost increases elsewhere on the project. The contractor received an additional \$1.55 million in profit for its efforts.

This case suggests that Value Engineering can be a useful and appropriate tool to stimulate creativity, innovation and cost savings. To succeed, owners must be willing to release their projects for advertisement as early as they possibly can. Contractors will offer few, if any, value engineering proposals for projects which are already extensively designed.

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