Photo: D. Allen Covey, Virginia DOT

Construction of the Southgate Connector in southwestern Virginia. By adopting alternative contract and delivery methods, states can mitigate or transfer risks.

Risk Sharing and Transfer Using Alternative Project Delivery Methods and Contracting

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Many transportation agencies seek ways to reduce the costs of developing, operating, and maintaining facilities and to obtain greater certainty regarding future costs. Techniques to avoid and manage risk are important tools in achieving this goal. One such technique is alternative contracting to manage and transfer risk. Recommended by a 2009 report issued by the National Surface Transportation Infrastructure Financing Commission, alternative contracting increasingly is embraced by the transportation industry (*1*).

Project Risk Management

The 2012 Moving Ahead for Progress in the 21st Century Act required each state department of transportation (DOT) to implement a risk-based management plan by 2015 to preserve the condition of their assets and to improve the performance of the National Highway System. The legislation was enacted largely in response to growing budget constraints, project complexity, and stakeholder involvement. Furthermore, transportation agencies' approaches to risk management were less sophisticated than those adopted by the private sector in banking, insurance, information technology, and other industries.

National Cooperative Highway Research Program Project 20-24, Executive Strategies for Risk Management by State Departments of Transportation, found that most state DOTs already practice project delivery risk management (*2*). Risk management helps avoid surprises and provides a foundation supporting better planning, performance, cost control, stakeholder relationships, and safety and environmental outcomes.

It is particularly important for an agency to assess project risks when it is planning to use an alterna-

Photo: Washington State DOT

Barges reinforce the trusses as part a project to expand and strengthen the George Sellar Bridge in Washington State. The traditional, design-bid-build project came in under budget, but it took extra working days because of unusual site and field conditions that were accommodated within the contract.

tive delivery method that deviates from its standard practices. A risk workshop can be a useful tool for examining significant risks and considering how best to allocate them in the contract documents. As a rule, risks should be shared by the parties or assigned on a case-by-case basis to the party that can best control them (3). Additionally, contractual risk-allocation provisions provide incentives for both parties to manage the consequences of risks and to minimize damages.

Project Delivery Methods and Associated Risks

Choosing an overall project delivery and contracting strategy is one of the most important decisions made by any transportation project owner. Several different delivery methodologies follow, along with an examination of how certain risks are addressed in each of them.

Photo: Doug Wallick, Flickr

Winona Bridge, Minnesota's first construction manager–general contractor (CM/GC) project. CM/GC offers faster design and construction time, more cost control, and higher quality than traditional delivery methods.

Design–Bid–Build

The traditional project delivery method in the United States involves three sequential phases: design, procurement, and construction. Under this linear approach, the owner solicits a construction contractor to build the project after design completion, with the contract awarded to the lowest bidder. Despite—or perhaps because of—the price competition, the final cost of design–bid–build (DBB) contracts can be significantly higher than the bid amount. Such contracts often rely on unit pricing, with the owner bearing the risk (and reward) if actual quantities differ from the estimates that formed the basis for the bids. The owner also bears a significant risk of cost overruns and project delays associated with design defects.

Construction Manager–General Contractor

Construction manager–general contractor (CM/GC) projects allow owners to reduce the risk of cost overruns and project delays and transfer certain risks to the contractor. Since the contract is awarded while design is still ongoing, the contractor has the opportunity to comment on the design, thus reducing the likelihood of design flaws affecting construction. The contractor may also perform specified preconstruction work to further mitigate project risks. Once the design reaches an appropriate level, the parties finalize the schedule and price for construction work, usually involving either a fixed or a guaranteed maximum price (GMP). If a GMP is used, the contractor bears some of the risk of excess quantities, providing an incentive to minimize cost growth.

Design–Build

Design–build (DB) contracts combine design services and construction work under one contract. The design–builder accepts responsibility for design errors and incomplete design, as well as other risks specified in the contract. Depending on state licensing laws and other factors, the design–builder can be a joint venture between a contractor and designer, a contractor with a design subcontractor, a designer with a construction subcontractor, or a single firm that performs both design and construction functions. DB facilitates synergies between the designer and constructor; combined with the design–builder's ability to start construction while the design process is still under way, DB often results in significant schedule acceleration.

These same factors also can generate significant cost savings for some projects, compared to DBB. DB contracts often include risk-sharing provisions that encourage the parties to work together to resolve issues affecting the project. Some contracts

use a band, or tiered, approach, with the contractor responsible for 100% of certain risk or risks, up to a specified dollar amount or set time (lower band). Above that (middle band), the parties share the risk or risks, and the owner is responsible for the risk or risks that exceed the limits of the middle band (upper band). The opposite scenario is possible as well, with the owner having responsibility for certain risk or risks in the lower band, and the contractor in the upper band.

Design–Build–Finance–Operate–Maintain

One dilemma faced by project owners is how to balance project construction costs against future costs of operation and maintenance. In DBB and CM/GC, this is addressed through the owner's management of the design as well as through quality assurance during construction. For DB projects, the owner typically reviews the design and remains involved in quality assurance, but then focuses on developing specifications that incentivize the DB contractor to factor operations costs into its decisions.

Although public–private partnerships come in many forms, the most typical approach involves all design–build–finance–operate–maintain (DBFOM) components, with contractor compensation based on predetermined payments or user fees (*4*). In the DBFOM model, operations and maintenance typically are delegated to the contractor over an extended time period (e.g., 20 to 30 years). The contractor also is responsible for project financing, which typically includes borrowing funds, investing equity in the transaction, or both, relying primarily on the project's cash flow for repayment. For projects that include the right to collect toll or other revenues from the project, the contractor may leverage revenue streams to obtain up-front financing; for other projects, such financing may be supported by performance-based availability payments from the public agency sponsor. At the end of the concession term, the facility is returned to the public sponsor.

In DBFOM projects, transferring risk and responsibility for operations, maintenance, and financing to the contractor creates incentives for developing optimal and innovative solutions and factoring life-cycle cost considerations into the decision-making process. Similar to DB, DBFOM contracts typically include risk-sharing provisions to encourage cooperation between the parties. According to a recent study, more than 80 percent of large-scale North American DBFOM highway projects—that is, projects costing more than $90 million—have had no cost or schedule increase from the contract requirements (*5*). Cost control may be attributable to financial incentives, such as life-cycle cost savings, and liability for the financing encourages the contractor to complete the project in accordance with applicable requirements in a timely fashion.

Photo: Washington State DOT

Washington State DOT rendering for the new Puyallup River Bridge. The agency turned to DB when it realized an opportunity to gain efficiencies through contractor innovation and expertise to reduce public impacts during construction, including improvements to staging, reduction of closures, and more.

Risk Allocation in Project Contracts

Although many owners are interested in shifting as much risk as possible to the contractor, they should be aware that risk transfer results in higher pricing. To avoid having the owner pay for the same contingency twice—once upfront and, later on, through a

Photo: Pietro, Wikimedia

Port of Miami projects, including the construction of a tunnel, were completed using a DBFOM delivery method that gave the concessionaire a 35-year contract to operate and maintain the facilities.

Powhite Parkway in Virginia. In a DBFOM contract, contract-holders can collect tolls or other methods of revenue until the end of the concession term.

Photo: Virginia DOT

Alternative Contracting Methods Leverage Construction Dollars

FHWA Perspective

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The Federal Highway Administration (FHWA) has promoted alternative contracting methods (ACMs) for many years because of the significant improvements these methods bring to project delivery. ACMs have generated substantial value in safety, cost, and time benefits—and these are being collated at FHWA's Turner–Fairbank Highway Research Center as part of its Quantification of Cost, Benefits, and Risk Associated with Alternate Contracting Methods and Accelerated Performance Specifications research project.[1]

FHWA's Special Experimental Project 14 (SEP-14) for alternative contracting was created to allow state departments of transportation (DOTs) to evaluate nontraditional and competitive techniques in search of more effective delivery methods.[2] SEP-14 supported the incubation and eventual FHWA approval of powerful contracting tools, including

- Price plus time bidding,
- Alternate pavement–type bidding,
- Design–build (DB),
- Construction manager–general contractor (CM/GC) project delivery methods, and
- Alternative technical concepts (ATCs) on DB projects.

State DOT partners continue to evaluate additional promising ACMs: ATCs for design–bid–build (DBB) projects; indefinite delivery–indefinite quantity, including job-order contracting; and fixed budget–variable scope contracting.

With Every Day Counts, FHWA's "innovation deployment" partnership with the states, the agency encouraged a more-widespread use of such ACMs as DB, CM/GC, and ATCs—under the right circumstances—because of the proven results realized by state DOTs, local and tribal agencies, and contractors. FHWA also created a library of national ACM resources to facilitate sharing of good practices and lessons learned.[3] Included in the resource library are

Photo: Georgia DOT

[1] www.fhwa.dot.gov/publications/research/infrastructure/17100/index.cfm

[2] www.fhwa.dot.gov/programadmin/contracts/sep14list.cfm?sort=state

[3] www.fhwa.dot.gov/construction/contracts/acm

claim—it is critical to draft contractual risk allocation provisions carefully and to be aware of potential legal arguments affecting enforceability. The owner should consider the underlying reasons for using a particular methodology and ensure that the contract as a whole promotes those goals.

Public agencies that use alternative delivery methods typically develop their own contract forms instead of relying on industry forms, to deal properly with the myriad rules that apply to the agency's contracts. Some agencies deal with differences between delivery methodologies by using special provisions to modify their standard contract specifications. This reduces the cost of document production but makes the overall contract more difficult to understand and may lead to ambiguities.

As discussed in Smith and Papernik (*6*), to increase the probability that risk allocation provisions will be enforceable, project owners should consider applying contract drafting rule, including:

◆ If a provision is intended to be mandatory, do not use words such as "should" or "may." The word "must" is generally recommended to avoid ambiguity, although "shall" still is used in many contracts to mean "must" (*7*).

◆ To the extent possible, use performance specifications instead of prescriptive specifications and allow preapproved alternative technical concepts to be included in proposals.

links to examples for enabling legislation, requests for proposals and contracts, manuals and process guidance, quality assurance and contract administration methods, as well as actual case studies—these help states enhance their ACM deployment.

Key lesson learned: ACMs must be used in the appropriate situation and selected wisely.[4]

Case Studies

Three ACM success stories are worth highlighting. More case studies are available from FHWA.

◆ **Design–Build ATCs**. At the program level, California DOT (Caltrans) has reported a 50-to-1 return on investment for its DB ATCs, with an overall savings of $164 million for eight projects. The DB program has been so successful that the state's legislators and leadership have given permission for 10 additional projects. Furthermore, Caltrans' first program of six CM/GC projects has gone so well that the agency is planning 16 more.

◆ **Design–Bid–Build ATCs**. Because of Every Day Counts, Michigan DOT decided to use ATCs for traffic control and phasing for a DBB project. This approach resulted in the project's completion nearly a year ahead of the date specified in the original contract. In addition to the benefits in safety, cost, and time, early completion of projects reduces the delays caused by work zones, which brings significant intangible benefits to the DOT in terms of public credibility.

◆ **Construction Manager–General Contractor**. The Pueblo of Acoma Tribe in New Mexico delivered a 7-to-10 year capital program in less than 10 months by utilizing CM/GC—resulting in a savings of more than $1.15 million. This was the first programmatic use of CM/GC in the nation to bundle contracting for several projects and included unique work such as bridge replacements, road stabilization, maintenance crew training, parking lot design and construction, Federal Emergency Management Agency work, and road rehabilitation and paving.

[4] www.colorado.edu/tcm/projects/alternate-contracting-methods

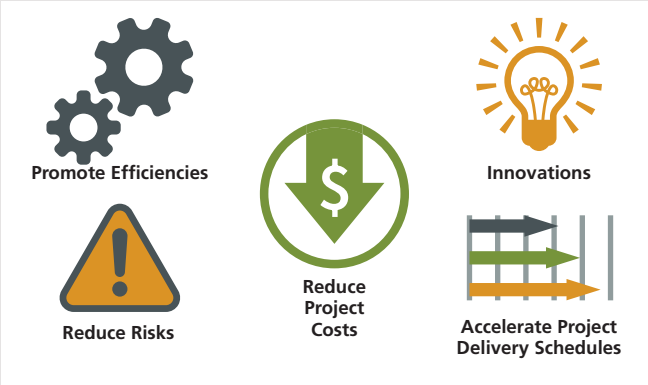
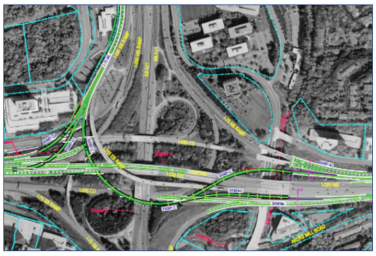


Image: Georgia DOT

Benefits of ATC.

ACMs are revolutionizing how FHWA is partnering with industry to deliver more value for highway dollars. Many enhancements come from integrating design and construction so that consultants and contractors can contribute creative ideas early and help generate a more competitive environment. This proven success has prompted FHWA, the National Cooperative Highway Research Program, and others to sponsor ongoing studies and to develop guidance for leveraging the benefits of ACMs, ATCs, project–bridge bundling, and risk management. Some of these guidance documents are available and others will be published soon.[3]



Improvements

- Reduced bridge structures and paving
- Eliminated redundant ramps while maintaining approved access points
- $7 million savings included in winning bid

Image: Georgia DOT

Northwest Corridor ATC benefits in Georgia.

Ohio DOT used DBFOM to renovate the Brent Spence Bridge in Cincinnati. The bridge corridor had been deemed functionally obsolete, and adequate funds were not available to replace or refurbish it.

Photo: PunkToad, Flickr

◆ For cases in which the contract is based on the owner's preliminary design, include clear statements in the procurement documents specifying that the contractor is ultimately responsible for meeting contract requirements and cannot rely on the owner's preliminary design to satisfy such requirements (*8*).

◆ Allow sufficient time for the proposer to perform investigations before the proposal due date. Pay a stipend if the proposal requires significant effort by the proposer.

Conclusion

Alternative project delivery and contracting requires thorough risk identification and assessment, along with careful contract drafting. Although the transfer of risks to the contractor means that the contract price will include contingencies associated with those risks, the cost associated with such contingencies may be offset by other factors, such as the contractor's ability to incorporate creative solutions into the design and construction process, as well as price certainty and schedule acceleration associated with alternative delivery.

The reconstruction of I-15 was Utah DOT's first DB project—and its largest to date.

Photo: Garrett, Flickr

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