NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP SYNTHESIS 455

Alternative Technical Concepts for Contract Delivery Methods

A Synthesis of Highway Practice

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

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FOREWORD

Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, "Synthesis of Information Related to Highway Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Jo Allen Gause
Senior Program Officer
Transportation Research Board

Transportation agencies are increasingly allowing design and construction contractors to incorporate alternative technical concepts (ATCs) in their proposals for highway projects. The ATC approach allows proposers to suggest modifications to a contract requirement that would improve a project technically or reduce costs. This synthesis documents various methods by which agencies have successfully implemented the ATC highway contracting process. The report identifies methods that promote transparency and fairness, while at the same time protecting the industry's right to confidentiality.

Information used in this study was gathered through a literature review, a survey of state departments of transportation (DOTs), analyses of DOT solicitation documents, and case examples.

Douglas D. Gransberg, Iowa State University; Michael C. Loulakis, Capital Project Strategies, LLC; and Ghada M. Gad, Bowling Green State University, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable with the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

ALTERNATIVE TECHNICAL CONCEPTS FOR CONTRACT DELIVERY METHODS

SUMMARY

"There is an emerging view in the construction industry that better performance or better value for money can be achieved by *integrating teamwork* for planning, design and construction of projects" (Forgues and Koskela 2008, italics added).

Integration can be achieved in a number of ways, but in the final analysis an "integrated" construction project includes the construction contractor in the design process in some manner. Design-build (DB) project delivery is the most common method in the highway industry of developing an integrated approach to design and construction. The construction manager/general contractor (CMGC) model also furnishes integration by bringing the construction contractor into the design process through a preconstruction services contract. Traditional design-bid-build (DBB) contracts have been described as not integrated "by definition."

However, thanks to the pioneering efforts of the Missouri Department of Transportation (MoDOT), that is no longer the absolute case because that agency chose to include alternative technical concepts (ATCs) on its DBB projects. FHWA defines an ATC as "a request by a proposer to modify a contract requirement, specifically for that proposer's use in gaining competitive benefit during the bidding or proposal process … [and] must provide a solution that is equal to or better than the owner's base design requirements in the invitation for bid (IFB for DBB) or request for proposal (RFP for DB) document." MoDOT proved that obtaining early contractor involvement to achieve integrated project delivery is possible on traditional low-bid highway projects. In doing so, the agency has accrued verifiable time and cost savings while enjoying the support of its local design and construction industry partners. In the words of one Missouri contractor, "we elected to pursue ATC because we felt we could derive a solution that would be more economical for us to build than the baseline design."

The purpose of this synthesis is to document various methods by which transportation agencies have successfully implemented the ATC highway contracting process. The report identifies methods that promote transparency, consistency, and fairness of the evaluation process, while at the same time protecting the industry's right to confidentiality.

In addition to a rigorous literature review, the synthesis is based on new data from a survey of DOTs, content analyses of DOT solicitation documents, and case studies. A general survey on ATC procurement practices received an 85% response rate, with responses from 42 U.S. state DOTs. All three Federal Lands Highway Divisions were also surveyed. The content analysis included solicitation documents for 62 ATC projects from 22 state DOTs and two federal agencies. Finally, nine individual project case studies from different states and one agency ATC program case study consisting of nine projects in a tenth state were conducted to furnish specific information on different approaches to dealing with ATC projects. The case studies document nearly $900 million in savings and demonstrate the potential for agencies that do not currently use ATCs.

The synthesis concludes that the practice of guaranteeing confidentiality of proposed ATCs so that competing contractors can build a competitive edge with their ATCs is widely used and is thought by practitioners to stimulate innovative project delivery approaches that were not considered during the baseline design process. The Hastings Bridge DB case study project in Minnesota is a prime example of a huge savings (roughly $70 million) that would not have been possible if the DOT had not been able to guarantee confidential consideration and preaward approval of an ATC that solved a particularly complex foundation design in a manner the agency had never previously used.

Other major conclusions documented in the report are as follows:

1. An ATC leads the agency to alter the baseline design or the baseline design criteria because if no deviation is required, the concept would be responsive if proposed as merely the given competitor's preferred design approach.

2. ATC usage is most common in DB projects and has been successfully implemented in nearly all types of project delivery methods.

3. ATC use is not constrained by an agency's project delivery selection decision, and agencies can implement ATCs without being constrained by technical or procurement issues on virtually all types of transportation projects.

4. Implementing ATCs on DBB projects requires the agency to schedule a longer period before receiving bids to conceive, receive, review, and approve ATCs than DB ATCs because the agency needs additional time to physically advance approved ATC design alternatives to biddable quantities.

5. In CMGC and DB-qualifications-based selection (DB-QBS) project delivery, ATCs are integral to CMGC contractor/design-builder selection process and are often used as selection criteria.

6. ATCs provide a contractual mechanism in DB projects to approach the agency with possible design solutions to complicated design issues and greatly reduce the risk that an innovative design approach would ultimately be disapproved after award of the DB contract.

Lastly, the legal review found that there was no existing case law that specifically addresses ATCs. Consequently, before a public transportation agency can develop its own ATC program, it may choose to look carefully at its local restrictions and legal framework, and then determine how to apply such restrictions and framework to a procurement using ATCs.

A well-documented, effective practice was the use of confidential one-on-one meetings to furnish an initial response to potential ATCs and permit competitors to decide whether to invest the time and effort to fully develop a formal ATC submittal. The remainder of the less-prominent conclusions, effective practices, and recommendations for future research are contained in chapter six.

The synthesis recommends that further research be conducted in two areas. First, the legal review found that the issue of design liability for contractor-designed ATCs can be shifted to the contractor in DBB projects. Second, research providing guidance on how to change an agency's procurement/technical culture when it adds ATCs to the project delivery process is also needed.

CHAPTER ONE

INTRODUCTION

INTRODUCTION

FHWA defines an alternative technical concept (ATC) as "a request by a proposer to modify a contract requirement, specifically for that proposer's use in gaining competitive benefit during the bidding or proposal process … [and] must provide a solution that is equal to or better than the owner's base design requirements in the invitation for bid (IFB for DBB) or request for proposal (RFP for DB) document" (FHWA 2012b). In a February 2011 meeting for interested contractors, the Missouri Department of Transportation (MoDOT) explained its motivation for including ATCs in the design-bid-build (DBB) project to replace the Hurricane Deck Bridge over the Lake of the Ozarks in the form of the following equation:

BOLD Approach = Industry + MoDOT = One Team = Best Value (MoDOT 2011)

Following that meeting MoDOT received several *bold* ATCs including two that proposed to completely realign the bridge from its baseline alignment. The low bidder's ATC realignment permitted it to bid $8.0 million under the engineer's estimate for the baseline design. Two of the five bidders did not propose ATCs and their bids were roughly $10 million over the low bidder. Once again MoDOT had shown how allowing the construction contractor to have substantive input in a project's final design accrues benefits to both the agency and the taxpayer.

The proliferation of alternative project delivery methods for transportation and other infrastructure projects is the result of the pressing need to rapidly renew the nation's deteriorating infrastructure. Specifically, state DOTs are using design-build (DB), construction manager/general contractor (CMGC), construction manager at-risk (CMR), and at times design-bid-build best-value (DBB-BV) contracts to take advantage of the design and construction industry's ideas for alternative design and construction solutions to highway projects. The FHWA Every Day Counts program is designed to identify and deploy innovation aimed at "*shortening project delivery*, enhancing the safety of our roadways, and protecting the environment … it's imperative we pursue better, faster, and *smarter ways of doing business*" (Mendez 2010, emphasis added). Soliciting ATCs as a part of the preaward procurement process is one method that has proven to yield innovative solutions for thorny design and construction problems on a wide range of projects. ATCs constitute a *smarter way of doing business* by bringing the collective experience and creativity of all project stakeholders to bear on a given project.

> "Appropriate procurement strategies are needed to help achieve optimal solutions in terms of cost, time and quality."
>
> (Kumaraswamy and Dissanayaka 1998)

> "Regardless of the project type, adopting an alternative delivery method that provides contractor design involvement [such as ATCs] enables the project team to reap a number of recognized and unrecognized benefits."
>
> (West 2012)

In many states, the construction and consulting industries have expressed their concerns about protecting proprietary as well as sensitive business practices when proposing an ATC. Public agencies have worked with their industry partners to develop transparent and fair procedures that treat all proposers fairly and provide management with a documented ATC approval process and its incorporation into the contract award procedures (Smith 2012). Previous research (Carpenter 2012; Coblentz 2012; R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012; Horn 2010) has shown that ATCs have potential for accruing sizable benefits in terms of cost savings, increased constructability, and schedule reduction.

SYNTHESIS OBJECTIVE

The objective of this report is to identify and synthesize current effective practices that comprise the state-of-the-practice in the use of ATCs on projects delivered using the full spectrum of project delivery methods and to discuss the procurement procedures that have been used to successfully implement ATCs on typical transportation projects. ATC usage is not new to the industry; the technique has been in DOT DB projects since 2001 (Carpenter 2012). However, the momentum created by the Every Day Counts program (Mendez 2010) has raised interest in learning more about ATCs. Additionally, the passage of "MAP-21," the Moving

Ahead for Progress in the 21st Century Act (Pub. L. No. 112-141) Section 1304 in 2012, which reduces the state match for federal-aid funded projects if innovative methods such as ATCs are used, has generated additional interest from DOTs who have until now been resistant to implement nontraditional project delivery methods (FHWA 2012b). This synthesis report will help DOTs develop effective procedures for delivering ATC projects and manage the ATC solicitation/evaluation/approval process in a fair, equitable, and transparent manner.

In addition to a rigorous literature review, the synthesis is based on new data from a survey of DOTs, a content analysis, and case studies. A general survey on ATC procurement practices provided responses from 42 U.S. state DOTs. The content analysis included solicitation documents for 62 ATC projects from 22 state DOTs and two federal agencies. Finally, nine project and two program (one comprised of nine projects and the other covering six) case studies from different states were conducted to furnish specific information on different approaches to dealing with ATC projects. The case study projects range from a $15 million interchange replacement to the highly visible multicontract $2.6 billion megaproject to construct a greenfield interstate highway. The projects were selected because each demonstrated a specific approach to ATC contracting that allowed an in-depth illustration of important information gleaned from the survey and the DOT policy documents.

KEY DEFINITIONS

The report will use a number of procurement terms in a precise sense throughout its entirety. Although the following are not to be considered standard or official definitions, it is important for the reader to understand the authors' specific definition for each key term to gain a full understanding of the meaning of this report.

Key Terms

- *Alternative (also termed as "alternate" in many sources) technical concept* (*ATC*): A request by a proposer to modify a contract requirement, specifically for that proposer's use in gaining competitive benefit during the bidding or proposal process. An ATC must provide a solution that is equal to or better than the owner's base design requirements in the invitation for bid (IFB for DBB) or request for proposal (RFP for DB) document (FHWA 2012b).
- *Baseline design:* "[A] project's scope, need and purpose … for organizing cost and performance data in order to compare value alternatives" (Caltrans 2007). "A project's original scope, cost and schedule … used to measure how [alternatives] deviate from the plan" (Ortiz 2008).
- *Equivalent design:* An alternative that is designed to perform equally and provide the same level of service, over the same performance period, and that has similar life-cycle costs (Wimsatt et al. 2009).
- *Stipend:* "[A] fee paid to unsuccessful firms for development of a responsive proposal" (WVDOH 2011).
- *Design-bid-build* (*DBB*)*:* "The 'traditional' project delivery approach where the owner commissions a designer [or uses its own in-house design assets] to prepare drawings and specifications under a design services contract, and separately contracts for construction, by engaging a contractor through competitive bidding or negotiation" (DBIA 2009).
- *Design-build* (*DB*)*:* "The system of contracting under which one entity performs both architecture/engineering and construction under a single contract with the owner" (DBIA 2009).
- *Design-build qualifications-based selection* (*DB-QBS*)*:* DB project delivery where the design-builder is selected on a basis of qualifications and past performance with no price competition (DBIA 2009).
- *Construction manager/general contractor* (*CMGC*)*:* "A project delivery method where the contractor is selected during design and furnishes preconstruction services. Also called CM-at-Risk" (DBIA 2009).

Procurement Terms

The definitions for the primary procurement terms that will be referenced in the synthesis are drawn from two sources. Federal terminology is defined in *Glossary of Federal Acquisition Terms* (Shields 1998) and the definition of nonfederal terms comes from the state of Minnesota's *Glossary of Common Procurement Terms* (2011), which seemed to be the most complete listing of this type. It is recognized that each state will have its own unique definitions for technical terms describing procurement and contract actions. However, to maintain consistent definitions throughout the report, the previously cited sources are used as the definitive reference.

- *Advertise:* "To make a public announcement of the intention to purchase goods, services or construction with the intention of increasing the response and enlarging the competition. The announcement must conform to the legal requirements imposed by established laws, rules, policies and procedures to inform the public" (Shields 1998).
- *Invitation for bids* (*IFB*): "A solicitation for offers under sealed bidding" (Shields 1998).
- *Request for qualifications* (*RFQ*): "The document issued by the Owner prior to the RFP that typically: describes the project in enough detail to let potential proposers determine if they wish to compete; and forms the basis for requesting Qualifications Submissions in a 'two-phase' or prequalification process" (DBIA 2009).

- *Request for proposals* (*RFP*): "A solicitation for offers under negotiation procedures" (Shields 1998).
- *Procurement:* The combined functions of purchasing, inventory control, traffic and transportation, receiving, inspection, store keeping, and salvage and disposal operations (Minnesota 2011). "All stages involved in the process of acquiring supplies or services, beginning with the determination of a need for supplies of services and ending with contract completion or closeout" (Shields 1998).
- *Solicitation:* "The process used to communicate procurement requirements and to request responses from interested vendors. A solicitation may be, but is not limited to a request for bid and request for proposal" (Minnesota 2011). "(1) A document sent to prospective contractors by a Government agency requesting submission of an offer, quote, or information. (2) The process of issuing a document requesting submission of an offer, quote, or information and obtaining responses" (Shields 1998).

STUDY APPROACH

The approach used to complete the synthesis relied on four independent sources of information:

- Literature review.
- Survey of DOTs and Federal Lands Highway Divisions (FLHDs).
- Content analysis of DOT solicitation documents.
- Case studies of ATC projects.

The first was a comprehensive review of the literature. An effort was made to seek not only the most current information but also historical information so that the change over time, if any, in ATC practices could be mapped and related to the current state of the practice. The second line of information came from the general survey responses of state DOTs, which received 42 DOT responses (84% response rate) including three FLHDs (100%). The survey questionnaire was based on the output of the literature review. Next, the DOT solicitation document content analysis using a protocol proposed by Neuendorf (2002) from 24 states plus the Central FLHD constituted the third source of information. Figure 1 shows the survey response, ATC document content analysis populations, and the case study locations as a map.

Finally, the case study projects were drawn from two sources: the literature and survey responses indicating an agency's willingness to contribute a case study. The primary source of information in this synthesis is the analysis of case studies. The analysis occurred on the following three levels:

1. Analysis of ATC highway road and bridge projects.
2. Analysis of corresponding public transportation agencies with ATC experience.
3. Analysis of case study projects from the transit and flood control sectors.

The study team used the case study method described by Yin (1994) to furnish a rigorous methodology for collecting the data from the case study projects. Yin maintains that planning the process of accessing and collecting data is essential preparation for efficiently and accurately collecting cogent information. Additionally, it is equally important to carefully select cases that can be compared directly with one another that also offer cross-sectional diversity. The selected sample fulfills this requirement in that there are single agency examples as well as a program of multiple projects for a single agency.

Although the collection of cases needs to cover the project delivery method spectrum in this study, it is "important that the participant pool remain relatively small" (Colorado State University 2008). Although fewer cases can sometimes lead to unsubstantiated research conclusions based on the probability of atypical case selections, it provides a better opportunity to examine each case in detail without becoming too cumbersome. Therefore, the information gleaned from the case studies is coupled with information collected in the survey and the literature review to validate any conclusion drawn from the case studies. Note the case study information was gathered by both face-to-face and telephonic interviews.

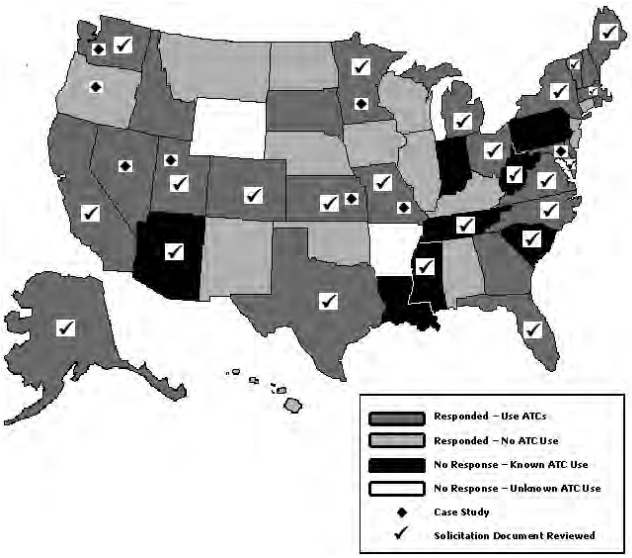

FIGURE 1 Survey response and ATC document content analysis map. (*Note*: Case studies shown in Oregon and Kansas are not DOT projects.)

Subjects where two or more research instruments produced intersecting information were considered significant and used to develop the conclusions and candidates for the list of effective practices. Points where only one source furnished substantive information on ATCs were used to identify gaps in the body of knowledge that showed potential for future research.

Protocol to Develop Conclusions and Recommendations for Future Research

The major factor in developing a conclusion was the intersection of trends found in two or more research instruments. The intersection of more than two lines of converging information adds authority to the given conclusion. Additionally, greater authority was ascribed to information developed from the general survey of highway agencies. The literature review and solicitation document content analysis were considered to be supporting lines of information. Finally, the case studies were used to validate the conclusion as appropriate because they were examples of how U.S. highway agencies have actually implemented ATC procedures to support the delivery of construction projects.

Recommendations for future research were developed based on the common practices described in the literature and confirmed as effective by one of the research instruments but generally not widely used. Gaps in the body of knowledge found in this study were also used to define the areas where further research would be valuable.

Organization of the Report

The remainder of the report is organized as follows:

- Chapter two—ATC Procurement Law, Legal Case Studies, and Relevant Case Law
- Chapter three—Content of DOT ATC Procurement Policies, Procedures, and Programs
- Chapter four—ATC Preaward Review and Approval Procedures
- Chapter five—ATC Procurement Project Case Studies
- Chapter six—Conclusions

The next chapter details the legal and contractual principles of construction contracts that include ATCs. The major legal issue in ATC projects is the agency's ability to guarantee confidentiality under local open records acts and sunshine laws. Therefore, chapter two contains information to provide the reader a foundation upon which to understand chapters three and four. Chapter five presents nine ATC project case studies and a case study of the Washington State DOT's (WSDOT's) ATC program that reviews an additional nine ATC projects. The case studies demonstrate the methods that agencies used to implement ATCs on a variety of DBB, CMGC, and DB projects.

CHAPTER TWO

LEGAL AND CONTRACTUAL ISSUES ASSOCIATED WITH ALTERNATIVE TECHNICAL CONCEPTS

INTRODUCTION

The legal and contractual issues associated with ATCs are quite diverse and create challenges for both the procuring agency and those entities responding to the procurement. This chapter focuses on four of these challenges, namely:

- Maintaining confidentiality of ATCs,
- Ownership rights associated with ATCs,
- Conducting a proper procurement, and
- Design liability arising from the implementation of an ATC.

> "Confidentiality in the ATC process is very important for the success of the ATC process."
>
> (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012)

It should be noted that the authors are unaware of any existing case law that specifically discusses ATCs. Consequently, before a public transportation agency can develop its own ATC program, it might be prudent to review prevailing confidentiality restrictions, legal framework, and federal requirements, and then determine how to apply such restrictions and framework to a procurement using ATCs.

MAINTAINING CONFIDENTIALITY OF ALTERNATIVE TECHNICAL CONCEPTS

To be willing to invest in developing an ATC, a contractor must truly believe that the intellectual property that it furnishes is going to be protected and that its competitors are not going to be given the benefit of the idea. "Confidentiality in the ATC process is very important for the success of the ATC process. Great care needs to be taken when exchanging files and emails" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012).

Confidentiality During the Procurement Process

With the move to alternative project delivery systems such as DB and CMGC, an increasing number of agencies conduct pre-proposal confidential/proprietary meetings with their proposers. These meetings are excellent opportunities to have the proposer discuss a range of RFP issues, including ideas on how to better the procurement or project. Because of the important policy reasons for maintaining confidentiality during the procurement, it has become common for agencies that use proprietary meetings to create a formal agreement among all participants to such meetings. Having this document in place on projects where ATCs are used is particularly important, given the confidentiality proposers expect for their innovative ideas. An example of a confidentiality provision is as follows:

> I will maintain the confidentiality of all procurement related information I gain access to as a result of the _____ (the 'Project') procurement process, which includes a series of one-on-one confidential meetings with each Offeror where the Owner and Offeror may discuss, among other things, proposed Alternative Technical Concepts and other aspects of the design and construction of Package A (the 'Collaboration Process'). This includes proprietary information, information designated confidential by the Owner or the Offeror, or any other information that might be considered sensitive which I have heard, seen or reviewed ('Designated Confidential Information').
>
> Except as may be required by applicable law or court order, I will not divulge any Designated Confidential Information to the media, any member of the public or any other Offeror. I understand that a list of the signatories to this type of agreement shall be maintained by the Owner. If contacted by any member of the public or the media with a request for Designated Confidential Information, I will promptly forward such requests to the Owner's Designated Representative. I will also maintain security and control over all documents containing such Confidential Information in my custody. (MWAA 2012)

This language creates an obligation on the individual who executes it to abide by its terms. Consequently, if the individual breaches this agreement by wrongfully disclosing information, he/she faces damages for the consequences of the wrongful disclosure. However, experience shows that reliance on the confidentiality agreement alone is not the most effective way of preserving confidentiality. A more effective approach may be to have the leader of the agency's team specifically discuss the reasons why confidentiality is so important to the integrity of the proposal process.

It is also important for the agency's team leader to reinforce the principles behind confidentiality with the proposer. The industry commonly thinks that the risk of a wrongful

disclosure comes from the owner. However, it is not unheard of for proposers who unsuccessfully raise an ATC during a proprietary meeting to circumvent the project team and bring up the idea to project stakeholders, members of boards of directors for the agency, and senior management—with the goal of creating political pressure to get the ATC recognized.

Impact of Governmental Disclosure Requirements

The treatment of ATC confidentiality is also implicated by the various federal, state, and local agency record disclosure requirements that create "sunshine" and transparency around information in the hands of the government. These requirements are premised on a general presumption that the public has a right to access the material and records used by the government in conducting its affairs and informing its decisions.

Although the obligation to disclose governmental records is quite broad, there are some common exemptions to this obligation. For purposes of ATCs, the most relevant exemptions relate to (1) trade secrets and commercial or financial information that is privileged or confidential, and (2) records that reflect the "deliberative process" of a governmental decision and that would not be available to a party in litigation with the agency.

There are literally hundreds of federal and state courts that have considered these two exemptions, and an in-depth discussion here would not be appropriate, particularly because there has yet to be a specific "open records" case that has addressed ATCs. However, in summary, these two exemptions address the following:

- The "trade secret and commercial information" exemption is intended to encourage those submitting a proposal to an agency to voluntarily furnish useful commercial or financial information, with an assurance by the government that it will be safeguarded from competitive disadvantages that could result from disclosure. There are many tests that have to be passed to qualify for this exemption, but the "confidential" component is generally satisfied if it can be shown that information disclosure is likely to (1) impair the government's ability to obtain necessary information in the future or (2) cause substantial harm to the competitive position of the person from whom the information was obtained.

- The "deliberative process" exemption is intended to encourage frank discussion between subordinates and chiefs concerning the administrative aspects of a decision. Although there are also many tests for this exemption as well, the two that are most significant are that (1) the document is so candid or personal in nature that public disclosure would likely stifle honest and frank discussion within an agency and (2) the communications have occurred before the agency reached a final decision.

The cases interpreting these two exemptions are highly fact-dependent, with courts attempting to determine the harm that could arise from disclosure. Looking at the purpose of these exemptions, it appears unlikely that ATCs, once agreed on and part of the proposal, will be shielded from disclosure on the grounds of either trade secrets or confidentiality. The bigger question may be the timing of when they are disclosed.

Consider, for example, *Michaelis, Montanari & Johnson v. Superior Court of Los Angeles* [38 Cal. 4th 1065, 136 P.3d 194, 44 Cal. Rptr. 3d 663 (2006)]. In this case, the court considered questions concerning the availability and timing of public disclosure of competitive proposals submitted to a public agency as part of a process of qualifying and negotiating for a public contract, lease, or other project. The court ultimately concluded that public disclosure of the proposals needed to await conclusion of the agency's negotiation process, occurring before the agency's recommendation is finally approved by the awarding authority.

This case involved an RFP issued by the city of Los Angeles Department of Airports for the lease of a parcel of land at Van Nuys Airport. The successful proposal was to be based on a number of criteria, including the proposed rent and concession fees. After the deadline for submitting proposals had passed, but before the agency had negotiated with or selected the successful proposer, a law firm submitted a request under California's Public Records Act for copies of all proposals submitted in response to the RFP. The agency refused to provide such information until after the negotiations had concluded, and litigation ensued.

Although the trial court agreed with the agency, the Court of Appeals did not, and believed that the city failed to demonstrate there was a "clear overbalance" in favor of delaying disclosure. The court believed that the public had a significant interest in knowing, prior to completion of the negotiating process, whether the agency had acted properly and in accordance with its own guidelines. The one dissenting judge reached a different conclusion, stating:

> The request for proposals suggests that [the agency] might elect to negotiate with more than one bidder. If the disclosure of bids takes place prior to negotiations with one or more bidders, the City's ability to obtain the most favorable arrangement may be jeopardized once a negotiating bidder becomes aware of the content of competitive bids because that bidder would no longer be in doubt as to its relative bargaining position. For example, a bidder that is negotiating will be in a position to know that it does not have to accede to City requests because of the content of other bids. The request for proposals also contemplates that changes and amendments to bid proposals will take place during negotiations. During negotiations, bidders may adjust their bids—presumably

> to the detriment of the City—if they have knowledge of other bids. (*Michaelis*, 136 P.3d at 199)

The Supreme Court of California ultimately agreed with the dissent and the city, finding that disclosure was inappropriate. It went through a detailed explanation of the practical issues with disclosure, including the that "advance disclosure of any significant 'gap' between the terms offered by the 'finalist' proposer and its competitors could induce that proposer to resist the city's requests for even more favorable terms, or lead to an amended proposal that offers less attractive terms" (*Michaelis*, 136 P.3d at 199). The court noted that the willingness of a negotiating party to agree depends in part on its assessment of the other party's alternatives. The court's decision also noted something significant in the context of ATCs:

> Proposers are not likely to present their best work in their proposals if they know that their competitors can filch their ideas during negotiations. A proposer might well hesitate to disclose creative, innovative insights or solutions after weighing the threat of misappropriation by competitors. The result could be submission of inferior proposals, to the ultimate detriment of the public interest. (*Michaelis*, 136 P.3d at 200)

One can imagine that a bidder would be highly interested in understanding how ATCs were presented by others, particularly before the time for selection or protests expired. This could be a particularly significant concern in the case of a public–private partnership contract, where there is often a gap between commercial close and financial close. The *Michaelis* case provides some thoughtful reasoning as to why this would be prejudicial to both the agency as well as the other bidders.

> Since answering the synthesis questionnaire in 2012, the Florida DOT has revised its policy regarding confidential ATCs to bring it in line with other DOTs and permit most ATCs to be kept confidential until contract award and to permit the contractor to withdraw the ATC if it cannot be kept confidential.
>
> (A. Autry, personal communication, "Florida DOT ATC Program Changes," Aug. 14, 2013)

There are several other ways that governmental disclosure requirements (and the previously cited exemptions) can impact the administration, review, and assessment of ATCs. For example, Florida's Sunshine Law, perhaps the broadest in the country, essentially mandates that any decision-making function be subject to public disclosure (Florida 2012). There are some important exemptions, such as meetings where (1) a negotiation is being conducted with a vendor pursuant to a competitive solicitation, (2) a vendor makes an oral presentation as part of a competitive solicitation, or (3) a vendor answers questions as part of a competitive solicitation process. In these situations, the Sunshine Law appears to require that a complete recording of the meeting is made, and that no portion of the meeting can be held off the record. The recording is exempt from public disclosure until 30 days after the opening of the bids or proposals.

The challenge for those working in Florida is determining where proprietary meetings and the evaluation of ATCs fit into these requirements. Some Florida agencies consider proprietary meetings exempt and have a complete recording made of such meetings. Whether this will withstand judicial scrutiny is unclear, although we are unaware of any direct challenges to this practice as of yet. That the evaluation of ATCs is "on the record" may also create some consternation by agencies, because their decisions to accept or reject an ATC may be subject to specific scrutiny by a disappointed bidder.

OWNERSHIP RIGHTS ASSOCIATED WITH ALTERNATIVE TECHNICAL CONCEPTS

In addition to confidentiality protection, those who bid or propose on projects that allow the submission of ATCs are highly interested in protecting their commercial investment in developing the ATC. If the ATC helps the contractor get the award, then that investment was worthwhile. If the contractor is unsuccessful, then it may find that it wasted money in developing the ATC, but it may have also enhanced the position of its competitor if the ATC is used by the agency with the winning bidder.

Projects using DB often help mitigate the expense of proposal development by offering stipends to unsuccessful proposers, giving them some (albeit limited) compensation for their efforts, including the development of ATCs. As with confidentiality agreements, it has become typical for an agency to condition the payment of a stipend on the offeror's execution of a stipend agreement granting, among other things, the agency with full ownership rights to all information submitted in the proposal. This eliminates the question of whether the agency has the right (legal or "ethical") to use the ATCs from unsuccessful proposers. Such a clause might look like this:

> All Proposal Work Product shall be considered work for hire, and the products of such work shall become the property of the Owner without restriction or limitation on their use. Neither Offeror nor any of its team members shall copyright any of the Proposal Work Product. Offeror, by executing this Agreement, specifically represents and warrants that it has the authority to convey to the owner all rights, title, and interest in the Proposal Work Product, including but not limited to those any rights that might have been vested in team members, subcontractors, consultants or anyone else who may have contributed to the development of such material.

Stipend agreements could also address the second issue relative to liability, such as with the following:

> If the Owner does not award Offeror the Contract, and the Owner proceeds to design and construct the Project through its employees, agents, third parties, or its Contractor, use of the Offeror's Proposal Work Product under this Agreement is at the sole risk of the Owner and/or the Successful Contractor without liability or legal exposure to Offeror or anyone working by or through Offeror.

The legal question of who owns the ATC if there is no stipend agreement is more uncertain. Some states have laws that say, in essence, any information submitted to an agency in pursuit of a proposal is owned, by operation of law, by the agency. However, to avoid ambiguity over this issue, procurement documents will treat the issue directly with language saying, in effect, that "all proposals will become the full property of the agency and a matter of public record" (WSDOT 2011).

Another consideration is that because an ATC derives from a subconsultant or a subcontractor, it may be beneficial to the agency that the entity that developed a given ATC directly convey the rights to the agency without including the prime contractor. Although no case has yet been reported on a situation like this, the failure to have the entity that created the ATC divest its ownership rights in the ATC may create problems for the agency.

CONDUCTING A PROPER PROCUREMENT

One of the practical challenges with ATCs is that they can create protest risk if the agency is not thoughtful about how to approach consideration of the ATCs. Although there have been no ATC-related protests of which we are aware, the risk is evident by considering a number of hypothetical situations.

One potential risk arises from the consequences of the agency giving points during the evaluation process for "creative ideas" or "potential alternative design approaches" offered by a proposer on a CMGC or DB project. A proposer could submit a number of interesting ideas and win the procurement based on having a high score for that evaluation factor. But if none of the ideas are ultimately used as the project moves to award, a disappointed bidder could argue that the selection was premised on a meaningless factor. Perhaps more significantly, someone who is a proponent of more traditional project delivery could, on learning how the selection took place, raise political arguments about the use of nonprice selection factors. Consequently, an agency may want to evaluate whether using a "creativity" evaluation factor is appropriate for its specific project.

Another potential protest risk arises from how the evaluation committee considers ATCs submitted by the various proposers. A proposer might believe it has a protest right if (1) the evaluation committee has rejected one or more of its ATCs, while accepting another proposer's ATCs; (2) its ATC is rejected, while a slightly different ATC from another proposer is accepted; or (3) during the natural "give-and-take" discussions that occur during proprietary meetings, the proposer believes it was discouraged from submitting an ATC while another proposer was "coached" and encouraged to submit an ATC. The basis for the protest would likely be that the agency treated the proposers differently.

Agencies are afforded broad discretion in procurement decisions. However, procurement laws require that an agency treat all proposers fairly, and courts considering a bid protest will likely be concerned if a proposer can demonstrate that it was misled or misjudged on something as important to the ultimate award as the acceptance/rejection of an ATC.

Given the complexity of dealing with ATCs preaward, some agencies will defer making decisions on ATCs until post-award simply to ensure that they can perform proper due diligence. A recent example of how this was addressed is Package A, Phase 2, of the Dulles Corridor Metrorail Project (MWAA 2012). The DB contract for this was awarded by the Metropolitan Washington Airports Authority (MWAA) in May 2012, with award based on a pass-fail technical, low-price process. Despite pressure from the shortlisted offerors, MWAA did not accept any ATCs, as it realized, among other things, that (1) it could not timely consider the most interesting ATCs that were being discussed during proprietary meetings and maintain its procurement schedule; (2) it could not ensure confidentiality of the proposed ATCs, given the many stakeholders involved in making decisions; and (3) the technical complexity of many proposed ATCs had potential effects on permits and other mandatory requirements that required substantial study before approval (MWAA 2012).

To encourage offerors to submit their ideas, MWAA gave each offeror the opportunity to submit "Pre-Award Value Engineering Change Proposals (VECP)" (MWAA 2012). These consisted of summary discussions of the proposed ATCs and were to be evaluated after award. The commercial reason for identifying these ideas was to enable the offeror to "carve out" these ideas and obtain 60% of the savings if the VECP was ultimately accepted—versus the 50% savings that would come from any post-award VECP. MWAA also used a stipend agreement to own the Pre-Award VECPs of the unsuccessful offerors, and the successful offeror was given an opportunity to propose them as well (receiving 50% of the savings) (MWAA 2012).

One other major procurement risk should be considered. It is a longstanding principle of government contract law that an agency cannot make a "cardinal" (i.e., substantial) change to a procurement without starting a new procurement. An unanswered question is how this applies to a major ATC. An

argument could be raised by an unsuccessful proposer if a competitor offered a major ATC and the agency's acceptance of this ATC led to the result. Although there are no cases to address this, agencies may want to be mindful of the risk.

Aside from properly conducting the procurement, an agency might also consider mitigating protest risk by using a two-step protest process. Under this process, the first protest right is based on the form of the procurement—including the selection process—and the second protest right is over the evaluation process, once the proposal has been submitted. An example of the first protest right is as follows:

> Protests regarding the structure or contents (including the terms, requirements or form) of this RFP shall be received by the Owner writing on the earlier of the following two dates: (a) the fourteenth (14th) calendar day after the issuance date of the RFP or, if applicable, the date of an amendment to the RFP containing the terms, requirements, or form that are the subject of the protest; or (b) the tenth (10th) calendar day before the due date for the submission of Offerors' Proposal. (MWAA 2012)

This two-step process will not help an agency avoid a protest if it has improperly evaluated the ATC. However, it will compel proposers to go on record early and argue that the selection criteria and manner in which the RFP has been crafted is flawed. As a practical matter, this may mitigate, or fully eliminate, this type of protest.

Finally, one other major potential procurement challenge with the use of ATCs is to ensure that the parties have formally agreed on what constitutes the commercial arrangement in accepting the ATC. A private sector case, *Rodman Construction Co., Inc. v. BPG Residential Partners, LLC*, WL 656176 (Del. Super. Ct. 2013), explains the point. In this case, the owner and its construction manager had reached some major concessions on value engineering to reach a budget. Unfortunately, the details were never agreed on and a fight ensued. The court characterized it this way:

> Further, as is frequently done in the industry, the owner and construction manager attempted to "fast track" the project through a "design-build" process by starting work on its early portions while design details and their associated contractual arrangements were still being planned for later phases. And they conducted "value engineering," modifying designs to save costs when initial cost estimates exceeded project budgets. Haste can, and did, make waste, however; and when the risks inherent in such an approach materialized, the parties came into conflict about their respective rights and duties, generating plaintiffs' eight claims and defendants' three counterclaims at issue here. (*Rodman*, WL 656176)

This type of conflict is far less likely to occur in a public sector project. However, it does raise awareness that there is a risk if the parties are not clear in finalizing the precise details of the ATC—such as what specifications are being relaxed and the impact on other commercial issues.

DESIGN LIABILITY ARISING FROM AN ALTERNATIVE TECHNICAL CONCEPT

One of the potential areas of risk associated with ATCs is design liability—that is, who has the risk if the ATC does not work as expected? Generally speaking, the designer-of-record bears the responsibility for any defects in the design it furnishes. Consequently, if an ATC is being used in a DBB or CMGC context, there is a possibility that the agency would assume the risk of designing the ATC properly, as neither the general contractor nor CMGC contractor has design responsibilities.

The risk to the agency seems less likely in DB, as the designer-of-record is part of the DB team. However, it is not clear what happens in a DB scenario if both parties have presumed that an ATC will work, but, when the actual engineering is performed, it turns out to be impractical or impossible. Contract language will typically shift this risk to the design-builder. However, there are theories of "mutual mistake" that may result in this risk being shared by both parties or, potentially, resulting in the contract being considered unenforceable. This remedy is not one that is used indiscriminately by courts, and it is likely that it would be implicated only in the event that the ATC was so significant as to make it unfair to require the design-builder to perform the original design based on its commercial terms for the ATC.

> Generally speaking, the designer-of-record bears the responsibility for any defects in a value engineering proposal.

CONCLUSIONS

The conclusions drawn from the analyses discussed in this chapter are as follows:

1. Most of the legal issues associated with ATCs, including confidentiality, criteria for consideration and acceptance, and protest rights, are identified in the procurement documents for a given project.

2. No definitive case law has been developed that relates specifically to ATCs and interprets the issues raised in this chapter.

3. Traditional procurement practices of fairness, objectivity, and transparency will all apply to ATCs regardless of the project delivery method for a given project.

4. Legal issues associated with ATCs are specific to each local jurisdiction, and legal counsel familiar with the jurisdiction will be the best source for advice on how to proceed with ATCs.

CHAPTER THREE

ALTERNATIVE TECHNICAL CONCEPT PROCUREMENT POLICIES, PROCEDURES, AND PROGRAMS

INTRODUCTION

"There is an emerging view in the construction industry that better performance or better value for money can be achieved by integrating teamwork for planning, design and construction of projects" (Forgues and Koskela 2008). The operating word in the quotation is *integration*, a term that is used frequently within the design and construction industries (Laborde and Sanvido 1994; Löhnert et al. 2002; Larsson 2002; Smulders et al. 2008). However, the definition of the integration process has not yet been well established. The *Oxford Dictionary* (2013) defines integrate as "Bring into equal participation in; give equal consideration to." The idea of "giving equal consideration" to each of the parties in a construction project requires a change in the construction procurement process from one where the construction contractor is not permitted to make input to the design process to one where it is given equal opportunity to suggest means and methods that require a change in the proposed design to make the project more constructable (McMinimee et al. 2009).

ATCs provide a mechanism to consider contractor design input before the award of a DBB, CMGC, or DB contract. "In the case of ATCs, the state allows a contractor to submit ideas for innovative concepts on projects out for bid" (McMinimee et al. 2009), and in doing so, the contractor is given the opportunity for equal consideration. Just as there are a number of different project delivery methods, there are a number of different approaches by which ATCs can be included in each method. As a result, this chapter will review findings of the study as they relate to the policies, principles, and guidelines currently being followed by state transportation agencies to implement ATCs for transportation projects.

DEPARTMENT OF TRANSPORTATION ALTERNATIVE TECHNICAL CONCEPT POLICIES

The literature reviews uncovered 28 DOT policy documents and reviewed 65 solicitation documents from 24 states. A formal content analysis was performed on both categories of documents. Figure 2 is a map that illustrates the distribution of the two content analyses.

The survey asked the respondents that used ATCs to indicate how many ATC projects their agency had each year. Fifteen DOTs (out of 21 that answered the question) deliver from one to five projects with ATCs each year; Colorado, North Carolina, and Missouri deliver five to 10 ATC projects; and Utah, Texas, and Florida deliver more than 10 ATC projects. Georgia DOT reported no ATC projects at the time even though they are authorized to use ATCs. The survey also sought to find out how many ATC projects had been let in the past 12-month period. Thirteen respondents reported a range of one to five ATC projects, three respondents let between five and 10 projects, and five DOTs let more than 10 projects in the past year. Of these projects, only the Missouri DOT let a DBB project with ATCs. Most of the others were DB projects, with Michigan, Utah, and Colorado having used ATCs in CMGC projects. The results of the survey and the results of the DOT policy document content analysis shown in Table 1 lead one to infer that including some form of ATC submittal process is an effective practice for DB projects.

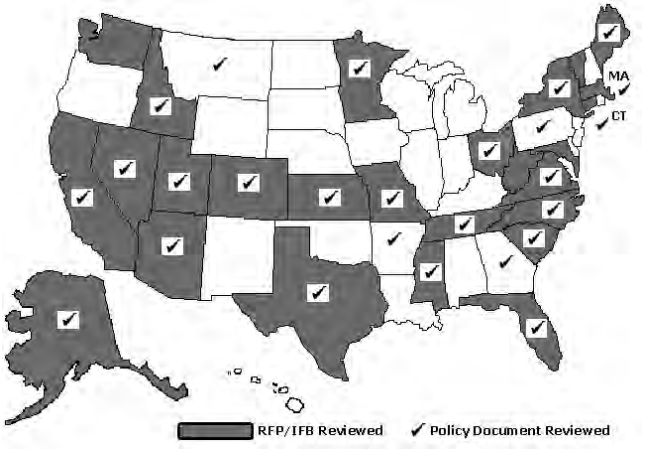

FIGURE 2 Solicitation and policy document content analysis distribution.

Project Delivery Method Policies

A glance at Table 1 shows that with the exception of the Missouri DOT—which uses DBB ATCs—that ATC policy is largely confined to DB project delivery. The analysis also found that at least two DOTs (Connecticut and Montana) do not permit ATCs on their DB projects. Missouri does not provide a baseline design in its DB projects. Hence, the entire DB proposal evaluation process is essentially open to all alternative concepts. As a result, MoDOT does not provide policy for DB ATCs.

TABLE 1
POLICY DOCUMENT CONTENT ANALYSIS OUTPUT

No. of Observations in Documents	DBB	DB	CMGC	Remarks
Project delivery method	1	27	0	None
Answer	Yes	No	Unknown	Remarks
ATCs allowed	25	3	0	None
One-on-one meetings authorized	19	4	5	None
Confidentiality guaranteed	20	1	7	Most included the verbiage "to the greatest extent of existing laws" as a caveat to the confidentially clause.
Approved ATCs required to be included in proposal	0	14	14	None
Stipend offered	25	3	0	Amounts cited ranged from 0.05% to 0.3%.
Stipend acceptance = DOT ownership of ATCs from unsuccessful offerors	25	3	0	None
Right to amend solicitation document to correct errors reserved	14	0	14	None
ATC approval = Amended solicitation	1	20	7	Statutory "apples to apples" requirement
Weeks	1	2	Unknown	Remarks
Required response time to ATC submittals	2	7	19	Many indicated that a "timely" response was called for.

The survey specifically asked respondents to explain their agency's policy with regard to the use of ATCs in conjunction with DBB project delivery. Figure 3 shows the results of that specific question. It shows that six of 16 respondents indicated that they could use ATCs on low-bid projects if they chose to do so. Seven DOTs reported that their laws were silent on the subject, but that they were reluctant to attempt to use ATCs without either a supporting legal opinion or extensive coordination with the construction industry to ensure the change would not create issues during procurement.

Figure 4 is adapted from an unpublished presentation made as part of the FHWA Every Day Counts program (FHWA 2012b), and the ATC submittal period has been added to show the differences in each project delivery method. The striking difference in the figure is how early the agency gets ATC input when using CMGC project delivery. This is because the competing contractors can be evaluated on potential for adding innovative alternatives to a given project without the need for the agency to review and approve each ATC before selecting the winning contractor. In DBB, the baseline design is complete and must be altered to achieve benefits from an ATC. In DB, the baseline design has been established through the preliminary design done to define the DB project's scope of work in the RFP. In this case, deviations from the baseline design and its associated criteria must be reviewed and approved before the DB contract can be awarded.

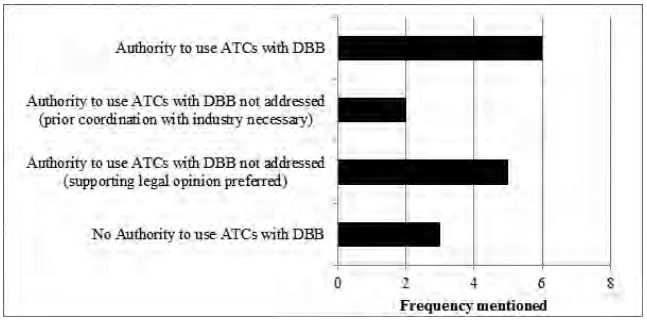

FIGURE 3 Which statement best reflects the DOT's policy regarding the use of ATCs with DBB projects?

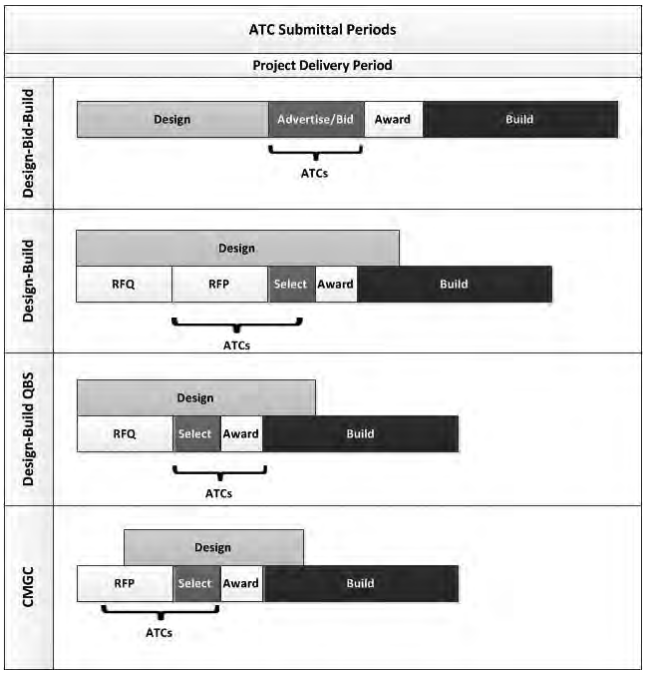

FIGURE 4 ATC submittal period in each project delivery method (adapted from FHWA 2012b).

Implementing ATCs on CMGC projects seems to be more cost-effective than DBB or DB because the ATCs can be incorporated directly into the final design without the loss of resources expended on the baseline design.

Because CMGC and DB-QBS use a two-step or two-part contract (i.e., preconstruction services followed by the actual construction contract), there is no need to conduct technical reviews of possible ATCs submitted during the CMGC selection process because there is no need to

change the baseline design until after award. The CMGC contractor can work with the designer-of-record after preconstruction services award to fully develop its innovative technical concepts as the design progresses without the need to lose expended baseline design effort if design criteria are changed to achieve ATC benefits. This leads to the conclusion that implementing ATCs on CMGC projects seems to be more cost-effective than DBB or DB because the ATCs can be incorporated directly into the final design without the loss of resources expended on the baseline design. The Sellwood Bridge case study in chapter five lends credence to this conclusion.

The survey also gathered information on the use of ATCs with various project delivery methods. Figure 5 shows the output for both the project delivery method and the procurement method. It confirms the preference regarding ATC use on DB projects and extends the concept to a preference for ATC usage on best-value-award projects rather than low-bid projects. The survey also found ATCs used on design-build-finance and P3 projects. The Michigan DOT mentioned they will be piloting the use of ATCs on a DBB project in 2013.

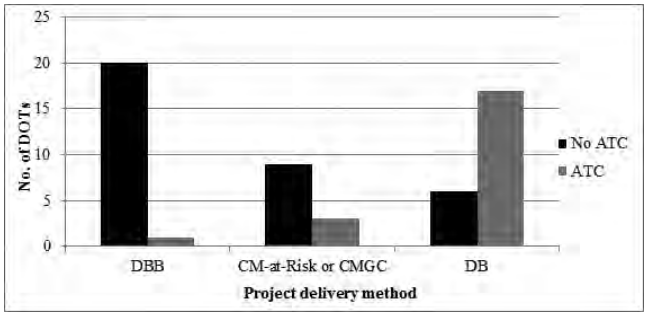

FIGURE 5 DOT project delivery method policies from survey.

ATC Submittal Policies

Next, DOT policies setting the process for receiving ATCs are also of interest. Agencies need to ask two basic questions when reviewing or setting ATC submittal policies:

1. What proposed changes to a given solicitation constitute an ATC?

2. Do local statutes require the agency to amend its solicitation upon approving an ATC to permit all competitors the opportunity to bid the alternative or can confidentiality be promised?

The so-called "equal or better standard" was cited in nearly all ATC policy documents and by most DOTs responding to the survey. Again the following WSDOT definition is typical:

> ATC must be deemed, in WSDOT's sole discretion, to provide a project that is "equal or better" on an overall basis than the project would be without the proposed ATC. Concepts that simply delete scope, lower performance requirements, lower standards, or reduce contract requirements are not acceptable as ATC's … design deviations that are approved for inclusion into an ATC, to the extent provided by law, shall not be disclosed to other Proposers until such time as the contract is executed. (WSDOT 2010)

This requirement to specifically identify proposed variations from cited RFP design standards was also common. A number of documents indicated that a proposed ATC that completely conformed to prescribed criteria was not an ATC because it could be responsively proposed without altering the solicitation. Taking the information found on this topic in the content analyses with the survey outcome regarding ATC definitions leads to the conclusion that the fundamental definition of an ATC requires the agency to alter the baseline design approach or the baseline design criteria because if no alteration is required, the concept can be found responsive if it were proposed as merely the given competitor's preferred design approach.

Figure 6 illustrates the results of the survey regarding individual definitions of changes that qualify as ATCs. The most frequently stated factors were as follows:

- The concept must generate a cost, time, or life-cycle benefit to the agency.
- The concept does not comply with the existing criteria, specifications, and so forth.
- The concept requires a design variation from standard agency documented practice.
- The concept requires a simple variation from a contract requirement unrelated to design.

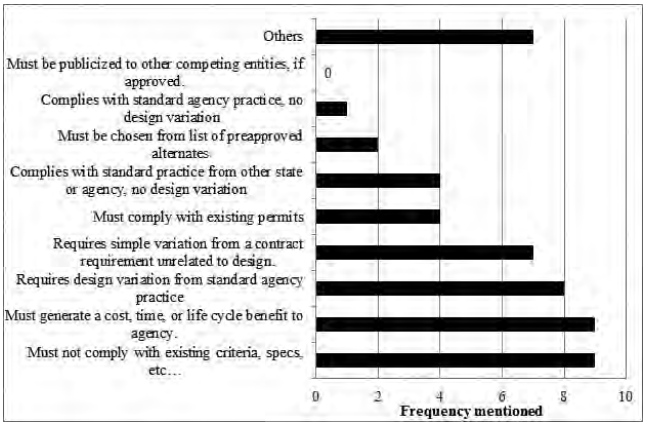

FIGURE 6 How does your agency define a contractor proposed change (concept) to the solicitation documents that qualifies as an ATC?

Georgia, Michigan, Minnesota, New York, Utah, Washington, and Maryland DOTs reported that the ATC must demonstrate that it is "equal to or better" than the function specified in the scope of work. Maryland reported that ATCs may also be submitted to determine if technical con-

cepts are consistent with the requirements of the RFP. Utah clarified that no scope reductions resulting in cost savings are allowed to be submitted as ATCs. The Michigan DOT allows ATCs on almost any item on DB projects (typically anything related to the pavement design cannot be an ATC) and Michigan defines "better value in terms of cost, time, traffic impacts, aesthetics, etc." Minnesota allows more latitude than most by also permitting the contractor to propose ATCs that affect project permits and deviate from solicitation design requirements.

Finally, a majority of the survey respondents indicated that they also permitted the use of ATCs to make changes to contract general and special provisions. Michigan DOT's first DBB ATC project is an example of this policy because it will limit ATCs to only maintenance of traffic (MOT) alternatives. Other possible examples would be a change to specified working hours or the waiver of a specific contract clause.

CONFIDENTIAL MEETINGS

> "Any question that may arise regarding conducting an **'apples to apples' comparison** of Proposals is resolved by requiring the ATC to meet the **'equal or better' standard."**
>
> (WSDOT 2010)

Table 1 shows that most agencies implement a confidential one-on-one meeting where competing contractors are allowed to present ideas for potential alternatives. This is in line with the survey results, as the most-mentioned policy/procedure change reported in projects employing ATCs is the confidential one-on-one meetings. In the documents where the one-on-one meeting was not authorized, competitors were generally required to submit a written ATC proposal for review and approval. In most cases, a deadline was established for submission, and nine agencies prescribed either a 1- or 2-week period for the owner's review and decision to be returned to the competitors. Most DOT policy documents provided for confidentiality of the outcome of the ATC review and approval process. The one that did not was Florida; that contained a requirement to amend the solicitation to provide an "apples to apples" comparison as follows:

> After the ATC meetings, the Contracting Unit, along with the Project Manager, will update the RFP criteria or issue an Addendum, if the ATC deviates from the RFP and is approved by the Department (FHWA must approve such change as applicable). Approved Design Exceptions or Design Variances will require an update to the RFP. (FDOT 2011)

It is assumed that the previous requirement is a state-level statute because many of the policy documents specifically addressed the "apples to apples" issue using verbiage such as that found in the Washington State DOT guidance: "Any question that may arise regarding conducting an 'apples to apples' comparison of Proposals is resolved by requiring the ATC to meet the 'equal or better' standard" (WSDOT 2010).

Since answering the synthesis questionnaire in 2012, the Florida DOT (FDOT) has revised its policy regarding confidentiality of ATCs. The current RFP clause states: "Approved Design Exceptions or Design Variations required as part of an approved ATC will result in the issuance of an addendum to the RFP notifying all Shortlisted Design-Build Firms of the approved Design Exception(s) or Design Variation(s)" (FDOT 2013). This seems to read very much like the previous clause. However, the new policy also directs the preparer of an RFP to include a list of those RFP requirements than cannot be changed through the ATC process as well as a second list of those that are fair game for ATC-based revision. The addition of the two lists suggests that any ATC approved that relates to features of work on the second list is not a "Design Exception or Design Variation" because the RFP explicitly expressed an interest in evaluating design alternatives for those requirements.

Survey results also show an increased importance of confidentiality factors on the success of the ATC projects. The two highest factors reported by DOTs in terms of importance to success of the ATC procurement process are the ability to safeguard ATCs containing proprietary content, and guaranteeing ATC confidentiality. Also important to success were confidential one-on-one meetings, and confidentiality of preproposal communications between agency and contractors on matters other than ATCs.

Randy Hitt, of the Missouri DOT, described his agency's approach to confidential ATC meetings, saying: "Confidentiality in the ATC process is very important for the success of the ATC process. Great care needs to be taken when exchanging files and emails" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012). Another paper written by a contractor expressed the same sentiment from the other perspective: "Trust in the Owner's confidentiality, objectivity and fairness is paramount" (Smith 2012). The legal issues surrounding confidentiality are discussed in chapter two of this report.

The content analyses and survey focused on the procedural and programmatic issues surrounding implementing ATCs. Table 2 is a synthesis of all the survey results regarding confidential one-on-one meetings. All the DOTs that reported using ATCs also reported using confidential one-on-one meetings to evaluate their potential.

This section will discuss the procedural issues that flow out of Tables 1, 2, and 3. An agency that desires to implement ATCs in their procurement process will need to answer the following six questions in the instructions to proposers:

TABLE 2
SURVEY OUTPUT FOR CONFIDENTIAL ONE-ON-ONE MEETING PROCEDURES

Features That Describe the Process Used for Confidential One-on-one Meetings That Involve ATCs	Yes	No	Don't Know
The contractor may choose to include or not include any of its approved ATCs in its proposal.	19	1	0
ATCs can be used to propose changes to the sequence of work/phasing plan.	18	1	1
ATCs can be used to propose changes to special provisions to the contract.	17	3	0
One or more one-on-one meetings are optional for all competing contractors.	16	3	1
Each contractor can ask for a one-on-one meeting if it wants one.	16	3	1
Agency members at the meeting are from the evaluation panel.	16	4	0
If required, the agency can refer an ATC to a third party for technical review.	16	2	2
ATCs must be submitted with an estimate of schedule impact.	14	6	0
The evaluation/approval of all ATCs is done by members of the evaluation panel.	13	7	0
ATCs must be submitted with an estimate of costs.	13	7	0
ATCs can be used to propose changes to general provisions to the contract.	12	7	1
The features of work where changes from ATCs may be proposed is specified.	11	6	3
If the ATC is a design change, the contractor must prove that it has been reviewed by an engineer licensed in the agency's state.	6	12	2
The number of ATCs that can be proposed is limited.	5	15	0
ATCs must require a deviation from the design criteria to be considered.	4	15	1
One or more one-on-one meetings are required for all competing contractors.	3	15	1
The ATC must save a specific amount of money to be considered.	2	16	2
Cost estimates from ATCs are reviewed by an independent cost estimator.	2	16	2
ATCs must not require a deviation from the published design criteria to be considered.	2	17	1
Only changes to the technical design of the ATC project can be proposed.	1	18	1
If an ATC is approved, it must be included in the proposal.	1	19	0

- How are ATC one-on-one meetings initiated?
- How much information is required to be brought to the first meeting?
- How many ATCs can each competing contractor submit?
- Which agency personnel will attend the ATC meetings?
- How will communications be controlled during and after the ATC meetings?
- Can confidential meetings be held to seek clarifications to the solicitation without proposing an ATC?

Initiating Confidential Meetings

The solicitation document content analysis reviewed 65 documents from 24 states and found that confidential meetings were initiated in three different ways. The most common method provided a date in the instructions to proposers by which competing contractors notify the agency of their intention to submit an ATC. For example a South Carolina (SCDOT) RFP (2012) stated: "All teams requesting a confidential meeting shall provide written comments and questions prior to the meeting in accordance with the [date contained in the] RFP." Additionally, 80% of the survey respondents indicated that contactors can initiate the one-on-one process by requesting a meeting. The benefit of this approach is that the initiation of the ATC meeting is purely voluntary on the part of the competing contractors. To do this effectively, the agency will want to ensure that there will be sufficient time to evaluate and rule on every ATC before the final proposals are due. MoDOT overcomes this hurdle by making their DBB 60% plans available for review up to 6 months prior to the scheduled letting and entertaining confidential meetings with interested contractors throughout that pre-letting period (R. Hitt, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012).

The second approach is merely a slight variation of the first and it involves specifying a date by which *all* contractors notify the agency whether or not they intend to submit an ATC. An example is as follows: "MassDOT shall conduct two (2) confidential one-on-one meetings *with each DB Entity* to discuss each ATC submitted" (MassDOT 2012, italics added).

The final approach is to schedule one-on-one meetings with all competitors and ascertain at that time if they are contemplating submitting an ATC. The Minnesota DOT DB manual states: "Shortly after the RFP is issued, MnDOT offers one-on-one meetings with design-build teams to discuss potential [ATCs]" (MnDOT 2010), and the Florida DOT uses this language: "The meeting should take place *prior to the ATC due date noted in the RFP*" (FDOT 2011, italics

added). The survey also supported that this final approach is not very common: only three out of 19 DOTs reported they required one-on-one meetings with all contracting parties.

There was no indication in the literature as to which of the three approaches was preferred, but a summary analysis of the advantages and disadvantages of each approach seems to indicate that the first approach was found in the most solicitation documents because it does not presuppose that ATCs will be proposed. At least two authors (Horn 2010; R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012) posited that the mere potential of one competitor submitting an ATC increased the relative level of competition on the project, and the Hurricane Deck Bridge project case study (see chapter five) experienced only a $46,000 difference on a $30 million project between the low and second lowest bids, both of which bid ATCs. The two contractors that bid the baseline design with no ATCs were $8.1 and $12.6 million over the low bid, which illustrates the impact of ATCs. When the concept that 41 of the 65 solicitation documents and 80% of survey respondents used the first approach is combined with the literature and case studies, an inference can be drawn that leaving the initiation of ATC confidential meetings up to the competitors with no constraint other than specifying a reasonable deadline for notice of intent is an effective practice.

Initial Amount of Technical Information and Limitations on Meetings

The solicitation document content analyses found that eight of 65 documents provided for a "preliminary" or "conceptual" ATC review to furnish the contractor with a determination as to whether its idea was approvable. If the answer was yes, then a "formal" or "final" ATC proposal was then submitted for detailed review and final disposition. The following is an excerpt from a North Carolina DOT RFP that is typical of this approach:

> At the Design-Build Team's option, a Preliminary ATC submittal may be made that presents a concept and a brief narrative of the benefits of said concept. The purpose of allowing such a Preliminary ATC is to limit the Design-Build Team's expense in the pursuit of a Formal ATC that may be quickly denied by the Department. (NCDOT 2010)

Thirty other solicitations provided for only a formal ATC submittal and 27 did not clearly indicate whether the contractor could get an indication of potential before investing the effort to fully develop the ATC submittal. The following New York City DOT clause is typical of those that were not clear enough to know whether a concept could be presented short of a formal ATC submittal:

> Proposer may elect to submit more than one scheme, but only one scheme will be reviewed for technical merit. You must clearly identify the scheme that the review committee will evaluate. Price is to be submitted for this scheme only. (NYCDOT 2007)

The other related issue is the maximum number of ATCs a given proposer will be permitted to submit for DOT review. Obviously, there is a point of diminishing returns where an agency could find itself overwhelmed with ATC review and lose the benefits it hopes to accrue to an unmanageable administrative nightmare or a potential delay in award. In the words of one RFP, the agency chose to allow ATC submittal "to avoid delays and potential conflicts in the design associated with deferring of technical concept reviews to the post-award period" (MassDOT 2012). Therefore, the MassDOT RFP goes on to limit the one-on-one meetings to a maximum of two each of 2 hours' duration.

MassDOT also limits the number ATCs to three in total. From the content analysis, this was the most restrictive set of conditions. Three other DOT RFPs limited the total number of ATCs. South Carolina joined Massachusetts with a maximum of three, Mississippi allowed 10, and Minnesota permitted 20. South Carolina and Massachusetts also made provision for preliminary concepts to be proffered. Thus, although it is impossible to tell from reading the RFPs, perhaps these two cases actually entertained a greater number of potential ATCs that were not formally submitted. MassDOT also specified that no financial information was to be discussed in the one-on-one meetings. The survey tracked almost exactly with the content analysis, finding that only seven of 28 respondents limited the number of ATCs that could be submitted.

The issue with limiting the number of ATCs is unintentionally eliminating innovative concepts that would have been submitted if there had not been a ceiling on ATC submittals. The survey found that the majority of agencies that use ATCs receive more than three ATCs from each proposer. The Minnesota DOT limits the number of ATCs to 20 and in the Hastings Bridge case study detailed in chapter five, it received between six and 13 ATCs from each of the three competing DB contractors. The winning proposal submitted eight approved ATCs that resulted in a cost savings of about $100 million. The Maryland SHA (MSHA) Intercounty Connector project provides an example of not limiting the number of ATCs. MSHA received 60 ATCs from the two short-listed competitors for one contract, and it approved 28. Eventually 25 of the approved ATCs were included in the final proposals. Collectively, the survey shows most procurements attract more than three ATCs per competitor. Only seven of 28 respondents indicated limiting ATC submittals. The content analysis found only four agencies had limits. If the preceding discussion is considered with the Minnesota and Maryland case studies, the conclusion can be reached that limiting the total number of ATCs will limit the industry's ability to innovate and add value to the project. If a limitation is required, then the agency will want to consider using as high a number as deemed practical. Minnesota's limitation of 20 ATCs is a good example.

Meeting Attendees and Control of Communications

The Minnesota DOT's (MnDOT's) policy regarding ATC meetings states: "The review of ATCs needs to be kept to a small group of key individuals for confidentiality reasons" (MnDOT 2012). MnDOT requires that all participants in the review and communication of the ATC process sign confidentiality agreements. MnDOT's policy manual also provides the following guidance regarding the control of communications: "The PM [project manager] and DBPM [design-build program manager] should be careful not to 'coach' the [competing DB] teams during one-on-one meetings. Comments should not give guidance, but *only indicate if items are acceptable or not acceptable*" (MnDOT 2012, italics added). On the other hand, a MassDOT DB RFP requires that meetings be attended by "the Selection Committee, MassDOT Office of the General Counsel, Federal Highway, as well as any appropriate MassDOT technical experts … [to] ensure that all parties abide by the ATC process and adhere to the confidentiality agreements" (MassDOT 2012).

The Washington State DOT concurs with Minnesota's conservative approach to controlling communications by mandating that: "to avoid potential conflicts and ensure the objectivity of the evaluation process, WSDOT employees or consultants that participate in pre-Proposal one-on-one meetings with Proposers shall not evaluate Proposals" (WSDOT 2010). The survey found that seven of 28 respondents also use a different group to evaluate ATCs than the group that evaluates the overall proposal. The Missouri DOT's Hurricane Deck Bridge project illustrates the need to control communications on DBB ATCs.

> [MoDOT had] one consultant with *four individual design teams* all throughout the United States *working on the different ATC designs* [for the same bridge]. [We] had to ensure confidentiality for the contractors to keep this successful. The design teams had to *exercise great caution in keeping separate proposals independent of each other.* We developed an external sharepoint site that was secure to each contractor. I've been told from contractors after the fact that they had no idea what other contractors were engaged in the ATC process and what ideas were being discussed. (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012, italics added)

The intersection of the successful Hurricane Deck Bridge case study DBB project with the concept that DOTs that are highly experienced with DB ATCs (such as Minnesota and Washington) separate the ATC evaluation team from the proposal evaluation team suggests that using different evaluation teams is an effective practice to avoid the appearance of impropriety. The practice is further confirmed by the seven survey responses.

Clarifications

Project risk is essentially a function of what is known and what is not known at the time the contract is awarded. In all project delivery methods, one "known unknown" (Ward and Chapman 2003) is whether the contractor is properly interpreting the solicitation documents as intended by the owner. Most agencies permit competing contractors to submit formal requests for information (RFI), which are answered in a public manner for all competitors. This creates a situation where a contractor may be hesitant to ask a question or seek a clarification for fear of losing a competitive edge. In this case, the RFI is not sent and the contractor will either assume the most conservative interpretation for bidding purposes or include a contingency to cover the possibility that a less-conservative interpretation will turn out to be false. Both cases lead to potentially unnecessary inflation in the price of the project (Ward and Chapman 2003). The confidential one-on-one meetings associated with ATCs provide a venue for seeking clarifications from the owner without fear of revealing a potentially attractive idea to one's competition. It also gives the owner a reading on how contract risks are being seen by the industry.

Formal requests for information, which are answered in a public manner for all competitors, create a situation where a contractor may be hesitant to ask a question or seek a clarification for fear of losing a competitive edge.

(Ward and Chapman 2003)

The Missouri DOT's policy is to "hold confidential meetings with each Proposer where clarifications or comments related to the Contract wording will be discussed" (MoDOT 2008). One DOT policy document states: "The ATC process … allows a certain level of control by the agency over potential risks contemplated by proposers" (Carpenter 2012). This idea is further explained by West, who explained that the ATC process was "valuable to both the owner and the proposers because the owner was able to gain an idea of what to expect from the bids while the proposers were able to gain a clear understanding of the owner's requirements. The process was completely confidential, enabling the proposers to retain any advantages established" (West 2012). The Maryland SHA also permits DB proposers to ask for confidential meetings to secure clarifications (Coblentz 2012). Finally, 13 of 65 RFPs permitted clarifications to be sought during ATC one-on-one meetings. That the literature, survey, content analysis, and three case study projects permitted clarifications to be sought during one-on-one meetings leads to the conclusion that the practice of publishing all RFIs may not be beneficial to the highway construction project process and a recommendation that agencies consider creating a mechanism to gain clarification of solicitation documents in a confidential manner.

Solicitation Amendments

Figure 7 shows the results of the survey question that asked for the disposition of an approved ATC. Most DOTs (14

of 23) reported that an approved ATC remains confidential through award of final contract. Thirteen reported that approved ATCs of a winning contractor are revealed on award whereas nine reported that approved ATCs from losing contractors are revealed on award. Six states reported that ATCs from losing contractors remain confidential. Only two (Florida and Idaho) reported that an approved ATC triggers an addendum to the solicitation to all competitors, and Florida has since changed its policy. Washington reported that if an ATC requires a design deviation then it might trigger an addendum, which is aligned with the new FDOT policy on addendum triggers.

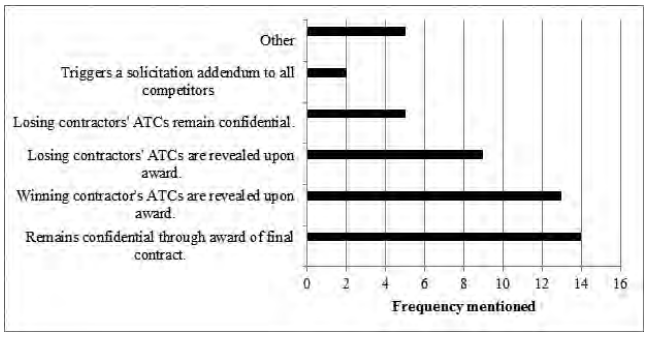

FIGURE 7 What is the final disposition of an approved ATC?

Idaho, Georgia, and New York DOTs stated that approved ATCs from losing contractors are only made available if those contractors accept a stipend. The Georgia DOT also clarified that ATCs from losing contractors that met the solicitation definition of "Department Property" may be incorporated into a preferred bidder's contract by a negotiated supplemental agreement. Proprietary items may be retained as confidential if they satisfy certain criteria. Michigan reported that ATCs remain confidential up to award; after award they can be disclosed through a Freedom of Information Act request. North Carolina DOT reported that if more than one ATC is submitted on the same concept, as determined by the department, the department reserves the right to revise the RFP to permit the concept presented in the ATC.

ATC Stipend Policies

Stipends are typically paid to unsuccessful but responsive proposers. The literature states that the purpose of a stipend is to enhance competition by partially reimbursing proposal preparation costs for the unsuccessful competitors (DBIA 2009). Stipends are typically only associated with DB projects because neither DBB nor CMGC require the submittal of any design product to win the contract. That situation changes when ATCs are permitted as a component of a project's procurement strategy. Most public agencies operate under the principle that the public entity must receive something of value for every tax dollar it expends (Li et al. 2005), and implementing stipends on DB transportation projects would appear to violate that principle. To resolve the issue, many public agencies have adopted the policy that when a competitor accepts a stipend, the agency essentially buys the intellectual property contained in the unsuccessful proposal and may incorporate attractive concepts into the final project at will (FHWA 2012b). Because the majority of ATCs are found on DB projects, applying the same principle to approved ATCs from unsuccessful competitors is logical. A typical example of the ATC stipend policy is found in the South Carolina DOT's DB manual:

> SCDOT expressly reserves the right to adopt and use any ATC, approved or disapproved, by the unsuccessful Proposer on this contract or other contracts administered by SCDOT. By submitting a Proposal, all unsuccessful Proposers acknowledge that upon payment of the designated stipend, all approved or disapproved ATC's may be included in this contract or other contracts administered by SCDOT and shall become the property of SCDOT without restriction on use. Prior to contract execution, limited negotiations may be conducted as necessary to incorporate the ideas and concepts from unsuccessful proposers provided a stipend is accepted by the unsuccessful offeror. (SCDOT 2012)

In the survey, South Carolina DOT reported that one of the major issues in employing ATCs is paying stipends because they are often difficult to obtain approval for. The survey also revealed stipends in DB projects as the most reported policy or procedural change (together with one-on-one meetings) applied to employ ATCs.

The Missouri DOT considered whether or not a stipend was appropriate on its DBB ATC projects (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012) and decided that it would not require extensive design effort to be expended by the contractors that wished to propose an ATC. This eliminated the need for including a stipend in DBB ATC projects. In doing so, MoDOT accepted the responsibility for advancing contractor-inspired ATC designs to the point where bid quantities could be generated and used in the construction contract award process. A more thorough discussion of this and its attendant issues is contained in chapter four.

ALTERNATIVE TECHNICAL CONCEPT SUBMITTAL PROCEDURES

ATCs have been successfully implemented in nearly all types of project delivery methods.

The procedures for suggesting ATCs vary between agencies and between project delivery methods. The content analysis of DOT policy documents suggests that care must be taken to ensure that competing contractors are not discouraged from pursuing ATCs as a result of onerous documentation requirements. For example, DOTs in Florida, Massachu-

setts, Missouri, North Carolina, Ohio, and South Carolina provide for a preliminary or informal contact with competitors where potential alternatives are suggested and vetted, and a determination is made of whether the potential ATC is something that the agency could possibly approve if it is formally developed and submitted. The Alaska DOT's policy document (2005) states: "Allowing the Proposers a forum in which to initially discuss potential solutions can help to ensure that the Proposal comes as close [as] possible to matching [the] DOT's desires."

The content analyses showed that ATC submittal procedures provide guidance in three primary areas. First, the conduct and character of meetings with competitors is covered to set the stage for ATC discussions. Next, the precise content of a responsive ATC submittal is specified so that competing contractors can gauge the resources and effort necessary to successfully propose an ATC. Finally, procedures for rectifying errors, omissions, and ambiguities found in the solicitation document are described to ensure that issues found in the baseline design do not become the competitive edge for the party that first identifies them. Table 3 contains a summary of the information gleaned from the solicitation document content analysis regarding ATC procedures described for specific projects.

Table 3 shows that although ATC usage is most common in DB projects, they have been successfully implemented in nearly all types of project delivery methods. Thus, it can be concluded that ATC use is not constrained by an agency's project delivery selection. The table also shows that ATC implementation is not a function of project type, with virtually even distribution between road and bridge projects. The one tunnel and seven "other" projects ranged from a traffic management system to an airport. Finally, the results show that ATCs can be implemented using IFB, RFQ, and RFP solicitation document types. This leads to the important conclusion that agencies can implement ATCs without being constrained by technical or procurement issues on almost all types of transportation projects.

For purposes of comparison, Table 4 contains the results of the survey regarding information similar to that found in the two content analyses, organized by project delivery method. Table 4 essentially confirms the content analysis output by showing that ATCs are more commonly used on DB projects than on the other delivery methods. The remainder of this section will report the findings of the content analyses and the survey with respect to ATC submittals.

Solicitation Document Errors, Omissions, and Ambiguities

One of the unsung advantages of the ATC process is the ability to identify issues with solicitations, such as errors, omissions, and ambiguities, before the contract is awarded and these become potential compensable changes. Most of the solicitation documents reviewed in the content analysis contained some form of verbiage reserving the right to correct errors found in the confidential one-on-one process or submittals prior to award. A passage from the Alaska DOT's DB manual is typical:

TABLE 3
SOLICITATION DOCUMENT CONTENT ANALYSIS SUMMARY

Information Item	Number of 65 Total				
	DBB	CMGC	DB	P3	Other
Project delivery method	1	6	50	6	2
Solicitation type	IFB		RFQ	RFP	
	1		4	59	
Project type	Bridge	Road	Tunnel	Other	
	29	28	1	7	

Information Item	Number of 65 Total		
	Yes	No	Unclear
ATCs permitted.	65	0	—
Confidential one-on-one meetings authorized.	43	22	—
Agency reserves right to amend solicitation to correct errors, omissions, and ambiguities found during ATC process.	18	25	22
Competitors are allowed to request confidential clarifications of solicitation document without submitting an ATC.	13	20	32
Base proposal in addition to ATC required.	12	12	41
Total number of ATCs is restricted.	6	49	10
Approved ATCs required to be included in proposal.	8	39	18
Agency ATC response time is specified.	19	46	—

TABLE 4
SURVEY OUTPUT FOR POLICY/PROCEDURE CHANGES BY PROJECT DELIVERY METHODS

Policy/Procedure Change	Frequency Mentioned			
	DBB*	CMGC	DB	N/A
The scope of what can be submitted as an ATC is limited.	4	1	9	14
Confidential one-on-one meetings are held.	4	3	20	1
Stipends are paid and permit the agency to use ATCs proposed by entities other than the winner.	1	1	20	6
Stipends are paid and do NOT permit the agency to use ATCs proposed by entities other than the winner.	1	0	2	25
ATCs are reviewed and approved by the project evaluation, selection, and/or award panel.	3	2	16	7
ATCs are reviewed and approved by personnel other than the project evaluation, selection, and/or award panel.	3	1	10	14
The number of ATCs submitted by a single entity is limited.	2	0	5	21
The number of ATCs submitted by a single entity is not limited.	1	1	14	12
Design concepts/standards/specifications from other states/agencies are permissible.	3	2	16	7

*These responses indicate that the respondents believe their agency could use ATCs with DBB projects, not that they do. As previously stated, only the Missouri DOT is known to have used DBB ATCs.
N/A = not applicable.

TABLE 5
ATC SUBMITTAL CONTENT FROM SOLICITATION DOCUMENT CONTENT ANALYSIS

No. of Documents	Preliminary Concept	Narrative Explanation	Drawings	Cost Data	Identify Deviations	Schedule Impact	ROW Impact	Permit Impact	Approved ATC Required in Proposal
Yes	8	63	55	31	51	47	45	51	8
No	30	0	6	26	4	7	8	3	39
Unclear	27	2	4	8	10	11	12	11	18

> These meetings may be kept confidential when discussing solution-specific issues. Allowing the Proposers a forum in which to initially discuss potential solutions can help to ensure that the Proposal comes as close as possible to matching DOT&PF's desires. If errors or inconsistencies in the proposal are noted then this information should be made available to all Proposers. (ADOT&PF 2005)

The FHWA's understanding of the ATC process also acknowledges the need to make corrections to the solicitation as discovered in confidential meetings if appropriate (FHWA 2012b). An example of this would be an ATC based on increasing the diameter of drilled shafts to decrease the total number if the DOT's evaluation of the ATC found that the dimension in question was erroneous in the baseline design. The Florida DOT "reserves the right to disclose to all Design/Build Firms any issues raised during the ATC meetings, except to the extent that FDOT determines, in its sole discretion, such disclosure would reveal confidential or proprietary information of the ATC" (FDOT 2011).

ATC Submittal Content

The most effective source of information for ATC content was the solicitation document content analysis, because each document contained instructions to proposers on how to assemble the necessary information to permit an ATC to be reviewed by the agency. Table 5 contains the results of that analysis.

Table 5 shows that nearly all the solicitation documents required some form of narrative explanation of the proposed ATC as well as most also requiring sketches of the ATC and how it related to the current project design. Next, 51 of 65 documents asked that explicit requests for the necessary design deviations to affect a given ATC be specified in the ATC proposal. Lastly, the majority of the solicitations also asked the contractor to estimate the impact of the proposed ATC on the project schedule, right-of-way (ROW), and permits.

Roughly half the solicitation documents asked for cost data to be submitted with the ATC. This shows that there are two approaches to the issue of providing cost impact data with a formal ATC proposal:

1. Cost data are required to prove that the given ATC will accrue actual savings or to prove that it fulfills the minimum cost savings constraint contained in the solicitation.

2. Cost data are excluded to provide a purely technical appraisal of the ATC and then the subsequent bid price will contain the ATC if approved.

Both approaches have several advantages and disadvantages. The main advantage to requiring cost data is that it furnishes the agency with order of magnitude information, which may aid in its review and decision process and ensure that the agency is not overwhelmed with too many small ATCs to review and approve, or in the case of a DBB ATC project, too many small details that require incorporation into the final project design. The primary disadvantage is that when evaluators know the cost of a new concept, it may influence their decision. The American Consulting Engineers Council (2010) opines, "When price is on the table it trumps other considerations, even quality and innovation."

The primary advantages to not having cost data is that the evaluation is purely technical and if any given ATC is approved, there is no expectation of specific cost savings because the ATC becomes part of the specific contractor's bid price. The disadvantage is that there is no easily measured limitation on the number of ATCs if the solicitation document does not explicitly set a limit on the total number from each competitor. The earlier analysis suggests that if cost data are not needed in the ATC evaluation process, then establishing a limit on how many ATCs can be submitted may be an effective practice to protect the agency from being "nickel and dimed to death" with a multitude of minor ATCs.

EVALUATION AND APPROVAL OF ALTERNATIVE TECHNICAL CONCEPTS

The process for evaluating and approving ATCs is best detailed in the project solicitation's instructions to proposers. The fundamental information necessary in these instructions has three components:

1. Guidance on baseline design standards and requirements, if necessary, for submitting baseline proposals.
2. Description of the evaluation process for the given project.
3. Criteria to be used by agency evaluators.

Baseline Design and Proposals

> Washington State received a programmatic waiver of the FHWA SEP-14 baseline design requirement and cited the need to "avoid unnecessary costs and diversion of resources required for proposers to advance a base design that will ultimately not be used."
>
> (Carpenter 2012)

Given the definition of an ATC in chapter one, the proposed concept requires a change to the solicitation to qualify. Thus, there will need to be a tangible benchmark against which this to measure. The federal statute 23 C.F.R. § 636.209(b) says agencies "may allow proposers to submit alternative technical concepts in their proposals as long as these alternative concepts do not conflict with criteria agreed on in the environmental decision making process. Alternative technical concept proposals may supplement, but not substitute for base proposals that respond to the RFP requirements." Thus, ATCs are measured against a baseline design scope of work, and to be compliant with the statute, proposers will submit a proposal for the baseline design as well as the design as modified by approved ATCs.

A number of states have requested programmatic waivers through the FHWA's Special Experimental Program 14 (SEP-14). Washington State is one and cited the need to "avoid unnecessary costs and diversion of resources required for proposers to advance a base design that will ultimately not be used" (Carpenter 2012) as justification. Maryland is another state that sought and received an SEP-14 waiver from requiring two proposals. It designed its ATC approval process in the following manner to ensure it met the requirements of the waiver:

> The waiver of FHWA's requirement to furnish a base proposal provided each proposer the opportunity to submit ATCs for pre-approval and then to submit a proposal with or without ATCs. The SHA's procurement process was carefully crafted to avoid any potential unfairness. Pre-approval of deviations, from design requirements that otherwise would be deferred until after the contract is awarded, was required as part of this process. The proposed ATC process gave the SHA the ability to factor the proposers' technical solutions into the selection process, allowing a true "best value" selection; and gave the SHA access to solutions from all proposers. It also gave the successful proposer a head start on implementation of its ATCs, and avoided unnecessary costs for proposers to advance a base design that was not used. (Peters 2008)

The solicitation document content analysis found that 12 of 65 documents required the statutory baseline proposal. Those 12 were DB RFPs. The baseline design is a different issue in DBB project ATCs. The Missouri DOT recommends that "[c]aution must be used to make sure baseline designs are finalized before any ATC submittal on that design element. … Any significant alterations could affect the savings on the ATC design. … Any changes could possibly be construed as co-opting the contractor's proposal" (Horn 2010).

ATC Evaluation Process Description

As mentioned in chapter three, the content analysis found that some agencies ask competing contractors to submit preliminary ATCs, which are then given a cursory review resulting in a recommendation to the submitter as to whether the concept was worth pursuing and the effort needed to submit a formal ATC proposal was warranted (NCDOT 2010). The solicitation document content anal-

ysis found eight documents (Massachusetts, Missouri, North Carolina, Ohio, and South Carolina) that specifically cited the need to submit preliminary ATCs as part of the evaluation process and the survey did not address that question. Figure 8 is a generalized ATC evaluation and review process based on a synthesis of the processes described in the literature.

Figure 8 assumes that ATCs are received before the one-on-one meetings. There are cases where the preliminary and formal ATCs are actually received for the first time at the meeting. Regardless of the case, it is important for the proposers to know exactly when and where the proposed alternatives will be presented. It is also critical that the criteria for evaluating the ATCs be known when the solicitation is first published (Peters 2010; Carpenter 2012).

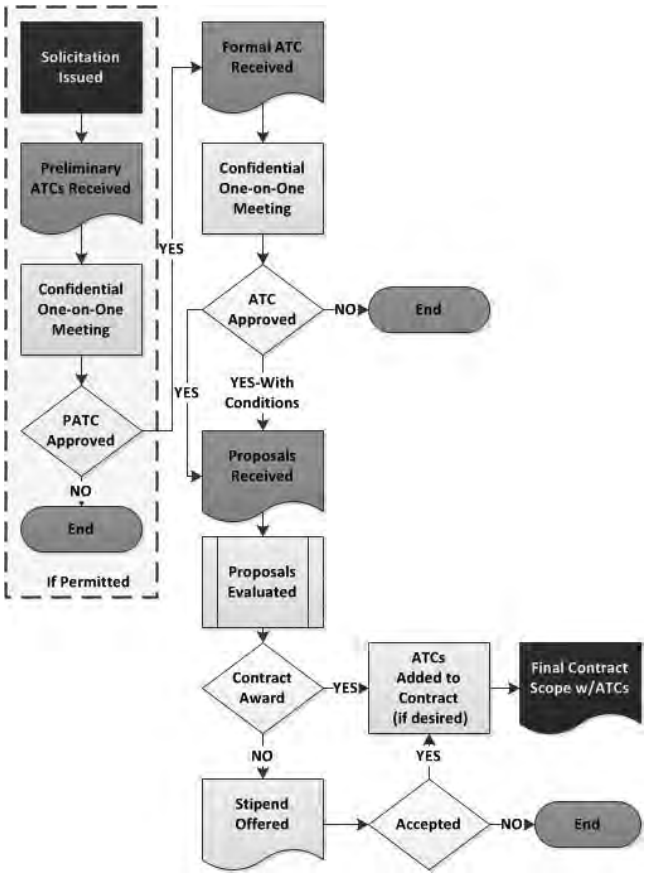

FIGURE 8 Generic ATC evaluation and review process.

ATC Evaluation Factors

The primary factor cited in the solicitation document content analysis is that "ATCs must be 'equal to or better than' the original requirements of the contract documents included in the procurement package" (Papernik and Farkas 2009). Many agencies qualify that statement by setting the standard as purely the agency's decision in this manner: "ATC must be deemed, in WSDOT's sole discretion, to provide a project that is 'equal or better' on an overall basis than the project would be without the proposed ATC" (WSDOT 2010).

The next most common factor dealt with the issue of deviations from cited design criteria and other documents. Two approaches were found in the analyses. The first merely specified that deviations from published criteria were not authorized. The second approach was to spell out the approval process for a deviation from project design criteria. An example follows: "ATC's requiring new Design Exceptions must receive both MoDOT and FHWA approval. Any new design exceptions must be offset by elimination or reduction of existing design exceptions elsewhere in the project. Any combination of existing and new design exceptions must be equal to or better than the existing design as determined by MoDOT" (MoDOT 2010). The Maryland SHA expanded its definition to permit consideration of ATCs that not only deviated from design criteria but also project requirements using the following verbiage:

> The Administration did not approve any ATC that entailed a deviation from the requirements of the RFP, unless the Administration determined, in its sole discretion, that *the proposed end product based on the deviation was equal to or better than the end product absent the deviation.* (Peters 2008, italics added)

More commonly, agencies described those elements of the baseline design that could not be changed. The following example of a typical clause comes from the Missouri DOT's Missouri River Bridge I-70 Interchange project in St. Louis:

> The following geometric design components are off-limits to change due to an ATC:
>
> a. The grade and alignment of the tie-in of the eastbound/westbound ramps (parkways) at Cass Avenue shall not change from as shown on contract documents.
>
> b. The grade and alignment of the tie-in of the eastbound and westbound ramps at the
>
> Missouri Approach to the MRB shall not change as shown on the contract documents.
>
> c. Unless it is a weekend closure due to a bridge demolition, at least two lanes of traffic in each direction on Interstate 70, 55 and 44 throughout the project area shall be maintained at all times.
>
> d. Any change shall be compatible with the Phase II full-build interchange. (MoDOT 2010)

Lastly, the system for evaluation and the range of possible outcomes for evaluated ATCs was included in most of the solicitation documents. Figure 9 is an excerpt from the solicitation document for the Missouri River Bridge I-70 Interchange DBB project in St. Louis. It provides an example of how simple an ATC evaluation plan can be for a major DBB bridge project.

5.0 Evaluation of Alternate Technical Concepts.
5.1 Alternate technical concepts (ATC) will be evaluated on a pass/fail basis. ATCs that meet the minimum requirements will pass and be considered for bid. ATCs that do not meet the minimum requirements will fail and not be considered for bid.
5.2 Alternate Technical Concepts will be evaluated using the following criteria. If any of the following criteria are not met, the ATC request fails.
(a) The ATC meets or exceeds the minimum requirements and engineering standards of the general conditions.
(b) The ATC does not adversely affect the overall completion date.
(c) The ATC does not adversely affect the long term maintenance of the project.
(d) The ATC re-design costs to the Commission; do not adversely affect the cost of the overall project. The Commission will determine the re-design cost.
(e) The ATC is consistent with the overall project goals, which include but are not limited to the following: Deliver the project on budget, Deliver the project on time. Minimize public impact by keeping regional and local traffic flowing efficiently and safely through the impacted area. Incorporate innovative design including faster/better construction techniques and inspection. Coordinate with all partners and the local community resulting in a project that is viewed as successful. Demonstrate quality construction, encourage green techniques and provide a long lasting facility that complies to ADA requirements.
(f) The ATC is equal to or better than the original design proposal. No decrease in engineering standard from the original design for any safety related item will be allowed, including but not limited to: narrower shoulders, narrower lane width, decreased sight distance, sharper horizontal curves, decreased design speed, decreased clear zone, reduction in clear distance to piers and/or abutments, vertical clearance, or reduced traffic control performance, etc. To be considered for approval, all safety related elements of the ATC must meet or exceed the MoDOT design. New design exceptions will be considered if they meet the requirements of Section 3.1.2.
(g) Direct or secondary cost and/or delay related to utility conflicts.
(h) Each contractor will only be allowed to submit three (3) ATCs per job.

FIGURE 9 ATC evaluation system from Missouri DOT Missouri River Bridge I-70 interchange solicitation (MoDOT 2010).

Figure 10 is extracted from the Minnesota DOT's *Design-Build Manual* (2012) and provides a typical example for evaluation of DB project ATCs. One will find that there is very little difference in the essential content of each program.

4.9 Alternate Technical Concepts.
Alternative Technical Concepts (ATC) allow for innovation and flexibility during the procurement process. The ATC process allows design-build firms to propose "equal or better" alternatives to the RFP requirements during the procurement process. The ATC process is a highly confidential process. Subject to Minnesota Government Data Practices Act, each ATC submitted during the procurement is kept confidential and not shared with the other design-build teams. The ATC process starts after the RFP is issued and can be used on best-value and low-bid projects. Shortly after the RFP is issued, MnDOT offers one-on-one meetings (see Section 4.8) with design-build teams to discuss potential ATCs. Design-build teams submit ATC to MnDOT prior to submitting the technical proposals. Upon receipt of the ATC, MnDOT reviews each ATC and responds with one of the following determinations:
a. The ATC is Approved
b. The ATC is not Approved
c. The ATC is Approved with Conditions
d. The ATC does not qualify as an ATC, but may be included in the design-build team technical proposal (i.e. concept complies with baseline RFP requirements)
e. The ATC does not qualify as an ATC and may not be included in the proposal.

ATC concepts should not be incorporated into the RFP as addendums. However, MnDOT reserves the right to correct errors in the RFP via an addendum if a team uses the ATC process to take advantage of the error.

4.9.1 ATC limitations
1. The PM, in consultation with the DBPM and other MnDOT specialty offices, will determine which items will not be accepted as ATCs. Typical items that MnDOT does not consider ATCs include pavement type, pavement material and pavement thickness.
2. The PM and DBPM will determine the maximum amount of ATCs that a proposer may submit.
3. The DBPM will draft the ATC section of the ITP using the ITP template. The DBPM will incorporate the maximum number of ATCs and identify the items identified in Point 1 above.
4. Design-build teams need to submit each concept as a separate ATC. The concept may include multiple interrelated parts (e.g. major geometric layout change which impacts alignments, profiles and intersection control). An ATC with multiple unrelated concepts should be rejected…

4.9.3 ATC Reviews
1. The review of ATCs needs to be kept to a small group of key individuals for confidentiality reasons. The PM will only distribute ATCs to these key individuals. The PM will verify that all key individuals have signed a confidentiality form.
2. The PM may request supplemental information from a design-build team at any time. Depending on the amount of supplemental information requested, the PM may require the design-build team to revise the ATC.
3. The PM should make every attempt to respond to the ATC within one week.
4. The PM will prepare a draft response to the ATC using the ATC response form.
5. The PM will send the draft response to the DBPM for review. See Section 2.3 for FHWA's involvement in the review and approval of ATCs…

FIGURE 10 ATC evaluation system from Minnesota DOT DB manual (MnDOT 2012).

INDUSTRY PERSPECTIVE

A paper by Papernik and Farkas (2009) furnishes one perspective understanding of the industry position on ATC procurement policies:

> *Proposers are motivated to propose confidential ATCs* which add value to the project owner *because the ATCs can give them a competitive advantage over other proposers.* Absent such a process, although the successful proposer could still share its ideas with the owner after it is selected; there is less incentive to do so once it has already won the job. Furthermore, under that approach the owner would only get the benefit of one proposer's ideas, instead of getting ideas from multiple proposers. Finally, any cost savings would not help drive down the initial pricing—a significant consideration given that a high initial project cost may mean that the contract is never awarded. (Papernik and Farkas 2009, italics added)

Papernik and Farkas make two strong arguments for an ATC procurement policy based on confidentiality that permits competing contractors to gain a competitive edge from their innovative concepts before contract award:

1. After award, the agency gains only one contractor's ideas to improve the project.

2. The low-bid culture of the industry makes preaward competition of ATCs more effective by driving down the contract award cost rather than post-award value engineering adjustments of the contract price.

Putting these points in the context of the project delivery method selection, the notion that using ATCs to leverage the potential benefits of alternative project delivery becomes logical. Previous research (Touran et al. 2008) found that owners select DBB when maximizing price competition is necessary; DB when there is a "need for speed"; and CMGC when constructability is essential. Thus, ATCs can be used to further address the need for lowering the cost, accelerating the schedule, or designing a constructable project on a project-by-project basis. However, to actually realize the benefits, the project's solicitation may need to be structured in a manner that both clearly communicates the owner's project goals (Haddad et al. 2012) and provides a mechanism for the design and construction industry to achieve the goals by developing project approaches that enhance their competitive edge (Beiser 2010).

"Alternative Technical Concepts and innovative bidding are a great partnering opportunity to involve our industry partners, and we can both benefit from the flexibility and up front opportunity to ensure low bid" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012). The remainder of this section will discuss the industry perspective of agency ATC procurement policies and how they impact the "partnering opportunity" on a given project.

Design Consultant Perspectives

Ken Smith (2012), a member of a national design consulting firm, provided a thoughtful industry perspective on ATCs

in DB projects. In a nutshell, he posited, "Good Design-Builders believe that they will put themselves in a position of 'innovate to win.'" A study of public DB RFPs by Gransberg and Barton (2007) found that public agencies "give price a very heavy weight in the government selection processes," and the result is that the "[owner's] benefit of being able to evaluate several competing designs and encourage creativity and innovation is effectively squelched if the proposed design must also carry the lowest price" (Beard et al. 2001). Smith (2012) maintains that a DB team necessarily decides whether to propose an "aggressive or conservative design" and "on average—aggressive designs will win more jobs because the work is not overpriced." In this paper, an aggressive design is one that is focused on proposing the "*minimum necessary* to meet the project requirements, and this is the *basis for pricing … and winning*" (Smith 2012, italics added). This paper confirms the finding of the public DB RFP study in 2007 by confirming what might be an unintentional bias toward minimizing cost by minimizing quality.

On the positive side of the procurement equation, Smith (2012) states that design-builders are "focused upon innovation during procurement," and "are not intimidated by solid competition." The result is that ATCs provide the necessary tool for DB teams to gain an "advantage through innovation." In DB project delivery, Smith believes that ATCs are the "key to the win." He also states that from the design consultant's perspective, "trust in [the] Owner's confidentiality, objectivity and fairness is paramount."

Another paper argued that design consultants "should be involved more in risk management because design is a very significant risk source in a construction project. Currently, risk management is not a part of consultants' assignment in traditional contracts" (Osipova and Eriksson 2011). Because risk and construction price are directly related (Touran et al. 2008), mitigating construction risk through preaward innovation in the form of ATCs is a means to involve designers in construction risk management. Scheepbouwer and Humphries (2011) argue that the "extension of the preliminary design stage by producing a more complete design could also minimize the designer's risk exposure in subsequent phases." The use of ATCs as the means to produce a more "complete design" may therefore reduce overall risk regardless of the project delivery method. The earlier discussion leads to the conclusion that there appear to be no barriers to implementing ATCs from the design consultant sector.

Construction Contractor Perspectives

Smith (2012) relates his experience with DB ATCs by saying, "Builders will lobby for ATCs, a result of the belief that their team will identify advantage through innovation." ATCs provide an effective risk management tool for the contractor. Bob French, the president of a large national construction company, outlined three ways to manage risk in a design-build project. The first was "Make it go away by either throwing money [a contingency] at it or remove it from the project." The second was "subcontract [the risk] out," and the third is "refuse to accept it" by not competing for the contract (B. French, personal communication, "Three Risk Management Approaches," 2006). In DBB, "low-bid competition … results in a [construction] contract where the contractor is basically out to protect themselves from losing money on the first day that they begin the project" (Bernstein et al. 2011).

However, the use of ATCs provides a means for the contractor to change the design, and provides an ability to manage an unacceptable risk by "removing it from the project" and replacing it with an acceptable risk (the ATC). It also avoids the alternative of increasing the cost by adding risk-based contingencies. *NCHRP Synthesis 429: Geotechnical Information Practices in Design-Build Projects* confirmed French's risk management rules in a series of contractor interviews. The study found the following:

> More than half of the contractors stated that they developed their [DB] proposals with the idea that they would not be able to use their preferred approaches to geotechnical design and construction either because of specific exclusion in the RFP or because they sensed that the owner's personnel would not relinquish control of the process. The contractors' remedy was to increase the proposal contingency accordingly. (Gransberg and Loulakis 2011)

Once again, ATCs provide a solution to permit contractors to propose their "preferred approaches" and receive a decision that their concept was acceptable or not before committing to a price. In the words of one contractor:

> An Owner's lack of flexibility can drive up the cost of Design/Build projects by not allowing Alternative Technical Concepts. Design/Build teams often can shave significant costs off a project by applying Alternative Technical Concepts that have little or no negative effect on the function of the finished product. An Owner that stifles this process loses one of the most significant potential benefits of Design/Build. (Christensen and Meeker 2002)

The Minnesota DOT Hastings Bridge DB case study (chapter five) provides a clear perspective on the potential benefits of using ATCs as a risk management tool for the industry.

Industry Perspective on ATC Evaluations

No matter how carefully an agency outlines the details of their evaluation system, the potential always exists that one or more of the ATC proposers will be dissatisfied with the outcome and will protest. Several lessons related to ATCs can be learned from the MnDOT case study project. First, the owner's published evaluation factors need to be transparent. This puts all the competitors on an even footing and

makes the defense against a possible protest stronger. Second, once the evaluation plan is published, the owner will want to carefully follow it to the letter, collecting documentation along the way to prove that the decisions made for the project flow directly from the published system and its attendant factors. Finally, the plan will need to be logical and the decisions that flow out of it will also be based on defensible logic.

Taking this discussion with the results of the previous section on evaluation planning leads to identifying the publication of an ATC evaluation system (in similar detail to Figure 8) as an effective practice.

CONCLUSIONS

The conclusions drawn from the analyses discussed in this chapter are as follows:

- In CMGC and DB-QBS project delivery, ATCs are integral to CMGC contractor/design-builder selection process and are often used as selection criteria.
- An ATC leads the agency to alter the baseline design or the baseline design criteria because if no deviation is required, the concept would be responsive if proposed as merely the given competitor's preferred design approach.
- ATC usage is most common in DB projects and has been successfully implemented in nearly all types of project delivery methods.
- ATC use is not constrained by an agency's project delivery selection, and agencies can implement ATCs without being constrained by technical or procurement issues on nearly all types of transportation projects.
- The practice of publicizing all RFIs may stifle competitors' need for clarification and interpretation of the baseline design. Incorporating ATCs in the procurement process creates a mechanism to gain clarification of solicitation documents in a confidential manner.
- Limiting the total number of ATCs that can be submitted may limit the industry's ability to innovate and add value to the project. If a limitation is required, then the agency may consider selecting as high a number as deemed practical.
- Transparency of the evaluation system is important to avoid protests that spring from ATCs.

The effective practices identified in this chapter are as follows:

- Including some form of ATC submittal process is an effective practice for DB projects.
- ATCs can be used in conjunction with incentives for both early completion and quality products.
- Because ATCs often revise the design to be more compatible with a given contractor's means, methods, and equipment, schedule and performance risk are reduced.
- The initiation of confidential meetings by the competitors with no constraint other than a reasonable deadline for notice of intent is an effective practice.
- A detailed ATC evaluation system should be published in the project's solicitation.
- Separating the ATC evaluation team from the proposal evaluation team is an effective practice to avoid the appearance of impropriety.
- Requesting a programmatic waiver to eliminate the requirement to submit a baseline in addition to the ATC design is an effective means of reducing proposal preparation costs and stimulating ATC submittal.

Further research is needed to develop guidance on how to change an agency's procurement/technical culture when it adds ATCs to the project delivery process. The research should investigate the issue from concept through construction completion and provide effective practices for implementation throughout the ATC project's life cycle.

CHAPTER FOUR

ALTERNATIVE TECHNICAL CONCEPT PREAWARD REVIEW AND APPROVAL PROCEDURES

INTRODUCTION

To accrue the benefits discussed in previous chapters, an agency needs a preaward review process that is both thorough and speedy. One contractor described design submittal reviews on awarded DB contracts as: "Sprinting in place while holding your breath" (S.R. Benton, personal communication, "Design-build Contractor's Perspective," Jan. 20, 2010). Regardless of the delivery method used to deliver the project, the review of an ATC is a mini-DB design review in that the contractor cannot move forward in its bid process until it knows whether or not the proposed ATC will be acceptable. Thus, there exists a need for speed in the agency review process.

Compounding the complexity of the ATC review process are specific requirements for assigning design responsibility appropriate to the specific project delivery method. Other issues involve validating promised benefits and determining how those benefits will be captured in the final contract in terms of alterations to the price or contract period of performance.

This chapter will discuss the procedures in use by DOTs to review, evaluate, and approve ATCs.

ALTERNATIVE TECHNICAL CONCEPT REVIEW PROCESS

The process for evaluating ATC has four major components:

1. The review/evaluation team.
2. The preconstruction schedule milestone requirements.
3. The management of ATC design information during review.
4. The assignment of design responsibility/liability for approved ATCs.

ATC Review Team

Pulling a team together to review ATCs is not as simple as it sounds. Not only are members that are technically qualified to determine the viability of proposed concepts required, but there also is a need for members who can evaluate the impact of each ATC on environmental permits, ROW, third-party impacts, as well as the legal requirements to properly incorporate the ATC into the construction contract. Chapter three provides a discussion on whether the proposal evaluation panel be included as members of the ATC review panel and concluded that separating the two was an effective practice to avoid the appearance of impropriety.

Another aspect to consider is the presence of observers from outside the agency. Minnesota and Utah are two states whose enabling legislation for CMGC and DB require outside membership on selection panels. Additionally, the potential exists that ATC evaluation panels might have representatives from the FHWA, state resource agencies, and local government. To cover this eventuality, the Texas DOT (TxDOT) includes the following clause in their solicitation:

> [competitors] are advised that observers from federal or other agencies, including representatives of local agencies and municipalities, may observe the … evaluation process. … FHWA has agreed to take reasonable steps to prevent this information from becoming a public record. Outside observers … will be required to sign TxDOT's standard confidentiality agreement. (TxDOT 2008)

As cited in the TxDOT clause, the confidentiality issue will need to be addressed for any outside observers. The strength of TxDOT's approach to this issue is that by stating the possibility that individuals external to TxDOT may be present, the agency effectively puts all proposers on notice that it cannot guarantee complete confidentiality except through its nondisclosure agreement. In doing so, it puts the competitors in a position of needing to vet every potential ATC to ensure that proprietary information is not accidently leaked outside the ATC evaluation panel, and on the downside, this might cause some to opt to not propose certain ATCs because of the external observers' presence.

Preconstruction Milestone Development

When an agency decides to implement ATCs on a specific project, it will need to verify the procurement schedule and ensure sufficient time for industry to develop ATCs and the agency to review them. Understanding that the time frames are highly dependent on the scale and type of project, project delivery method, and individual agency capabilities,

Table 6 is provided as an example of the difference between DBB and DB for two case study projects of major bridges found in chapter five. It can be noted that because CMGC projects do not require the contractor to commit to a price until after the design is fundamentally complete (Molenaar et al. 2009), there is no need to technically evaluate ATCs before awarding the CMGC preconstruction services contract (see chapter three for detailed explanation). With ATC review outcome being changed from a technical review approval to a CMGC contractor selection criterion, the need to establish specific milestones for ATC evaluation no longer exists because contractor-developed alternatives are part of the routine CMGC preconstruction process. The solicitation document content analysis found that the average period between CMGC RFP release and proposal due date ranged between 21 and 55 days (3 and 8 weeks) with an average of 40 days (6 weeks).

The solicitation document content analysis found that the average period to prepare and submit ATCs for DB projects after RFP release was 47 days (7 weeks) within an overall proposal period of 90 days (13 weeks). Some states extended the time for proposers to consider potential ATCs to 168 days (24 weeks) by releasing a draft DB RFP before the final RFP release. The major difference in the MoDOT DBB and MnDOT DB milestones shown in Table 6 is the period over which the ATC development, submittal, and review process occurs. The DBB ATC process begins nearly a full year before bids are opened. Whereas the DB project provides a 4-month period to process ATCs before final technical proposals are due. To fully understand the differences, that MoDOT made the *business decision* to advance approved ATC designs to biddable quantities itself to avoid potential design liability issues requires consideration (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012). If one combined the content analysis output provided at the beginning of this paragraph with the DBB ATC period from the MoDOT case study, the conclusion can be drawn that DBB ATCs require a longer period than DB ATCs to allow the agency to physically advance approved ATC design alternatives.

ATC Design Information Management

The management of the ATC design review process can be likened to traditional value analysis conducted during the design phase of a DBB project. Lee et al. (2011) define value analysis as "a systematic analysis of a project, product, or process aimed at improving quality and performance and reducing operation, maintenance, and life-cycle costs and environmental impacts." Essentially, the goal for the agency ATC reviewers is to determine if the concept under review will furnish the required technical functionality while accruing a benefit to the overall project in terms of cost, schedule, or life-cycle savings. Neither the survey, the content analyses, nor the case studies furnished detailed information of the procedures currently in use on the topic of managing design information flow during ATC review. Therefore, the remaining discussion is drawn from the literature and placed in the context of the greater picture painted by the previously discussed output from the other research instruments.

Value Analysis

Value analysis is one of the two major concepts found in the literature that apply directly to ATC reviews. The other is termed "integrated design" (Larsson 2002). ATCs are indeed an integration tool as discussed in chapter three because, even in a DBB project, they become a mechanism where the owner, designer, and contractor come together before setting the project's price to investigate potential ideas to improve overall project technical, cost, and schedule performance. Forgues and Koskela (2008) list the "core principles of integrated design" as:

- Strong client [owner/agency] leadership by establishing clear goals and objectives;
- A multi-disciplinary approach involving active participation of [the project stakeholders]…
- Continual learning to address all design issues flowing from the objectives;
- Whole system thinking and whole lifecycle costing are priorities;
- The… team effort is invested in the early stage of the project.

TABLE 6
EXAMPLE ATC PRECONSTRUCTION MILESTONE SCHEDULES

DBB Milestone—MoDOT Hurricane Deck Bridge	Timing	DB Milestone—MnDOT Hastings Bridge	Timing
ATC information meeting	Day 0	–	–
Base design confirmation	Day 21	–	–
30% plans posted	Day 36	RFP issued	Day 0
Start one-on-one meetings	Day 39	ATC submittal due	Day 60
60% plans posted	Day 107	Clarification submittal due	Day 104
Last day to submit ATCs	Day 165	PAE submittal due	Day 90
ATC biddable plans to contractor	Day 255	Technical proposal due	Day 120
Bids due	Day 350	Price proposal due	Day 145

PAE = Preapproved element; MnDOT's term for an approved ATC.

Although the typical ATC does not involve the complete redesign of a given project, taking the fundamentals of value analysis and integrated design together and focusing them on the specific alternative concept under evaluation provides a framework from which the management of ATC design reviews can be conducted.

Performance Attribute Matrix

The California Department of Transportation (Caltrans) uses performance attribute matrices as the central focus of its value analysis methodology (Lee et al. 2011). Table 7 is an example.

Caltrans employs this technique during its design process to "provide a standardized means of identifying, defining, evaluating, and measuring performance … [through] a systematic analysis of a project, product, or process aimed at improving quality and performance and reducing operation, maintenance, and life-cycle costs and environmental impacts" (Lee et al. 2011).

The concept of measuring potential performance of an alternative concept fits nicely with the objective of ATCs, to improve project performance. Table 7 contains the performance attributes that were important for a value analysis of

TABLE 7
DESCRIPTION AND RATING SCALE OF PERFORMANCE ATTRIBUTES FOR I-80 PROJECT (Lee et al. 2011)

Attribute	Description	Rating	Definition	Score
Phaseability	An assessment of how easily a transportation facility can be improved or expanded at some future date. This attribute considers the degree of throwaway work involved and future traffic/public impacts when planned future improvements are made.	Excellent	Provide all travel lanes, barriers, and shoulders for the future HOV project	10
		Good	Provide some travel lanes, barriers, and shoulders for the future HOV project	5
		Poor	Provide no new facilities for the future HOV project	2
Maintainability	An assessment of the long-term maintainability of the transportation facility(ies). Maintenance considerations include the overall durability, longevity, and maintainability of pavements, structures, and systems; ease of maintenance; accessibility and safety considerations for maintenance personnel.	Excellent	Highest level of maintainability that far exceeds expectations	10
		Very Good	High level of maintainability. Low maintenance features	8
		Good	Provides satisfactory level of maintainability	6
		Fair	Requires maintenance greater than normal	4
		Poor	Requires maintenance that far exceeds the normal	2
		Unacceptable	Extreme and unacceptably high maintenance	0
Construction Impacts	An assessment of the temporary impacts to the public during construction related to traffic disruptions, detours, and delays; impacts to businesses and residents relative to access, visual, noise, vibration, dust, and construction traffic; environmental impacts related to water quality, air quality, soil erosion, and local flora and fauna.	Excellent	No traffic or environmental impacts	10
		Very Good	Some minor traffic or environmental impacts	8
		Good	Some nighttime lane and ramp closures, moderate	6
		Fair	Significant traffic and environmental impacts	4
		Poor	Intensive, lengthy, and disruptive traffic and environmental impacts	2
		Unacceptable	Unacceptable severe impacts to the public	0
Project Schedule	An assessment of the total project delivery as measured from the time of the value analysis study to completion of construction.	Excellent	Completed in 24 months	10
		Very Good	Completed in 28 months	8
		Good	Completed in 32 months	6
		Fair	Completed in 36 months	4
		Poor	Completed in 40 months	2
		Unacceptable	Cannot be delivered in the given manner	0
Ride Quality	An assessment of the pavement quality in regard to the experience of motorists. Considers vibration caused by points, slab rocking, etc.	Excellent	Highest quality of smoothness and continuity	10
		Very Good	Exceeds public expectations	8
		Good	Generally good. Meets public expectations	6
		Fair	Marginal. Falls short of public expectations	4
		Poor	Does not meet public expectation	2
		Unacceptable	Completely unacceptable	0

a paving project on I-80. The study identified three potential alternatives to the baseline design:

1. Upgrade the 5.18-m (17-ft) median-widening pavement from 20-year standard-life HMA to 40-year long-life JPCP,
2. Use different curing-time concrete mixes during 55-hour extended weekend closures for the main line (No. 3 lane) pavement rehabilitation, and
3. Upgrade the concrete pavement (JPCP) rehabilitation of the No. 2 and No. 3 lanes from 20-year standard life to 40-year long life. (Lee et al. 2011)

The Caltrans team then evaluated each alternative using the performance attribute matrix method, comparing each performance attribute with all others using the analytic hierarchy process (Caltrans 2013a). Table 8 is the output from the analysis and shows that all three alternatives improve project performance, as seen by the positive percentage performance change.

Figure 11 is derived from consolidating the Caltrans performance attribute matrix process with the integrated design process proposed by Larsson (2002). Its essential characteristic is employing a multidisciplinary design review team composed of the owner's personnel to provide the "strong leadership" described by Forgues and Koskela (2008) in "establishing clear goals and objectives," and the designer-of-record's technical experts "to address all design issues flowing from the objectives" with the alternative concepts proposed by the contractor. In DBB projects, the designer-of-record would be either the owner's internal designers or the owner's design consultant. In DB, the designer-of-record would be working with the contractor to present and explain ATCs to the owner's multidisciplinary review team.

The process shown in Figure 11 involves first establishing the performance attribute matrix for the baseline design and then using that output as the foundation on which all ATCs are evaluated. The process utilizes the assumption that for an ATC to be approved, it will exceed the performance rating of the baseline case.

OTHER ALTERNATIVE TECHNICAL CONCEPT PROCEDURAL ISSUES

As with any innovation, there are always many minor but important administrative details that need addressing before the innovation can be fully implemented. ATCs are no different. Although it is beyond the scope of the synthesis to create an ATC "how-to" guide, four topics were gleaned from the research instruments that provide information on ATC administration:

- Payment provisions and incentive/disincentive provisions related to ATCs performance.
- Design and construction quality assurance (QA) differences, if any, in ATC projects.
- Procedures to modify the solicitation documents based on ATC approval.
- Procedures to award DBB contracts with confidential ATCs.

The remainder of this section will discuss these four topics.

ATC Payment and Incentive/Disincentive Provisions

Payment for ATCs does not appear to be different than the agency's normal design and construction payment procedures for CMGC and DB projects. None of the solicitation documents and policy documents reviewed contained ATC-specific payment provisions beyond the stipend clauses. When the ATC process described in the DB solicitation documents is taken in the context of the payment provisions contained elsewhere in the document, it seems that agencies expect the ATCs to be incorporated into the proposed price and literally lose their identity as an ATC, becoming part and parcel of the contract amount against which the contractor will be paid in accordance with the general provisions of the contract. ATCs are included in the selection process in

TABLE 8
PERFORMANCE ATTRIBUTE ANALYSIS

Performance Attribute (Weight)	Baseline		Alternative 1		Alternative 2		Alternative 3	
	Rating	Weighted	Rating	Weighted	Rating	Weighted	Rating	Weighted
Phaseability (12.7)	6	7602	8	101.6	6	76.2	6	76.2
Project schedule (3.9)	6	23.4	6	23.4	5.5	21.5	6	23.4
Construction impacts (7.1)	6	42.6	6	42.6	6	42.6	6	42.6
Maintainability (38.6)	8	308.8	9	347.4	9	347.4	10	386
Ride quality (37.7)	6	226.2	7	263.9	7	263.9	6	226.2
Performance total rating	–	677.2	–	778.9	–	751.6	–	754.4
Performance change (%)	–	–	–	+15	–	+11	–	+11

Source: Lee et al. (2011).

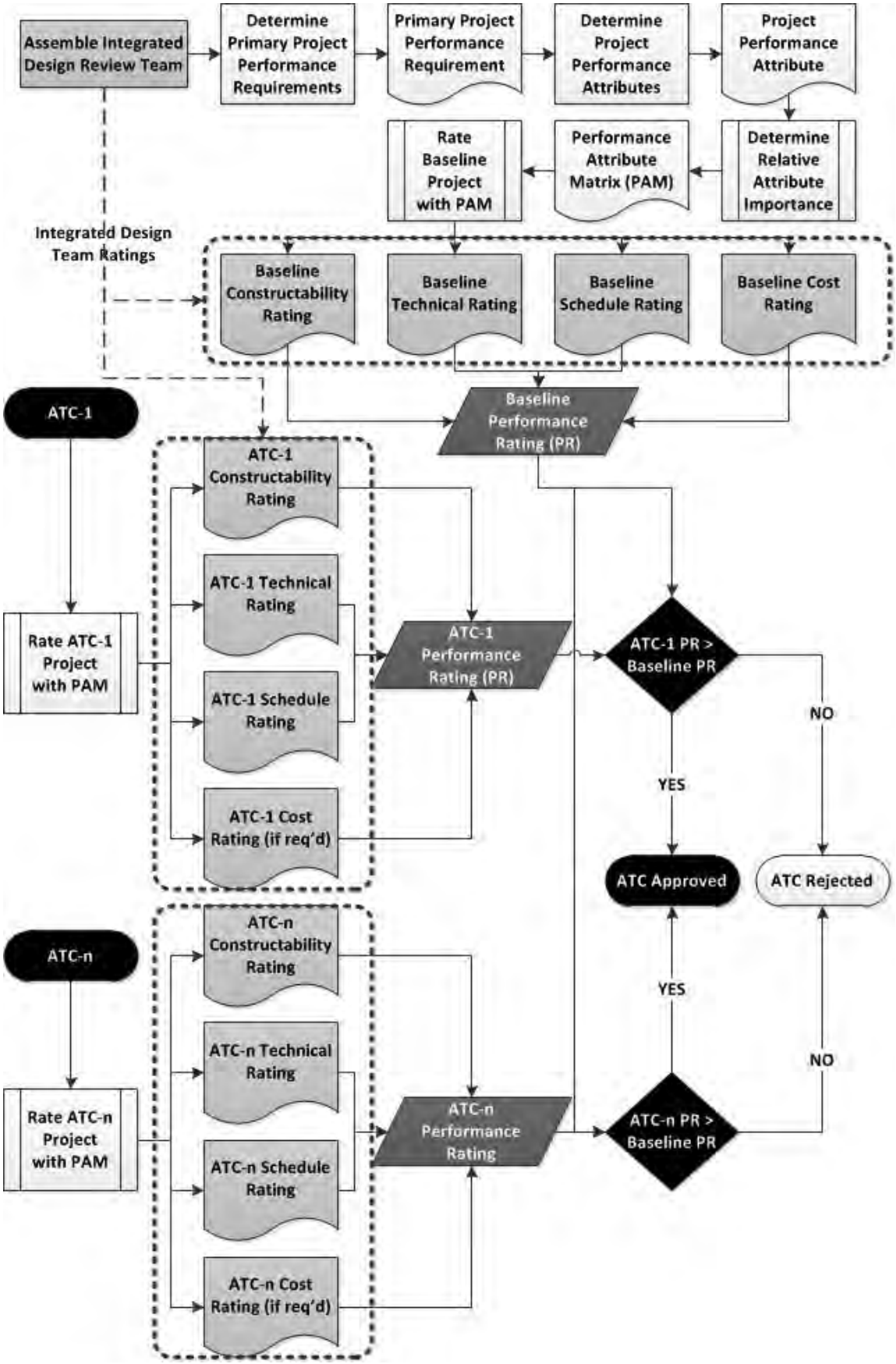

FIGURE 11 Hypothetical integrated design and performance attributes based ATC review process.

CMGC projects and not finally approved until later in design development. Therefore, no special ATC payment provisions are necessary in CMGC.

DBB ATC Payment Provisions

On the other hand, DBB projects, because of their low-bid award mechanism, require additional explanation regarding measurement and payment provisions. Given that the only DBB ATCs found were from Missouri and MoDOT chose to not burden the contractors with responsibility to complete the ATC design, the following provisions were found in the MoDOT ATC contract:

- The proposal documents contain all of the proposed work for the project to be bid as designed by the Commission. Contractors choosing not to participate in the ATC process must bid the base set of plans furnished by the Commission.
- Contractors submitting an ATC bid will receive modified bidding documents with separate pay items for the pre-approved ATC and other applicable bid items. If the contractor elects to bid the project with pre-approved ATCs, the contractor shall enter the unit prices in the modified bidding document. If the successful contractor's pre-approved ATC is abandoned by the contractor or fails to be constructed for any reason, a no cost change order will be processed to re adjust the bid items to the original design quantities. The contractor is obligated to complete the project utilizing the original design at the awarded cost.
- No direct payment will be made for any change in quantity of pay items not included in the ATC that are affected by the contractor's decision to use an ATC on this project.
- No direct payment will be made for delay of schedule due to the use of an ATC, including but not limited to delay resulting from the design, review, implementation or construction of an ATC. Additionally, if the ATC causes conflicts with utilities that were not previously identified in the original ATC submittal, the contractor's sole remedy for the effects of the presence of utilities, delay in their relocation or any other effects they have on delivery of the project shall be a non-compensable, excusable delay as provided in Section 105.7.3 of the Missouri Standard Specifications for Highway Construction. No time delay will be granted for any utility conflicts identified in the original ATC submittal. (MoDOT 2011)

The previous provisions spring from the notion that MoDOT intends to retain responsibility as the designer-of-record. Hence, it chooses to clarify the limits of that responsibility and transfer the risk for changes made during the ATC process for impact on utilities, quantity variation, and a post-award decision to abandon the ATC. One can see that MoDOT was careful to cite remedies for impacts resulting from realized risks and limit them to "non-compensable, excusable delay as provided in Section 105.7.3." Therefore, it is concluded that standard payment provisions need to be modified only for ATCs implemented on DBB projects.

Lastly, the survey asked whether DOTs incorporated a deductive amount for the baseline scope that was being replaced. Only two DOTs answered affirmatively and another eight indicated that they did so on some but not all ATCs. The responses may appear counterintuitive, but they are actually logical because those agencies that received SEP-14 waivers to not require a baseline proposal do not require baseline pricing and hence the proposed price includes only the ATC scope.

Incentive/Disincentive and Liquidated Damage Provisions

The survey asked a question about agency incentive/disincentive schemes, and the respondents ranked these schemes as the least important factor to ATC success. Like payment provisions, none of the documents reviewed in the content analysis *directly linked* ATCs to incentive/disincentive schemes. A number contained early completion bonuses, which were no doubt impacted by any approved ATCs, but since those clauses were outside the ATC clause, it can be concluded that implementing ATCs does not create a requirement to adjust typical incentive/disincentive schemes that the agency may be considering for a given project.

Eight of 21 DOTs reported that the ATCs that promise time savings *do not* trigger liquidated damages (LD) if the revised completion is not met. However, six reported that contract completion dates are revised and do trigger LDs, and seven report they sometimes impose LDs if the completion date promised by an ATC is not met. It would appear that if an ATC were accepted on the basis of schedule benefits, imposing LDs would be appropriate if the promised schedule improvement were not realized. However, the virtually even spread among the respondents of the three possible choices leads to a recommendation that future research address this issue to provide definitive guidance to DOTs.

ATC Impact on Quality Assurance Procedures

The major impact ATCs have on the quality management process is to create a need to apply QA to the ATC design review process. The Hastings Bridge project case study in chapter five provides an example of this new requirement. The column-supported fill ATC required the Minnesota DOT reviewers to evaluate a geotechnical design solution that had previously not been used in the state. Before approving the ATC, the reviewers sought a peer review from an expert with the necessary technical experience to provide a knowledgeable professional opinion on the ATC's potential for success. Because the primary engineering factor of interest was embankment settlement after construction completion, the ATC was approved on the condition that instrumentation is installed to monitor settlement in the subject fill. Both these acts constitute design QA activities directly related to the ATC (Sillars

and Harman 2013). There was no mention of ATC-driven changes to the construction quality management process in any of the research instruments.

Solicitation Amendment for Approved ATCs

As discussed in chapter three, the survey found that very few DOTs reported the need to amend their solicitation after an approved ATC. One of the reasons cited by the FHWA for confidential one-on-one meetings is that the dialog helps the agency to better understand "what RFP change is being requested and this helps the Agency understand if any RFP amendments would be appropriate" (FHWA 2012b). Thus, the decision on whether or not information brought to the agency's attention warrants an amendment to the solicitation is really a determination of whether the ATC originates from an error, omission, or ambiguity in the solicitation or if it is indeed a change to the scope of work. The Florida DOT confirms this assertion in its DB manual when it states: "The Department reserves the right to *disclose* to all Design/Build Firms *any issues raised during the ATC meetings, except* to the extent that FDOT determines, in its sole discretion, such disclosure would reveal *confidential or proprietary information* of the ATC" (FDOT 2011, italics added).

The literature indicated that contractor design input contributes to an effective design and reduces errors and omissions through the input of construction knowledge (Yates and Battersby 2002). Furthermore, West (2012) argues that "contractor design input is [a] benefit … because it enhances constructability and innovation and creates potential for cost savings through effective design solutions." One reason that the Massachusetts DOT (2012) chose to implement ATCs was "to avoid delays and potential conflicts in the design." Taking these findings with the QA discussion in the previous section leads to the conclusion that implementing ATCs with confidential one-on-one meetings effectively provides a new level of design quality control through the involvement of the contractor in reviewing the solicitation and design documents and identifying errors, omissions, and ambiguities. In West's (2012) words, the practice creates a "form of price clarification, eliminating confusion and potential misunderstanding by mandating information-rich communications."

DB ATC Contract Award Procedures

Figure 12 shows the survey results regarding advertising and awarding contracts with ATCs. As can be seen, adding ATCs to DB projects does not typically change the two-step RFQ/RFP process encouraged by FHWA (2006). It should be noted that Figure 12 shows more than one response for the last two questions. These responses came from the Missouri DOT, which used DBB ATCs, and two others that have not used DBB ATCs but believe that they could if they wanted and responded hypothetically to the question.

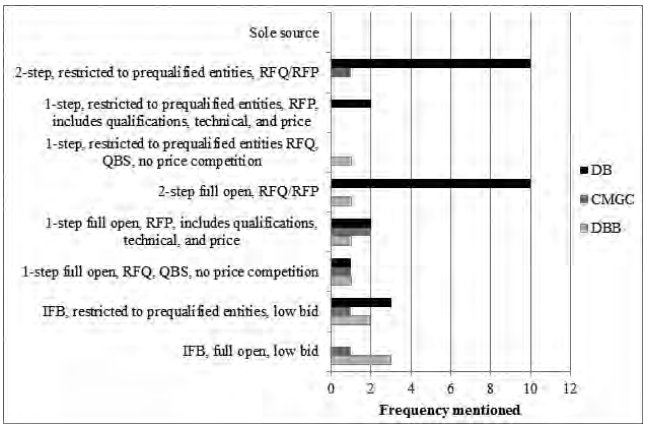

FIGURE 12 How do you advertise and award contracts with ATCs (competition method)?

DBB ATC Contract Award Procedures

Since the national experience with DBB ATCs is limited to a single DOT, Missouri, the only information on this topic comes from that agency. That information is further constrained because MoDOT chose to retain full responsibility for advancing ATC design changes to a point where biddable quantities can be generated. As a result, it seems that awarding DBB contracts involving ATCs boils down to the agency making two decisions. First, it will consider exactly how much variation from the baseline design it is willing to consider. In the MoDOT Hurricane Deck Bridge case study, the agency spelled out "minimum requirements" for roadway, bridge, structural wall, and general design specifications (MoDOT 2011). These constraints were used to communicate those technical aspects that were open to revisions and those that were not. The following is an example of one of these constraints:

> There are many factors that limit the options in altering the horizontal alignment. Prior to investing an extensive amount of time in any Conceptual ATC proposal that would affect the horizontal geometry of the base design; the contractor is strongly encouraged to contact MoDOT to discuss these limitations. (MoDOT 2011)

The second decision is the determination of whether the agency or the contractor will furnish the final design documents for approved ATCs. Although Missouri chose to retain design responsibility, there appears to be no technical reason why an agency could not assign that responsibility to the contractor. The legal issues that must be addressed before placing ATC design responsibility on the contractor will be very specific to the jurisdictions in which the approach is implemented. The analyses on this topic discussed in the previous chapters essentially show that DBB ATCs require an early decision before design has advanced to a point where the cost of lost design effort exceeds the benefit brought by the ATCs. However, the magnitude of the savings recorded on MoDOT projects and that DBB remains the predominant project delivery method in transportation reveal a pressing

need for research on the various legal and contractual issues surrounding the use of ATCs on DBB projects.

CONCLUSIONS

The conclusions developed in this chapter came from the intersection of trends found in two or more research instruments. The intersection of more than two lines of converging information adds authority to the given conclusion. The conclusions drawn from the analyses discussed in this chapter are as follows:

- DBB ATCs require a longer period than DB ATCs to allow the agency to physically advance approved ATC design alternatives.
- Standard payment provisions need to be modified only for ATCs implemented on DBB projects and not for CMGC or DB projects.
- Implementing ATCs does not create a requirement to adjust typical incentive/disincentive schemes that the agency may be considering for a given project.
- Implementing ATCs with confidential one-on-one meetings effectively provides a new level of design quality control through the involvement of the contractor in reviewing the solicitation and design documents and identifying errors, omissions, and ambiguities.

No effective practices were identified in this chapter.

Future research needs identified in this chapter are as follows:

- No information exists that validates the assumption that an approved ATC demonstrate that it exceeds the performance rating of the baseline design. Research is needed to develop a process, perhaps similar to the Caltrans performance attribute matrix, to develop a rational methodology for quantifying the as-designed performance of the baseline as a benchmark in a manner in which the proposed performance improvement of ATCs can be compared.
- There is a need for research on the various legal and contractual issues surrounding the use of ATCs on DBB projects. Specifically, the assignment of design responsibility/liability for ATC changes from the baseline design is of great interest.

CHAPTER FIVE

ALTERNATIVE TECHNICAL CONCEPT PROJECT CASE STUDIES

INTRODUCTION

Case study data collection was based on the results of the literature review. Each project case study was selected to highlight a specific procurement issue that was addressed using ATCs in conjunction with the range of project delivery methods.

> "Proposers are motivated to propose confidential ATCs which add value to the project owner because the ATCs can give them a competitive advantage over other proposers."
>
> (Papernik and Farkas 2009)

The team was able to identify and document information on 24 ATC projects in eight states worth more than $6.8 billion, including 15 from two agencies' programs. The case study projects represent the cross-section of variations on project delivery methods (PDMs). Table 9 is a summary of the case study projects sampled for this study. The case study projects represent the use of four different project delivery methods including a hybrid version of CMGC called early contractor involvement (ECI) by a federal agency. The project types spanned the spectrum from an interstate highway paving project to the replacement of an interstate highway bridge over the Mississippi River. The cases also include one from the rail

TABLE 9
SYNTHESIS CASE STUDY PROJECT SUMMARIES

Agency (case no.)	Case Study Project (value)	Construction Type (location)	Solicitation Type (PDM)	Payment Provision Type	Major ATC	Savings
Missouri DOT (1)	New Mississippi River Bridge ($230M)	Bridge Construction (St. Louis, MO)	IFB (DBB)	Unit Price Low Bid	Replace 14–10 foot diameter drilled shafts design for side friction with 6–12 foot diameter shafts designed for end bearing and side friction.	$7.4 million
Missouri DOT (2)	Hurricane Deck Bridge ($32M)	Bridge Replacement (Camden, MO)	IFB (DBB)	Unit Price Low Bid	Replace new bridge on new piers with a bridge built on temporary piers and slid into place on existing piers.	$8.1 million
Multnomah County, OR DOT (3)	Sellwood Bridge ($160M)	Bridge Replacement (Portland, OR)	RFP (CMGC)	GMP	Replace building new bridge 1/2 at a time to jacking existing bridge 90 feet to temporary piers and use for detour. Build new bridge in place on existing piers.	$6.0 million
U.S. Army Corps of Engineers (4)	Tuttle Creek Dam ($122M)	Dam In-Situ Stabilization (Manhattan, KS)	RFP (ECI)	Target Price	Replaced conventional soil stabilization with a newly developed jet-grouting system.	$75 million
Utah Transit Agency (5)	Weber County Commuter Rail ($241M)	Commuter Rail Extension (Ogden, UT)	RFP (CMGC)	GMP	Replaced a large fly-over bridge with two short bridges and three fills.	$9 million
Maryland SHA (6)	Intercounty Connector ($2.6B)	New Freeway (MD)	RFQ/RFP (DB)	Lump Sum	Programmatic use of ATCs. 30 ATCs approved on 4 contracts.	$97.4 million
Minnesota DOT (7)	Hastings Bridge ($120M)	Bridge Replacement (Hastings, MN)	RFQ/RFP (DB)	Lump Sum	Replace foundation with column supported fill.	$80 to $100 million
Utah DOT (8)	Pioneer Crossing ($180M)	Interchange (American Fork, UT)	RFQ/RFP (DB)	Lump Sum	Redesigned to a diverging diamond interchange plus installation using SPMTs.	$25 million
Nevada DOT (9)	West Mesquite Interchange ($15M)	Interchange (Mesquite, NV)	RFQ/RFP (DB)	Lump Sum	Replace build in-place bridge with slide-in bridge.	$13 million
Washington DOT (10)	Agency ATC Program	9 Projects (WA)	RFQ/RFP (DB)	Lump Sum	Long-term usage of ATCs	$551 million
California DOT (11)	Agency ATC Program	6 Projects (CA)	RFQ/RFP (DB)	Lump Sum	Long-term usage of ATCs	$503 million

transit industry and a federal water resource/flood control project. Payment provisions ranged from traditional low-bid unit pricing to a somewhat exotic successive target pricing scheme.

CASE STUDY PROJECT DETAILS

The following sections relate the details of each case study project. The objective of this section is to portray the breadth and depth of the case study projects in a manner that gives the reader the background to understand how each project's features contributed to the analysis reported in preceding chapters.

The format has been standardized for each project, to permit the comparison of each project with all other projects in the sample. In all cases, the details shown in this chapter were obtained through structured interviews (either in person or by telephone) with the agency and then supplemented as required by specifics about each project from the literature. Many of the interviews were conducted in conjunction with the nine Every Day Counts regional summits sponsored by the FHWA during the period of October to December 2012. This unique opportunity allowed the researchers to gain a particularly deep understanding of how each agency's approach to ATCs fundamentally differs from other agencies'.

NEW MISSISSIPPI BRIDGE PROJECT

The New Mississippi River Bridge project provides an example of how one agency, MoDOT, has evolved the ATC process to the point where it can be reliably used in a traditional DBB project on a major interstate highway bridge. Two key points can be kept in mind when reading this and the next MoDOT ATC case study. First, MoDOT made the business decision to advance the design of all approved ATCs to the point where bid quantities can be generated to avoid possible contractor design liability issues. Second, in order to effectively implement the business decision, MoDOT makes the plans available to industry months before the project is advertised and in most cases before the design is complete. The result is the opening of dialog with the Missouri construction industry on DBB projects with ATCs that lasts right up until the letting date for these projects. However, the cost of engaging contractors in the design process is the requirement to potentially advance more than one design by in-house personnel.

Case 1—Missouri DOT: New Mississippi Bridge Project, St. Louis, Missouri

Value: $258,703,979

Contract Award with ATCs: Main Span $229,450,505

Missouri Approach $21,826,136

Project Delivery Method: DBB

Scope: The New Mississippi River Bridge project in St. Louis, Missouri, and East St. Louis, Illinois, consists of building a new, four-lane, long-span, cable-stayed bridge across the Mississippi River 1 mile north of the existing Martin Luther King Bridge. In addition, the project includes a new North I-70 interchange roadway connection between the existing I-70 and the new bridge, with further connections to the local St. Louis street system at Cass Avenue. On the Illinois side, the project includes a new I-70 connection roadway connection between the existing I-55/64/70 Tri-Level Interchange and the main span and significant improvements at the I-55/64/70 Tri-Level Interchange in East St. Louis that will connect to the new I-70 connection leading to the main span. The 1,500-ft main span will be the third-longest cable-stayed span in the United States on completion. Figure 13 shows the project's layout.

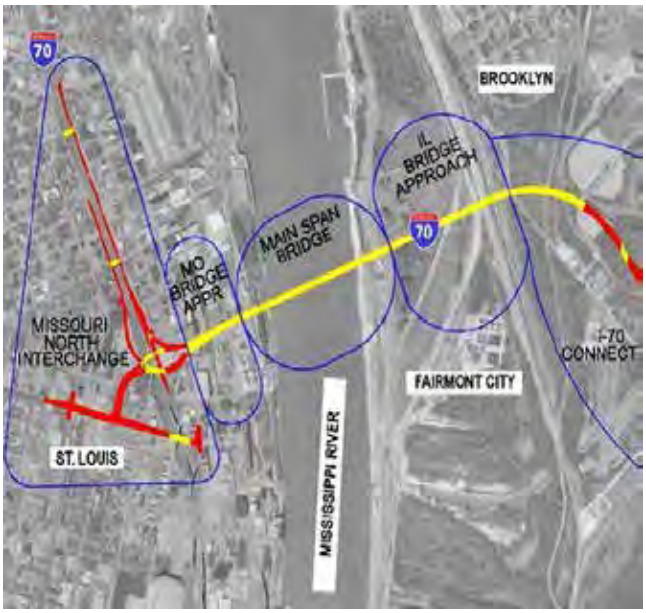

FIGURE 13 New Mississippi River bridge layout (Horn 2010).

ATC Scope: The primary ATC for this project was a change to the foundation of the main span. MoDOT engineers had provided for fourteen 10-ft-diameter drilled shafts based on side friction design. Both contractors proposed foundation design changes. The successful bidder chose to increase the diameter of the drilled shafts, which subsequently reduced the total number of shafts and the quantities of work, and significantly reduced the time it took to construct them. The winning bidder's ATC furnished six 12-ft-diameter drilled shafts designed for side friction and end bearing as well as a test shaft installed to confirm the design assumptions before starting construction. Figure 14 shows the details of the ATC. The winning bidder's ATC cost MoDOT an additional $73,000 to redesign but generated $7.5 million worth of savings. MoDOT believed that additional indirect savings may have actually be accrued

because "there may have been some indirect saving for less risk in construction, time-savings, and increased competition due to the uncertainty of what their competitor may have been bidding" (Horn 2010).

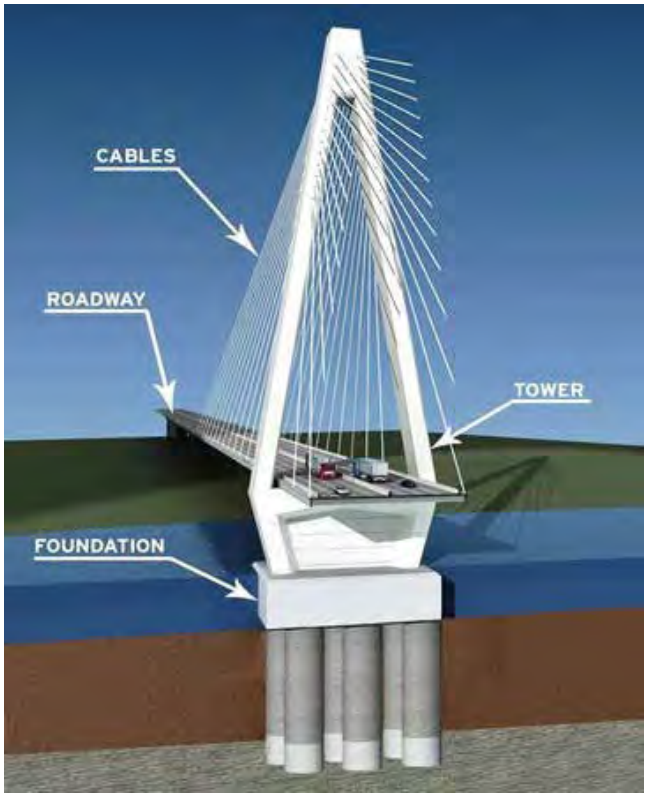

FIGURE 14 New Mississippi River bridge foundation ATC (Hitt 2012).

Procurement: MoDOT procured this project using DBB and as a result, MoDOT modified the typical DB ATC process by prequalifying contractors to be able to bid with ATCs based on past performance of work of similar scale and complexity. Not all contractors were prequalified. Those that were not were allowed to bid on the base set of plans. On the Missouri Approach job, four contractors were qualified to submit ATCs. Prequalified contractors were allowed to submit ATCs with the following limitations:

1. The Contractor must be registered [prequalified] to be eligible to participate in the ATC process.

2. The Net Savings for an ATC shall be $100,000 for the ATC to be considered for the Project. Net Savings is defined as the estimated construction cost savings minus all engineering and design costs, utility relocation costs and right of way costs.

3. All aspects of the approved Access Justification Report (AJR) must be adhered to. This includes but is not limited to:

    a. Westbound ramp from new Mississippi River Bridge (MRB) to tie-in at 11th Street at Cass Avenue, including the approved number of lanes and turn lanes.

    b. Westbound ramp from MRB to westbound I-70 including the approved number of lanes.

    c. Eastbound ramp from I-70 to the MRB including the number of approved lanes.

    d. Eastbound ramp from tie-in at 11th Street at Cass Avenue including number of approved lanes and turn lanes.

4. All pertinent information in the approved EIS for this project shall be adhered to including but not limited to:

    a. Design Criteria.

    b. No new right of way shall be obtained for the project that is outside the limits of the approved EIS. Any new right of way needed that is within the EIS limits shall be obtained using FHWA guidelines and at the Contractor's expense.

5. No extension of completion of work will be considered that will extend the project such that it will cause delay to the MRB corridor opening.

6. The ATC shall comply with all parts of the Municipal Agreement between MoDOT and the city of St. Louis.

7. The following geometric design components are off-limits to change due to an ATC:

    a. The grade and alignment of the tie-in of the eastbound/westbound ramps (parkways) at Cass Avenue shall not change from those shown on contract documents.

    b. The grade and alignment of the tie-in of the eastbound and westbound ramps at the Missouri Approach to the MRB shall not change from those shown on the contract documents.

    c. Unless it is a weekend closure due to a bridge demolition, at least two lanes of traffic in each direction on Interstate 70, 55 and 44 throughout the project area shall be maintained at all times.

    d. Any change shall be compatible with the Phase II full-build interchange.

8. ATC's requiring new Design Exceptions must receive both MoDOT and FHWA approval. Any new design exceptions must be offset by elimination or reduction of existing design exceptions elsewhere in the project. Any combination of existing and new design exceptions must be equal to or better than the existing design as determined by MoDOT.

9. Any utility relocation costs associated with an ATC shall be at the expense of the Contractor.

10. Confidentiality agreements between the Contractor, MoDOT and design staff will be part of each ATC proposal. (MoDOT 2010)

ATC Evaluation Process: Because MoDOT did not want to create potential issues regarding contractor liability for ATC designs, it chose to complete the designs for approved ATCs in-house. To support this process, it established a two-stage submittal process in which contractors would first sub-

mit a Conceptual ATC (CATC) that would be reviewed to determine if the idea had merit and appeared to generate the estimated cost savings. According to the solicitation,

> CATC's will require minimal engineering and are intended for the contractors to present their ideas prior to investing time and resources into detailed engineering of their concept. The CATC submittal shall include at a minimum:
>
> a) Detailed narrative of the change being proposed.
>
> b) Estimate of cost savings.
>
> c) Any impacts on project time or other impacts to the project. (MoDOT 2010)

MoDOT allowed a 2-month period in which contractors could submit CATCs and then specified that if approved, they had to submit a "formal ATC Proposal" 2 weeks after the CATC submission deadline. MoDOT sought to review and rule on CATCs within 2 weeks of their submission. This occurred in November 2010 and the letting for this project was held in April 2011. This provided roughly 6 months for MoDOT designers to advance the ATC to the point where bid quantities could be generated and the ATC could be included in the contractors' final bids if desired. There were no successful ATC submittals on the Missouri Approach Project.

Summary: The main span bridge project showed the value of allowing ATCs on DBB projects. The ATCs offered were less of a design change than they were of a change to the assumed means and methods used to build the bridge's foundation. DOT design personnel are trained to ensure that their designs do not reduce competition because of the means or methods necessary to execute them. In this case, MoDOT believed that the average bridge contractor would be able to furnish the smaller diameter drilled shafts. However, each contractor has its own unique set of equipment and preferred means and methods. By revising the foundation design to match the winning contractor's actual equipment before bidding the project, MoDOT was able to log a large savings by tailoring the design to the contractor. This is described by Hitt of MoDOT: "In the broadest sense, ATCs are similar to value engineering, but are made a part of the bid proposal before contract award and ensures the contractor that their concept is acceptable prior to bidding giving them the competitive bid advantage" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012).

HURRICANE DECK BRIDGE REPLACEMENT PROJECT

The Hurricane Deck Bridge Replacement Project was selected because it provides an interesting example of just how innovative the construction industry can become when given the opportunity to do so. In this DBB project, MoDOT used the same two-stage CATC/ATC process as in the New Mississippi River project detailed in the previous section.

Case 2—Missouri DOT: Hurricane Deck Bridge Replacement Project, Lake of the Ozarks, Missouri

Value: Program Estimate: $40.4 million

Contract Award with ATCs: $32.3 million

Project Delivery Method: DBB

Scope: Original scope of work included replacing the existing bridge by constructing a long-span steel delta frame structure on temporary foundations adjacent to the existing bridge, to utilize the new bridge as a temporary alignment for traffic while the existing structure was demolished and foundations rehabilitated, followed by a slide-over of the delta frame bridge into the permanent alignment as shown in Figure 15.

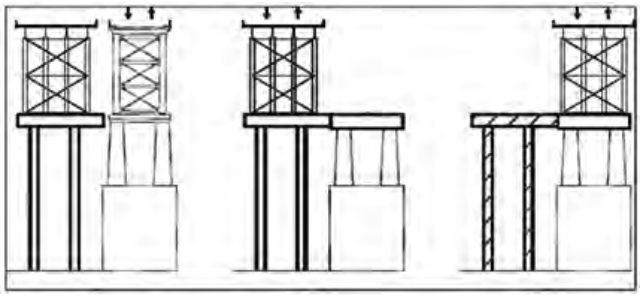

FIGURE 15 Original staging plan for hurricane deck bridge (MoDOT 2011).

ATC Scope (submitted by awarded contractor): Construct a new permanent structure on an alignment offset 37 ft 7 in. to the east of the existing alignment. The ATC compromises the following:

> a 2,260' long structure comprised of two plate girder units and two precast girder units, founded on a combination of driven piling, drilled shaft and spread footing foundations. The plate girder spans involve span lengths of 265' and use parallel flange plate girders with a 93" web depth. In order to reduce the longitudinal flexural demand of the piers in the deep lake … the structure was divided into two structural units with an in-span hinge. Longitudinal loads are distributed back to the first land pier location on each side of the lake where it can be more efficiently resolved. … The north end of the bridge employs two 90' spans of precast girders and the south employs a single span of 70' concrete girders. The precast structural units are supported on a combination of spread footings, driven-piling and drilled-shaft foundations. Upon completion of the new bridge, [the contractor] will undertake demolition of the existing bridge. … the ATC employed less than half of the fabricated structural steel quantity employed by base design … [and] eliminated a seven day total closure of the road required for construction of the baseline design. (American 2012)

Procurement: The procurement process was virtually identical to the one MoDOT followed for the New Mississippi Bridge detailed in the previous case study; however, contractors were not required to be prequalified for this project and the overall net savings for ATC submittals was $100,000. Table 10 shows the timeline that was used on this project. The February 2011 contractor information meeting asked the contracting community to consider submitting "bold" CATCs. MoDOT explained their ATC program as follows:

> Why are we doing ATCs? Best Value:
>
> - By achieving the best construction practices and using the most economical design
> - Maximize opportunities for Contractor Innovations (means and methods)
> - Minimize risk of costly Change Orders
> - Maximize competitive bidding
> - BOLD Approach = Industry + MoDOT = One Team = Best Value. (MoDOT 2011)

The result was substantive input from three contractors. One proposed CATCs to the baseline design and the other two proposed entirely new designs that were "completely independent of the baseline design. Not only was MoDOT designing the baseline design, but we also had 3 other designs being pursued for this major bridge" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012).

TABLE 10
HURRICANE DECK BRIDGE REPLACEMENT PROJECT TIMELINE

Date	Event	Date	Event
February 10, 2011	Contractor Information Meeting	August 15, 2011	Last day to submit ATCs
March 1, 2011	Commission Confirms Base Design	November 10, 2011	Pre-bid deliverables due
March 1, 2011	30% Plans Posted on Website	December 2011	Bids Due
March 1, 2011	Contractor CATC meetings start	January 2012	Contract Awarded
May 27, 2011	60% Plans Posted on Website	March 2012	Notice to Proceed

Source: Hitt (2012).

ATC Evaluation Process: The interest generated by MoDOT's aggressive approach to ATCs created a number of procedural issues that had to be addressed. First, MoDOT continued to advance the baseline design through the environmental process, but because there were potentially three variations to the selected design alternative in the environmental assessment (EA), MoDOT was careful to ensure that the "environmental document made reference to the ATC process and had FHWA involved in our environmental discussions and on our team from day one. The ATC team had open communication with the environmental office and disclosed even potential designs that could trigger having to completely redo the NEPA [National Environmental Policy Act] document if they weren't originally covered" (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012). MoDOT's ATC evaluation team had "conversations with contractors daily" during the evaluation period. Issues with confidentiality, public involvement, and ROW also had to be addressed. The solution was described as follows:

> - Confidentiality—There was one [MoDOT] consultant with four individual design teams all throughout the United States working on the different ATC designs. It was necessary to ensure confidentiality for the contractors to keep this successful. The design teams had to exercise great caution in keeping separate proposals independent of each other. We developed an external sharepoint site that was secure to each contractor. I've been told from contractors after the fact that they had no idea what other contractors were engaged in the ATC process and what ideas were being discussed.
> - Public involvement—We couldn't tell the public what the final proposed improvement would be until after we went to bid. We let them know we were allowing contractors to propose alternative ideas for construction.
> - Also, we couldn't finalize right of way negotiations; couldn't share with the property owners what the footprint for impacts would be without disclosing the confidentiality of the contractor's design. (R. Hitt, personal communication, "Alternative Personal Concepts and Design-Bid-Build," Oct. 2012)

Summary: The significant investment in the ATC process resulted in a low bid that included an approved ATC to build the entire structure on a new alignment, and the second-low bid included ATCs to the baseline design. Only $46,000 separated the low and second-low bids. The remaining three bidders were between $3.2 and $12.6 million over the low bid. The two contractors that bid the baseline design with no ATCs were $8.1 and $12.6 million over the low bid, which leads to the conclusion that the ATC process resulted in a savings of at least $8.0 million. The project is currently under construction. At this writing there have been no major issues with environmental permitting or public dissent as MoDOT has been able to live up to all of the commitments it made in the NEPA process (R. Hitt, personal communication, "Alternative Technical Concepts and Design-Bid-Build," Oct. 2012).

SELLWOOD BRIDGE REPLACEMENT PROJECT

This project was selected to provide an example of how ATCs can be integrated into a major project delivered using CMGC. CMGC involves two contracts: preconstruction services and construction (West 2012). These

effectively split the ATC proposal/evaluation/approval process, shifting the proposing of potential ATCs to the CMGC contractor selection process where it is used as a criterion to gauge innovation and often included in the scoring scheme. The actual ATC evaluation/approval process is conducted during preconstruction, often under the guise of contractor constructability or value analysis reviews (Schierholz et al. 2012). Hence, the ATC process is literally inherent to CMGC project delivery and as such may not be visible as a separate, distinct activity in project solicitation documents. That is the case in the Sellwood Bridge project, where the competing contractors were asked to submit "innovative ideas" with their price and qualifications proposals, and then the winning contractor further developed the "shoo-fly bridge" ATC in conjunction with the owner and the designer-of-record during preconstruction.

Case 3—Multnomah County, Sellwood Bridge Replacement Project, Portland, Oregon

Value: Engineer's Estimate: $165 million

Contract Award with ATCs: $159 million

Project Delivery Method: CMGC

Scope: The current 84-year-old, two-lane bridge is experiencing deterioration in the reinforced concrete deck girder approach spans and the concrete deck over the steel truss. The scope includes:

- Demolish existing 1,100-ft-long bridge.
- Construct a new steel arch deck bridge on the current alignment *that is widened 15 ft to the south to allow for continuous traffic flow during construction* (the baseline design that was changed by the ATC).
- Deck that is 64 ft at a cross-section of its narrowest point: two 12-ft travel lanes, two 12-ft shared use sidewalks, and two 6.5-ft bike lanes/emergency shoulders.
- Grade-separated and signalized interchange at the OR-43 intersection on the west end.
- Architectural gateway feature and structural element surface texturing.
- Bike lane and path surface treatments.
- Enhanced street lighting and fencing.
- Structural lighting on the bridge itself.
- Pedestrian benches and belvederes (Multnomah County 2011).

ATC Scope: Repurpose old bridge as a "shoo-fly" bridge, proving a full-scale detour for traffic during construction. Jack the 1,100-ft-long, 3,400-ton existing bridge onto temporary piers. Delete the need for temporary widening of the new structure for maintenance of traffic during construction. Construct temporary approaches and connections to existing traffic lanes to support the use of the old bridge. The ATC concept is shown in Figure 16.

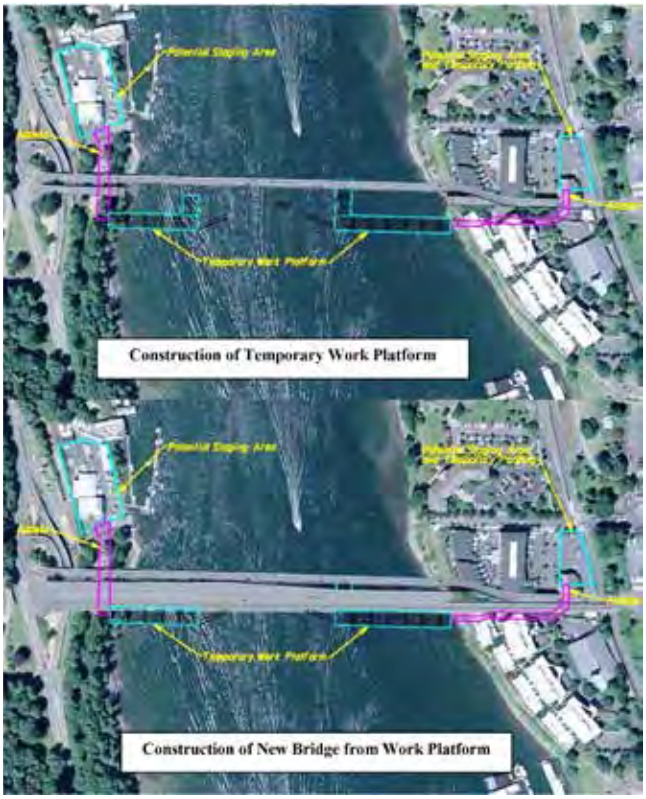

FIGURE 16 Sequence of work after shoo-fly complete (West 2012).

The benefits of the ATC are described as follows:

> The shoofly is felt to offer a number of benefits when compared to the staged construction. It could reduce construction duration by up to 12 months and could reduce costs by $5 to $10 million. Because it would separate traffic from the construction areas, it would be safer for workers and travelers. The method allows a less redundant design, preferred by the architect for improving the bridge appearance. Shoofly also requires less temporary work, construction time, and time spent in the water. Less than four in-water work windows would be anticipated for construction. (Multnomah County 2011)

Procurement: Multnomah County chose to deliver the project using CMGC after discovering that the project engineer's estimate had exceeded the amount of available funding. This created a need to phase the construction to coincide with the financing as it became available. A primary benefit ascribed to CMGC project delivery is its ability to support phased construction (Anderson and Damnjanovic 2008), and the county believed that this approach would allow work to progress as planned while the necessary additional financing, approximately $5.0 million, was obtained by means of a bond issue (Schierholz et al. 2012).

Competitors submitted qualifications, proposed preconstruction and construction management fees, a preliminary schedule, and other administrative data in their responses to the project RFP. An interview process was used in which the contenders gave a formal presentation that included the corporate qualification and past projects, the qualifications and experience for key CMGC contractor personnel, project-specific issues, innovative ideas (potential ATCs), and preconstruction services components. During the interview, the contenders were asked to respond to a list of questions specific to the proposal and some other standard questions. The winner was identified with a direct point scoring in weighted categories that was published in the RFP. Price was given 60% of the graded score. There was a protest on this project alleging that one scorer's decision was biased by having seen prices during the technical evaluation phase. The protest was denied (Schierholz et al. 2012).

ATC Evaluation Process: Because the project was delivered using CMGC, no formal ATC analysis process was required because the construction pricing impacted by the ATC was not required to be locked down until much later in the design process. Hence, the evaluation process was greatly simplified and consisted of a scoring of a given contractor's demonstrated ability to innovate in a manner that accrued potential benefits to the owner. In this case, after awarding the preconstruction services contract to the CMGC contractor, the ATC was fully evaluated without the need to maintain confidentiality or the design responsibility assignment issues that are addressed in DBB and DB ATCs. The proposed shoo-fly ATC was fully developed and found to result in a $6.0 million cost savings and a 12-month time savings, which eliminated the need to secure additional bond funding as well as the need to stage the construction as previously contemplated (West et al. 2012).

Summary: The project demonstrates the value of early contractor design input through the ATC process. In this case, the innovative approach portion of the interview process was the mechanism where potential ATCs were first considered. Because the owner does not force the contractor to commit to a price before awarding the first contract, CMGC furnishes an avenue to fully consider possible ATCs without the pressure of the letting schedule deadlines. It also permits the design liability to be put squarely on the shoulders of the designer-of-record, who has privity of contract with the agency (Shane and Gransberg 2010).

TUTTLE CREEK DAM STABILIZATION PROJECT

This project was included to illustrate the use of ATCs by a federal agency on a quasi-emergency infrastructure project. It also provides an example of managing ATC design/performance risk by requiring full-scale testing of the ATC on the project itself. This aspect can be accomplished only in a project being delivered by CMGC because the ATC approval is conditional on the completion of a successful testing regime. In DBB or DB, the ATC is approved before the contractors' bids are submitted, and to impose a field testing condition on an ATC before award could create an unacceptable delay in the procurement schedule. To impose the field testing as a post-award condition would increase the risk profile to the point where the contingency included by the contractor to cover the risk could potentially eliminate the time and cost savings associated with the ATC.

Case 4—U.S. Army Corps of Engineers (USACE) Project, Manhattan, Kansas

Value: Engineer's Estimate: $197 million

Contract Award with ATCs: $122 million

Project Delivery Method: ECI (a form of CMGC)

Scope: The Tuttle Creek Dam Safety Assurance Project is the largest dam safety ground modification project on an active dam that has ever been performed. The project was necessitated by the discovery that the dam was founded on soils that were potentially liquefiable. A seismic analysis of the existing dam indicated that it would likely fail if subjected to a relatively minor seismic event. The scope shown in Figure 17 includes the following:

- Construction of cement bentonite slurry walls for stabilization of the downstream foundation.
- Construction of a relief well buried collector system.
- Construction of an upstream riprap overlay.
- Spillway rehabilitation.

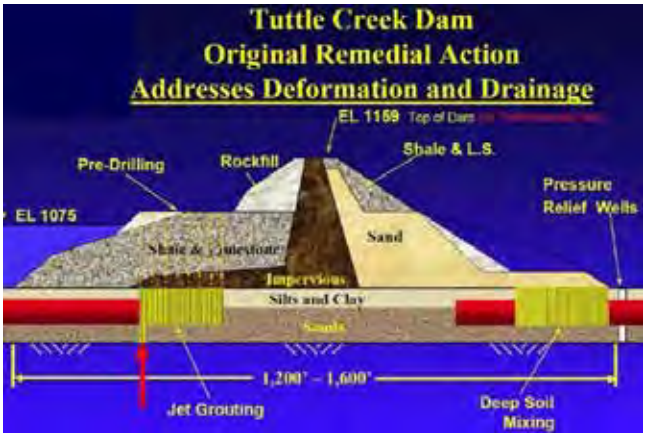

FIGURE 17 Tuttle Creek cross-section (Hoffman et al. 2009).

ATC Scope: The winning contractor proposed to take a technology that had shown promise on a smaller scale and expand it to the scale required for this project, something that had never been attempted before. The quasi-emergency nature of the project led USACE to agree, primarily for the antici-

pated construction time savings of over a year. Before starting construction, the contractor was awarded a small contract to conduct full-scale field testing of the proposed jet grouting technology (shown in Figure 18) as well as the original deep soil mixing and slurry wall design. The test was part of the ATC evaluation process. The successful testing allowed the construction to proceed as proposed and ultimately resulted in a 2-year schedule savings (West et al. 2012).

FIGURE 18 Jet grouting in progress (Trevicos 2010).

Procurement: The project was originally slated to be delivered using DBB, with in-house designers preparing the construction documents. The ECI contract was advertised when USACE realized that the "project was so complex that it would benefit from having real time construction contractor feedback as the design progressed" (Hoffman et al. 2009). In the RFP, the agency included the following:

- Description of scope of work.
- Preliminary plans/specifications.
- Construction testing matrix.
- Quality management roles and responsibilities.

A key part of the ECI contractor's proposal included a narrative describing "means and methods for success." This portion provided competitors the opportunity to propose conceptual ATCs and explain the anticipated benefits of each one. An interview process was also used to select the ECI contractor. Contenders gave a formal presentation that included the corporate qualifications and past projects, the qualifications and experience for key contractor personnel, project-specific issues, innovative means and methods, ATCs, and preconstruction services components.

ATC Evaluation Process: Because this project involved the contractor directly in the in-house design process, the ATC evaluation process was less formal than those found in other case study projects. Nevertheless, the agency constituted a "design check advisory panel" of highly experienced geotechnical specialty consultants to check compliance with the new performance specification developed from the ATC. This specification was developed for the jet-grouting technology that had never been used before for the project's required application. The evaluation included full-scale destructive testing of the jet-grouting methodology to validate production and performance. The testing samples are shown in Figure 19. Ultimately, the project validated the jet-grouting methodology for certain applications. This allowed deleting previous features because of subsequent seismic modeling. The project ended by completing the seismic upgrade with approximately 30% savings on cost and 2 years ahead of planned completion.

FIGURE 19 Jet-grouted samples prior to destructive testing (Note the size of the samples compared with the size of the equipment in the picture) (Hoffman et al. 2009).

Summary: The project's use of ATCs combined with a CMGC-like project delivery method permitted this urgent project to move forward without the delays in the procurement process that are usually found in DBB and DB, where ATCs require evaluation and approval before awarding the construction contract (West et al. 2012). The full-scale testing of a new technology could have been conducted only in the CMGC procurement environment. The amount of effort and expense that went into the ATC evaluation process was justified by the potential emergency and vindicated by the savings in both time and money. Additionally, USACE and the rest of the industry now have a new field-proven tool for deep soil stabilization. This case probably most effectively illustrates the fundamental reason for including ATCs in the procurement process: to inspire the construction industry to innovate in a manner that benefits all project stakeholders.

WEBER COUNTY COMMUTER RAIL PROJECT

This project was included because it illustrates how ATCs can be used in CMGC to not only provide innovative technical solutions but also to gain assistance with ROW acquisition and permitting issues. Additionally, it highlights the point that because of CMGC's two-contract, staged process (preconstruction contract award before construction contract award), more time is available for agencies to fully evaluate potential ATCs (West et al. 2012). Finally, it also simplifies

the issue of ATC design liability because an approved ATC is completely designed by either in-house designer or the agency's design consultant.

Case 5—Utah Transit Authority (UTA): Weber County Commuter Rail Project, Ogden, Utah

Value: Engineer's Estimate: $250 million

Contract Award with ATCs: $241 million

Project Delivery Method: CMGC

Scope: The alignment begins in downtown Salt Lake City, Utah, at the Inter-modal Hub and extends north along the Union Pacific Railroad (UPRR) right-of-way through Davis and Weber Counties, passing on new elevated structures over the Ogden Yard, continuing north of Union Station in Ogden to Pleasant View as shown in Figure 20. There are presently three freight sidings (industry tracks) from the UPRR mainline track crossing the commuter rail tracks. Grade crossings and grade crossing protective devices for the commuter rail line are also being constructed or reconstructed as needed. The Weber County Commuter Rail project scope includes the following:

- Forty-four miles of new rail guideway using single track with sections of double track at key locations to provide bypass capability.
- Eight stations, including the Inter-modal Hub in Salt Lake City, which is being constructed under a different project.
- All stations, including the downtown Salt Lake City Inter-modal Hub, are planned to include Park and Ride capabilities (Shane and Gransberg 2010).

ATC Scope: The original design called for a large (1/2-mile-long) fly-over bridge to carry the guideway from one side of the ROW, over the UPRR's Ogden rail yard, to the other side of the ROW. The CMGC contractor proposed to replace the single bridge with three fills and two short bridges (see Figure 21). To be able to implement the ATC, the contractor negotiated a ROW swap with the railroad. As part of the ATC, it also negotiated an agreement with the municipalities through which the project ran to waive individual permits for any improvements made on the final ROW, resulting in expedited fund approval from the FTA. The combination of bridge replacement and permit agreement resulted in the project being finished 6 months early. Because this project generates revenue, the early completion translated into a large increase in revenue for UTA, which is not included in the savings.

Procurement: The project's alignment included sharing and crossing the UPRR ROW as it passed through 10 different communities. Additionally, the utility relocations had to be coordinated with the typical entities and also with the UPRR. UTA selected CMGC project delivery primarily because of the large number of third-party stakeholders involved in this project (Shane and Gransberg 2010).

FIGURE 20 Weber County commuter rail alignment (Meyer et al. 2004).

FIGURE 21 Ogden Yard ATC (Meyer et al. 2004).

ATC Evaluation Process: UTA solicited ATCs, called "innovative approaches to project execution," in their RFP. The competing contractors were asked to describe at least one ATC during the interview process and demonstrate how it would impact the project's schedule and risk profile. Because this was a CMGC project and the winning contractor would be participating in the design process, there was no need to approve or disapprove potential ATCs before awarding the preconstruction services contract (West et al. 2012). Thus, the formal ATC evaluation process consisted

of merely scoring the "innovative approaches" factor for each contractor during the interview. There was no mention of the ability to transfer promising ATCs from the losers, but because there was no stipend, it would appear that any attempt to do so would be problematic.

Summary: The UTA was able to complete this project 9 months ahead of schedule and within budget (Touran et al. 2009). They believed that the use of CMGC project delivery and especially the early contractor involvement in the design process through ATCs was largely responsible for the project success. The contractor first proposed and then developed an ATC of a large fly-over bridge that crossed the Union Pacific railroad yard. The basis of the savings was a ROW swap between UPRR and UTA that allowed the fly-over to be reduced to two small bridges on three fills. UTA accrued the entire savings of nearly $7 million.

UTA also used an innovative clause in their CMGC contract that created an incentive for the contractor to maintain good public relations during construction (Touran et al. 2009). The clause effectively put half the CMR's post-construction services fee at risk by requiring a monthly meeting of a stakeholder panel that included the impacted municipalities, the state environmental quality agency, and representatives from the railroad and the federal transit administration. The panel reviewed the issues that arose in the past month and recommended to UTA how much of the at-risk fee would be awarded in the monthly progress payment. The clause worked well. In only one month was less than the full amount applied, and the panel decided to restore it the next month after the contractor had taken aggressive, immediate corrective action to resolve the issue.

INTERCOUNTY CONNECTOR PROJECT

The Intercounty Connector (ICC) project provides an example of how ATCs can be applied across several projects in the same major program. The agency developed a uniform process to implement ATCs, fine-tuned it with each succeeding contract, and reaped the benefits of increased competition, enhanced innovation, and better constructability in a variety of different technical features of work on this megaproject.

Case 6—Maryland State Highway Administration (MSHA): Intercounty Connector Project, Baltimore, Maryland

Value: Total Program: $2.399 billion

Contract Award with ATCs: $1.642 billion

Project Delivery Method: Design-Build

Scope: The ICC project consists of 18.8 miles of construction on a new alignment and incorporates some reconstruction of interchanges and an existing corridor that intersects the new project (Figure 22). The purpose of the project is to link existing and proposed development areas between the I-270 and I-95/US-1 corridors within central and eastern Montgomery County and northwestern Prince George's County with a state-of-the-art, multimodal, east-west highway that limits access and accommodates passenger and goods movement. Other purposes are to increase community mobility and safety; to facilitate the movement of goods and people to and from economic centers; to provide cost-effective transportation infrastructure to serve existing and future development patterns reflecting local land use planning objectives; to help restore the natural, human, and cultural environments from past development impacts in the project area; and to advance homeland security.

The project scope includes

- 18 miles of new construction,
- 9 interchanges,
- 6 miles of existing highway reconstruction and 2.4 miles of resurfacing, and
- Environmental issues.

The project is divided into four separate DB contracts (A through D/E Modified) and 51 separate environmental stewardship and mitigation contracts. The total budgeted cost is $2.399 billion, with $109 million accounting for the environmental contracts. The first construction segment of the project started in November 2007. Three of the four construction contracts (contracts A–C) were awarded after using best-value procurement and are currently in their warranty period. Originally planned as two separate contracts, the final contract (D/E Modified) was a two-step, low-bid procurement. Notice to Proceed for this contract was issued in February 2012.

ATC Scope: MSHA approved more than 64 ATCs in contracts A, B, and C, with the DB teams submissions claiming nearly $100 million in savings. Table 11 shows the tally of ATCs submitted, approved, and included in competing proposals on contracts A, B, and C. Table 12 is a sample of the types of concepts that were proposed through this process for the three contracts.

Procurement: The MSHA's procurement process for the 18.8-mile ICC project was based on a competitive sealed proposal process with a best-value selection for contracts A, B, and C and a low-bid selection for contract D/E. MSHA used alternative technical concepts to allow innovation and flexibility to be incorporated into the competing proposals. Confidential one-on-one meetings were held to permit competing DB teams and MSHA to ask questions and seek clarifications on submitted ATCs. MSHA received a waiver from the FHWA requirement to submit a proposal for the base design along with an ATC design. The FHWA found that

FIGURE 22 ICC alignment (Coblentz 2012).

"SHA's method of evaluating alternative technical concepts during the proposal review process was deemed satisfactory (with concurrence from FHWA Headquarters office) under FHWA's Special Experimental Program 14 (SEP-14), innovative contracting experimental program" (Peters 2008).

TABLE 11
ICC ATC SUMMARY FOR CONTRACTS A, B, AND C

Phase		ATCs		
Contract	Competitor	Submitted	Approved	Included
A	1	32	13	10
	2	6	2	2
	3	2	1	1
B	1	31	10	10
	2	29	18	15
C	1	19	9	6
	2	14	11	9
	Totals	**133**	**64**	**53**

Source: Peters (2008).

TABLE 12
ICC ATC VARIETY

ATC Description	Value
Use of fanwalls for noise walls	$1,000,000
Modify alignments at Metro Road Interchange	$13,000,000
Bike path alignment	$400,000
Change bridge fixed/expansion joints	$650,000
Shorter span lengths for two bridges	$4,000,000
Deck overhang lengths	$750,000
Use of MSE walls for abutments	$350,000
Roadway profile adjustment	$1,000,000
Reduce median width	$1,250,000
Drilled shaft foundations	$7,800,000

Source: Coblentz (2012).

ATC Evaluation Process: The MSHA required proposers wishing to submit ATCs to "detail concerning how the ATC would impact the environment (social and natural, including commitments), safety, life cycles or maintenance costs, potential costs to the Administration and the price proposal for the contract" (Peters 2008). This encouraged the competitors to minimize environmental impact without reducing the project's final quality or increasing the project's cost. To achieve the requisite level of detail, most ATCs typically included engineering design beyond the design level provided by MSHA when the RFP was developed, as shown in Figure 23. Once an ATC was approved, the proposer then had the option of including it in their proposal or leaving it out. Each proposer was required to identify any ATC in their proposal. Environmental issues were a key project success factor and therefore MSHA was particularly sensitive to any changes that might impact permit commitments. The Director of the ICC program put it this way:

> Given the environmental sensitivity of the ICC project, the RFP included many environmental requirements and commitments. These environmental requirements or commitments were in many cases general in nature. For instance, details regarding the limits to which the mainline profile could be adjusted were provided. In that instance, the ATC process gave the Proposer the ability to request, with justification, adjustments within that requirement, at specific locations. By carefully maintaining the full confidentiality of the ATCs submitted, the Administration encouraged the Proposers to develop and submit ATCs. This provided opportunity for Proposers to differentiate their proposals by being creative and innovative. (Peters 2008)

Summary: The project is nearing completion, with contracts A, B, and C open to traffic and in the warranty period. Contract D/E is expected to open early in 2014. This case study clearly demonstrates the value of including ATCs in DB procurement. Not o nly did MSHA receive a large number of ATCs, but the ATCs applied to a broad cross-section of

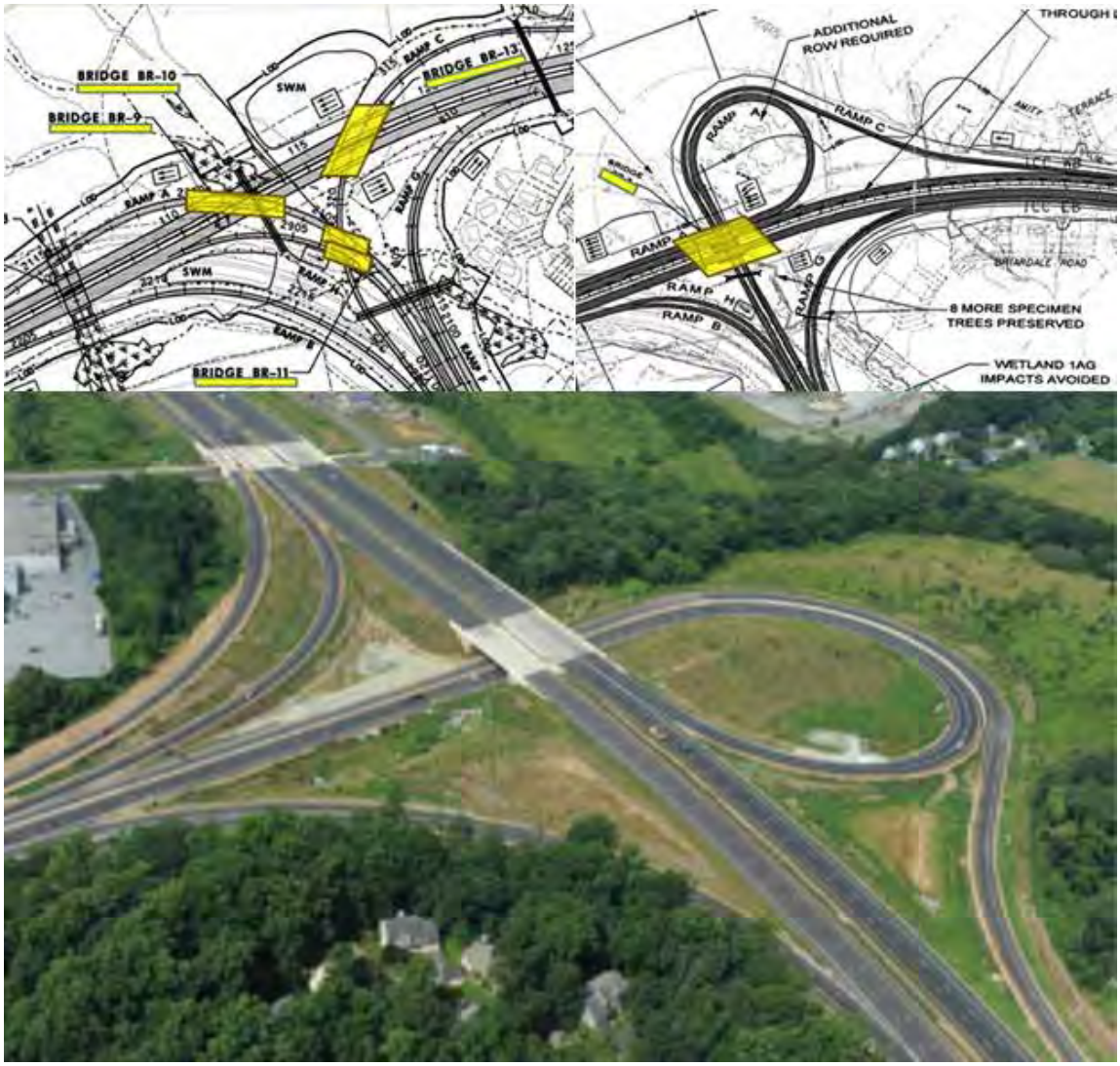

FIGURE 23 ICC contract a realignment ATC (Coblentz 2012). (*Note:* Top left is RFP alignment; top right is ATC alignment; bottom completed structure.)

technical features of work. MSHA's notion that an approved ATC "constituted a change in the contract requirement for only that Proposer and may be incorporated into only that Proposer's Proposal" (Peters 2008) created a situation in which an unsuccessful proposer could theoretically protest the award on a basis of there not being an "apples to apples" comparison. However, no such protest materialized, which testifies that the competing DB teams believed that the process was fair and equitable to all parties. This is a particularly important conclusion because this case extended over four separate contracts across a time span of more than 5 years. Both of those factors provided ample opportunity for a challenge to the MSHA procedure to arise.

TH 61 HASTINGS BRIDGE PROJECT

This project was included because of the difficult foundation conditions that had to be dealt with on the north approach to this bridge. Those conditions created a great deal of uncertainty for the competing DB teams, but because MnDOT permitted ATCs, there was a means to mitigate the geotechnical risk through the ATC process. The project involved replacing an existing bridge whose northern abutment had serious settlement issues throughout its 30-year service life. Indeed, it had been jacked back up into alignment three times. During the proposal preparation period, MnDOT successfully employed the use of "preapproved elements" (PAE) and ATCs proposed and discussed during confidential one-on-one meetings.

Case 7—Minnesota DOT (MnDOT): TH 61 Hastings Bridge Project, Hastings, Minnesota

Value: Engineer's Estimate: $220 million

Contract Award with ATCs: $120 million

Project Delivery Method: DB

Scope: Design and construction of a basket-handle arch main span segment with low maintenance, robust and highly redundant concrete tie girders, and knuckles. A main span is a 545-ft tied arch with free-standing, trapezoidal vertical steel arch ribs and post-tensioned concrete knuckles and tie girders. It is erected using a low float-in operation to maximize public safety. The south approach segment includes two side-by-side bridges that are five-span, solid cast-in-place, post-tensioned concrete slabs with an arched soffit over Second Street and a constant 5-ft-deep cross-section for the remainder of the spans. The north approach segment is a low-maintenance five-span precast concrete girder bridge. A north approach roadway was constructed on a column-supported embankment, with less than 2 in. of total settlement complete within 3 months of embankment construction. The project requires a 3-year warranty on settlement of the north approach and includes installed instrumentation for MnDOT to monitor settlement. Figure 24 is a rendering of the winning proposal's design.

ATC Scope: MnDOT was directed by the highway commissioner to accelerate the replacement of this particular bridge. Therefore, it selected DB as the most appropriate project delivery method to reduce the delivery period available within its statutory procurement constraints. The agency had recently completed the emergency replacement of the I-35W Bridge in Minneapolis and had an experienced project team in the same district. Additionally, MnDOT has successfully employed a sophisticated method to confidentially evaluate and preapprove an ATC before award and believed that it could leverage these "one-on-one" conferences not only to encourage innovative solutions to the north approach geotechnical problem but also to share the differing conditions risk with the winning design-builder.

Procurement: The project used a typical two-step process, with MnDOT first issuing an RFQ from which it developed a short list. The RFQ specifically evaluated the qualifications and past experience of the geotechnical engineering team, assigning it 8% of the weight in the ATC evaluation process scheme. It then issued an RFP to the members of the short list. Geotechnical was assigned 5% of the total weight in the proposal's technical ATC evaluation process. The literature confirms that a weight of 5% or more would be considered "heavily weighted" (Scott et al. 2006). The unique aspect of the procurement process that was particularly important to the geotechnical aspects of the project was the use of "private preproposal meetings" whose purpose was described as follows:

> Each Proposer is invited and encouraged to attend a private preproposal meeting at which the Department will address and respond to the Proposer's concerns and questions regarding details of the project scope, administrative procedures, outstanding issues for the remainder of the bid process, and any other related matters. Each meeting would be private in that only one

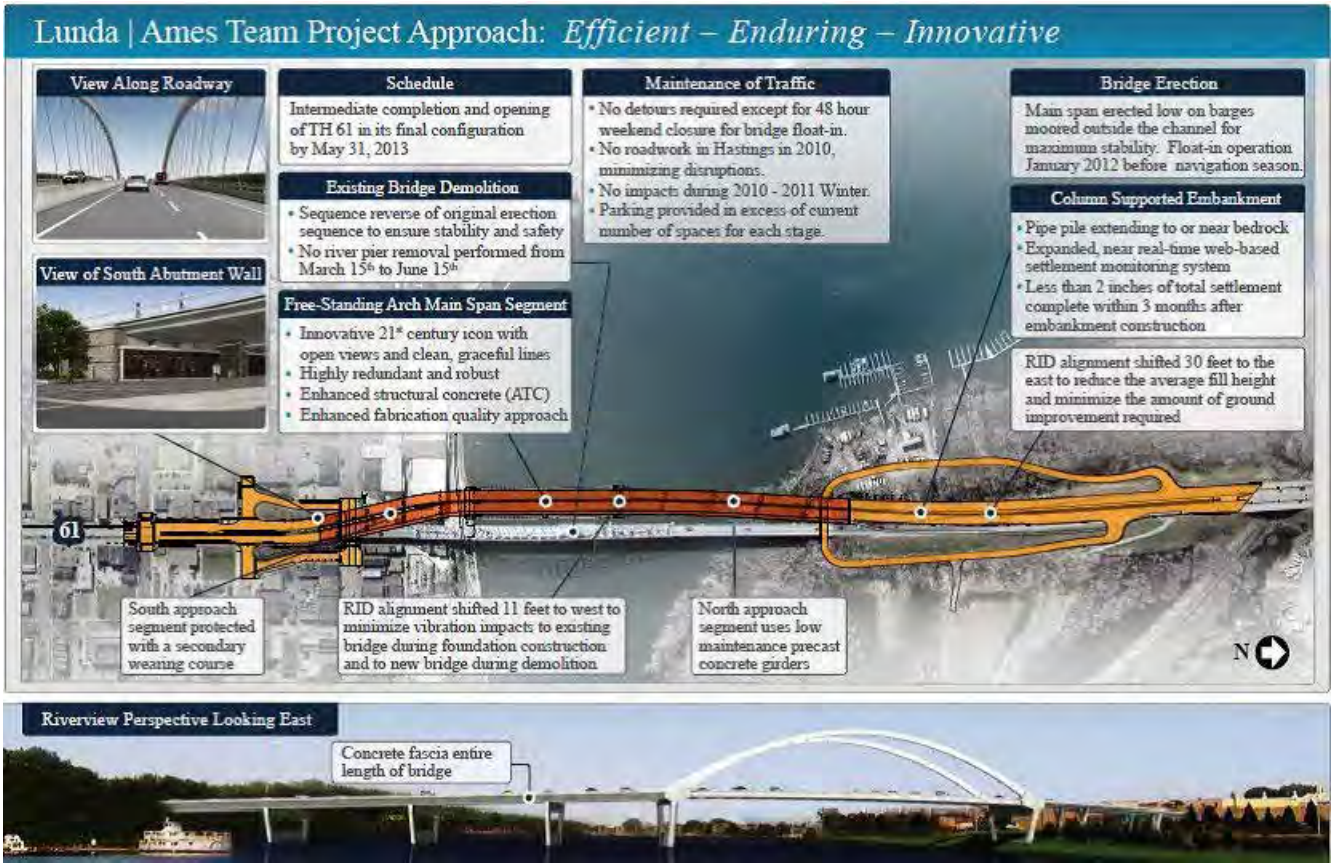

FIGURE 24 Renderings of Hastings Bridge design-build project from winning proposal (Behnke and Ames 2010).

> Proposer would meet with MnDOT representatives at a time. Proposers are not required to accept the meeting invitation. (MnDOT 2010)

PAE is different than ATC. The complexity of the structure made it impossible to write contract requirements on several key items. To minimize the risk to MnDOT and the industry, MnDOT required DB teams to submit PAEs on the following four areas:

- Redundancy concepts for main structure segment.
- Scour analysis.
- Bridge fixity and thermal expansion.
- Refined analysis method.

The PAE process allowed MnDOT and DB teams to work through complex issues before the bid. This resulted in a higher quality product and lower risk of major claims. Each team needed to have a PAE approved in each of the four categories in order to be deemed responsive. Teams would submit their PAE technical concept and MnDOT, similar to the ATC process, would approve, approve with conditions, or reject.

The ATC process is different because it allows innovation and deviation from the contract requirement. The PAE process mitigates risk of complex contract language. The one-on-one meetings in this project generated between six and 13 ATCs from each competing design-builder. Additionally, MnDOT approved as many as nine PAEs for one proposal, and the winning design-builder incorporated eight into its technical approach (Behnke and Ames 2010). Two of those, the column-supported embankment and continuous settlement monitoring, were specifically related to innovative design solutions for the north approach geotechnical problems. Figure 25 is a cross-section of the column-supported embankment that illustrates the design-builder's approach to this issue. Figure 26 is a detail of the continuous settlement monitoring instrumentation.

The effectiveness of the one-on-one meetings with the competing design-builders can be directly measured as the project was awarded at a price $100 million under the engineer's estimate. The RFP stated that "price proposals that exceed $220 million will be considered nonresponsive" (MnDOT 2010). Therefore, all the competitors had knowledge of the project's budget. The adjusted-score best-value award algorithm used in this project essentially makes the price equal to all other ATC evaluation process criteria by dividing it by the technical score (Scott et al. 2006). Thus, there would be some pressure on the competitors to keep their prices down. However, the success of the preproposal interaction between the agency and its proposers to clarify project risk and to furnish PAEs was ably demonstrated by the outcome of the proposal ATC evaluation process. The winning proposal was scored only 1 point in 100 lower than the best technical proposal while delivering the project for nearly 30% less cost. This leads to the conclusion that encouraging interactivity during DB proposal preparation for projects with significant geotechnical issues reduces risk and results in benefits to the agency.

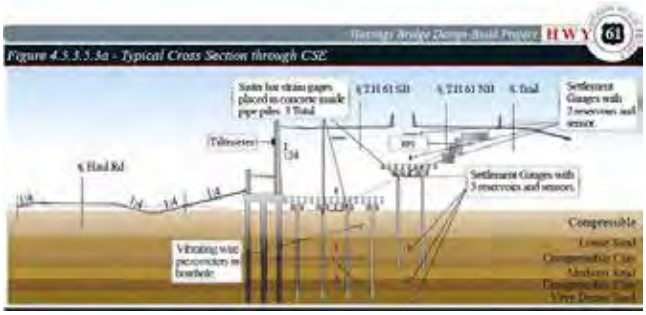

FIGURE 25 Cross-section of the Hastings Bridge column-supported embankment. (Behnke and Ames 2010).

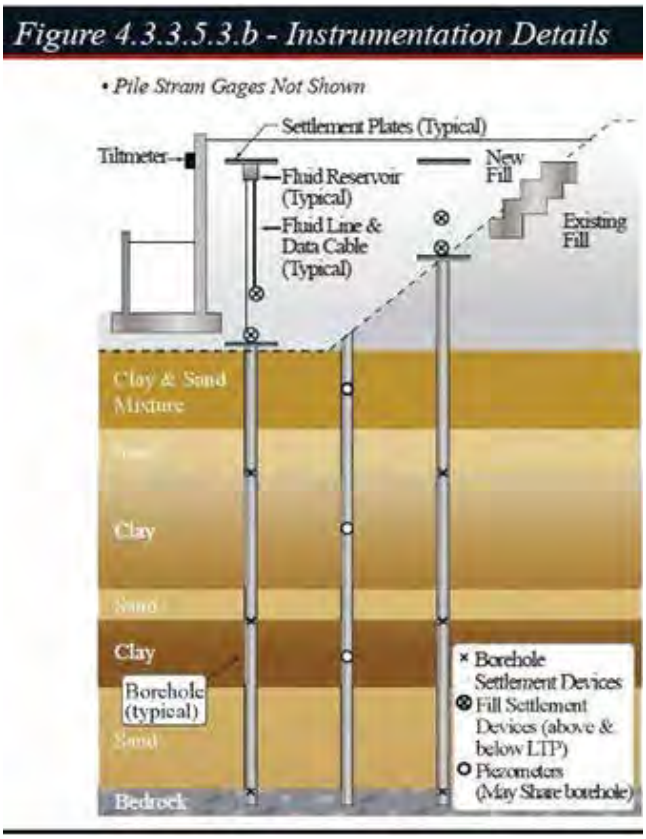

FIGURE 26 Detail of the Hastings Bridge continuous settlement monitoring instrumentation (Behnke and Ames 2010).

ATC Evaluation Process: MnDOT limits the number of ATCs that it will accept from any single DB team. ATCs are presented in two stages in confidential one-on-one meetings. The first stage is a presentation of the concept and is intended to give the contractor a decision on whether or not to pursue the proposed idea and prevent wasted effort developing the ATC "If an idea has zero chance of acceptance" (Ravn 2012). If the ATC appears to be acceptable, the

contractor develops the approach and it is presented to and evaluated by a technical review panel made up of MnDOT design engineers who are NOT on the DB proposal evaluation panel. Once the evaluation is complete, MnDOT limits it responses on the given ATC to one of the following:

- The ATC is acceptable.
- The ATC is unacceptable.
- The ATC is unacceptable in its present form, but may be acceptable upon the satisfaction, in MnDOT's sole judgment, of certain identified conditions that must be met or clarifications or modifications that must be made.
- The submittal does not qualify as an ATC, but may be included in the proposal (that is, the concept complies with the baseline RFP requirements).
- The submittal does not qualify as an ATC and may not be included in the proposal. (Ravn 2012)

MnDOT pays a stipend and reserves the right to use ATCs and PAEs from unsuccessful proposals in the final project design. Figures 27 and 28 show how the RFP articulated two possible design concepts and the designs of the two DB teams that did not win.

Summary: The project is under construction. This case study furnishes an example of the value of clarifying risk during proposal preparation rather than the traditional fielding of requests for information. That the competing design-builders had a contractual mechanism to approach MnDOT with possible design solutions for both the aesthetic requirements and the thorny geotechnical issues associated with this project greatly reduced the risk that an innovative design would ultimately be disapproved. Without the confidential one-on-one meetings and the PAEs, MnDOT would not have had the opportunity to consider technical solutions that its engineers and consultants had not contemplated. The extraordinary cost savings and the innovative solution to the north approach settlement problem validate the value of interactivity during DB proposal preparation, making this method an effective practice candidate.

PIONEER CROSSING PROJECT

This project was included because it illustrates how the implementation of ATCs in a DB project can generate innovative solutions that the DOTs have not contemplated. In this case the ATC proposed to build a diverging diamond interchange, only the second one built in the nation (Walker and Haines 2010).

Case 8—Utah DOT (UDOT): Pioneer Crossing Project, Salt Lake City, Utah

Value: Engineer's Estimate: $205 million

Contract Award with ATCs: $180 million

Project Delivery Method: DB

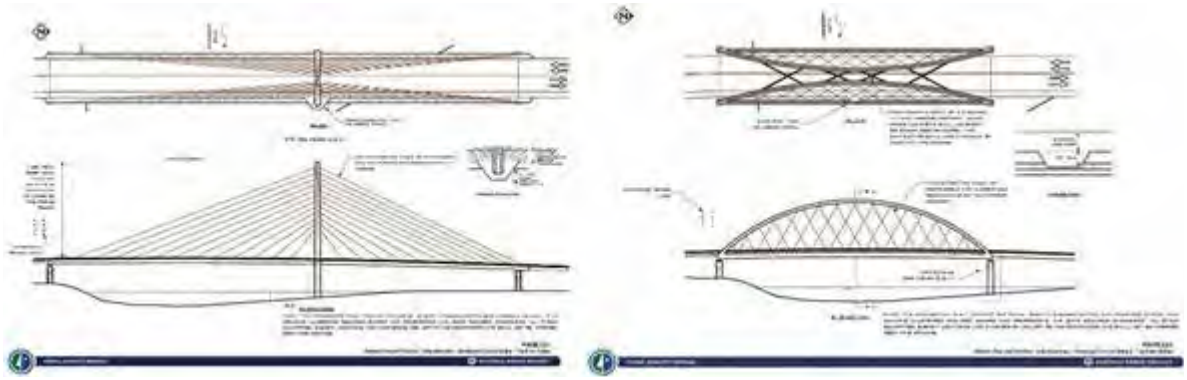

FIGURE 27 Hastings Bridge RFP baseline design options 1 and 2 (Ravn 2012).

FIGURE 28 Unsuccessful proposal Hastings Bridge designs (Ravn 2012). (*Note:* Left is ATC design and right is the baseline design.)

Scope: The Pioneer Crossing Project in American Fork, Utah, is comprised of roughly 6 miles of a new arterial connection in Utah County, a mile of I-15 reconstruction south of Salt Lake City, and an interchange where I-15 intersects the arterial. The new roadway is intended to serve rapidly growing traffic from the cities of American Fork, Lehi, and Saratoga Springs. The interchange with I-15 baseline design was a single-point urban interchange (SPUI) (Haines 2011).

ATC Scope: The interchange with I-15 will be the second diverging diamond interchange (DDI) in the United States. The project's designer-of-record describes the ATC scope as follows:

> The Utah DDI includes twin two-span prestressed concrete girder superstructures replacing an existing four-span structure over I-15. Each of these structures was to be placed using accelerated bridge construction techniques, whereby each span would be built off location, but within the project site limits, and moved into place, span by span, using short-term weekend roadway closures rather than long-term intermittent closures normally utilized in conventional bridge construction. The DDI spans were designed similar to a conventional bridge with live-load continuity being provided with continuous deck reinforcing. Seat-type abutments were utilized at the ends of the bridges, supported by a series of pipe piles adjacent to two-stage mechanically stabilized earth (MSE) walls. The center bent was supported by four 8-ft 2-in.-diam. drilled shafts. The final superstructure design required nine precast, prestressed concrete bulb-tee beams, each with a 94½-inches. depth and a maximum length of 190 feet 9½ inches. As final design [included] placement of the self-propelled modular transporters (SPMTs). (Walker and Haines 2010)

Figure 29 shows one of the bridges being moved into place on SPMTs.

Procurement: UDOT procured this project using its typical DB two-step procurement process. ATCs were solicited, and confidential one-on-one meetings were held where the DB teams could not only propose ATCs but also obtain clarification of RFP requirements. Figure 30 shows the completed project.

ATC Evaluation Process: UDOT required a significant effort be put forth by the DB team to ensure that both departmental and FHWA criteria were fully met by the radical redesign of the interchange. The ATC proposal included information regarding "DDI design, operational benefits … previous lessons learned and to identify implementation concerns. Elements of the [ATC] included the following: safety, geometrics, traffic modeling, signing, striping signalization, operations, lighting, drainage, human factors, and MOT/construction staging" (Haines 2011). It is important to note that after contract award, the design-builder was required to participate in additional joint design reviews to "ensure all

FIGURE 29 Pioneer Crossing Bridge being put in place by SPMTs (Haines 2011).

FIGURE 30 Completed diverging diamond interchange at Pioneer Crossing (Haines 2011).

parties were in agreement on the approach to ensure effective design progression" (Haines 2011).

Summary: The project furnished an alternative design that had two major advantages over the baseline SPUI design. First, it reduced the ROW requirements for the project and second, it increased safety for the traveling public (Haines 2011). UDOT published a report a year after the project had been opened to traffic and found "the DDI at I-15 and American Fork Main St has performed well from a traffic standpoint and is expected to continue to perform well for years to come" (Rasband et al. 2012).

I-15 MESQUITE OVERPASS PROJECT

This project was included because the ATC involved a radical shift from the baseline design. The baseline prescribed that the new interchange be built in a different location than the existing interchange. The ATC essentially proposed to demolish the existing bridges and replace them in their exact location. Additionally, it illustrates a case where the agency was faced with evaluating an entirely new technology: slide-in bridge construction. Finally, it illustrates the application of ATCs to a project that is the size that most DOTs routinely build, not a megaproject.

Case 9—Nevada DOT (NDOT): I-15 Mesquite Overpass, Mesquite, Nevada

Value: Engineer's Estimate: $28 million

Contract Award with ATCs: $15 million

Project Delivery Method: DB

Scope: The project's purpose was to reconstruct the interchange servicing I-15 and Falcon Ridge Road in Mesquite, Nevada (Jones 2012). The baseline scope of design and construction work included:

- Demolition of existing bridges,
- Construction of two new bridges,
- Construction of two roundabouts,
- Ramp improvements,
- Falcon Ridge widening and extension to Leavitt, and
- Drainage facilities, lighting, signing, landscaping, and curb and gutter (Espinoza 2010).

The baseline design around which the DB RFP was developed assumed "there could be significant closures and impacts on I-15 to rebuild the interchange. … NDOT [also] assumed the interchange would be built in a new location, which would add to the cost" (Searcy and Kolkman 2012). Figure 31 shows the baseline locations of the new interchange and the existing interchange.

FIGURE 31 Mesquite Overpass project baseline design (Espinoza 2010).

ATC Scope: The successful proposer based its proposal on an ATC that depended on accelerated bridge construction (ABC) technology similar to that used in the UDOT Pioneer Crossing case study. The ATC to replace the built-in-place bridges with a slide-in variety in the original location (Figure 32) was premised on the following factors:

- Ample land was available adjacent to the final location for building the bridges on temporary foundations.
- There were no viable alternate routes.
- Precast concrete components were available.
- There are high traffic and freight volumes.
- The location of the bridge at an interchange allowed interstate traffic to be routed down the ramps during the demolition of the existing bridges and the slide, avoiding any closures on I-15.
- Traditional methods would have required significant I-15 traffic restrictions to construct the bridges.

FIGURE 32 Mesquite Overpass project prior to bridge slide (Searcy and Kolkman 2012).

Procurement: NDOT procured this project using its standard two-phase DB process that included a robust

RFP criteria clarification process to ensure that competing design-builders are fully aware of both the project's performance criteria and that the agency is able to minimize the risk of misinterpretation during proposal preparation.

ATC Evaluation Process: NDOT defines ATCs as "deviations from the project technical requirement that provide equal or better utility or function" (NDOT 2011). It does not generally limit the number of ATCs it will allow though it reserves that right if necessary. If NDOT approves an ATC, the proposer retains the option to include it or not include it in its proposal. Confidential one-on-one meetings are permitted for competitors to suggest possible ATCs and receive an indication of "the Department's initial response to a given ATC; however, no formal response to such question may be provided other than a general conceptual response to the ATC" (NDOT 2011). Once a formal ATC is submitted and reviewed, NDOT will either accept, conditionally accept, or reject the ATC. If conditional approval is provided, the risk of satisfying the given conditions is shifted to the proposer both during proposal evaluation and, if successful, after award of the DB contract. The review is made by the NDOT "project team," which prepares the RFP. Individuals on the project team may also serve on the proposal evaluation panel.

Summary: The project furnishes an example of just how much innovation can be inspired by the option to propose ATCs on DB projects. Not only did the design-builder propose to site the new interchange in its current location, but it also introduced an ABC technology that not only cut the anticipated cost nearly in half, but also "shaved six months off the required schedule, while only closing I-15 for two 56 hour periods" (Searcy et al. 2012).

Washington State DOT ATC Program

The Washington State DOT (WSDOT) has been successfully delivering projects using DB since 2001. The early program avoided federal procurement constraints by executing DB delivery only on state-funded projects. That changed in 2009 when federal-aid projects were added to the DB program. The important reason to profile this agency's program is because its DB ATC procedures were very mature by the time WSDOT exposed its DB procurement process to the FHWA's influence. The major difference is the federal requirement to submit proposals for both the ATC and the baseline design [23 C.F.R. 636.209(b) 2011]. Because WSDOT had been allowing its competing DB teams to submit only one proposal based on the ATC design, in 2010 it applied for and received a programmatic waiver of the requirement to submit two proposals under Special Experimental Project-14 (SEP-14). One of the reasons cited for the waiver was to "avoid unnecessary costs and diversion of resources required for proposers to advance a base design that will ultimately not be used" (Carpenter 2012). In light of this discussion, this program was case studied to show agencies contemplating the use of ATCs the benefit of information on an agency-wide ATC program rather than just a single project or a series of contracts in the same project, such as the MSHA ICC case.

Case 10—Washington State DOT (WSDOT) ATC Program

Project Delivery Method: DB

ATC Scope: WSDOT does not limit ATC scope programmatically, but rather relies on each project's instructions to proposers (ITP) to detail any constraints that may be imposed on potential ATCs. However, its policy document states, "Concepts that simply delete scope, lower performance requirements, lower standards, or reduce contract requirements are not acceptable as ATCs" (Carpenter 2012).

Procurement: ATCs are typically included in every DB project RFP "to maintain flexibility in the procurement process" (Carpenter 2012). WSDOT generally uses a two-phase, best-value selection process in its DB program. ATCs are allowed to be proposed in the second step during technical proposal preparation. If an ATC is approved, the proposer is free to include or not include it in its final proposal. To avoid an appearance of conflict of interest, WSDOT does not permit personnel involved in evaluating ATCs to be on the proposal evaluation panel.

Because WSDOT offers stipends to unsuccessful responsive proposals, it deems any promising ideas found during the ATC process as its property regardless of whether it was ultimately included in the proposal or not. This concept is described as follows:

> By submitting a Proposal in compliance with the ITP, all unsuccessful Proposers acknowledge that upon payment of the designated Stipend, all ATC's incorporated into a Proposal, as well as any ATC's that were approved by WSDOT but not included in the Proposal, shall become the property of WSDOT without restriction on use. (Carpenter 2012).

ATC Evaluation Process: Table 13 details the WSDOT ATC review, evaluation, and approval process.

Program Details: Table 14 provides a summary of the WSDOT DB ATC program since 2009. It shows the potential for achieving substantial savings by allowing competing DB teams to confidentially propose ATCs.

An analysis of Table 14 indicates that the period from June 2009 through January 2012, WSDOT advertised and awarded 11 DB projects valued before award at more than $3.2 billion and recorded an apparent savings of $551.5 million. If the one project in which the award cost exceeded the

TABLE 13
WSDOT ATC EVALUATION PROCESS

Timing	Event	Process	Remarks
Prior to advertising	WSDOT decision on ATC inclusion	Project team evaluates the potential for ATCs.	Consider whether to limit ATC technical content or not.
Advertise for DB Phase 1: Qualifications	RFQ contents	Include verbiage to notify proposers that ATCs may be considered during Phase 2.	None
Advertise for DB Phase 2: Technical and Price	RFP contents	Detailed description of ATC process in the ITP	Specific dates, definition of ATC, procedures for submittal, ATC evaluation procedures, caveat regarding application of stipend clause to ATCs
ITP date for ATC initial submission	One-on-one meeting	WSDOT reviews concept for compliance and potential.	WSDOT notifies the proposer whether or not it suggested ATC is likely to be approved if formally submitted.
ITP date for ATC formal submission	WSDOT ATC evaluation	WSDOT evaluators make the following determinations from the ATC submittal: • "WSDOT understands what is being proposed; • WSDOT understands specifically what changes to the RFP are being requested; • The submittal establishes an understanding from the design builder on the change in risk exposure associated with the requested changes; and • WSDOT determines whether or not the ATC will provide a project that is 'equal or better' on an overall basis to what the project would be without the proposed ATC"(Carpenter 2012).	The response to the design-builder does not indicate how incorporating the ATC into its proposal will impact the way the proposal is viewed. In other words, the response merely approves or disapproves the ATC as described in the submittal. It does not judge whether the final evaluation will be enhanced or degraded by ATC inclusion in the technical and price proposal.
DB contract award	WSDOT evaluates ATCs from unsuccessful proposers	Determination is made whether or not to add to successful proposal.	None

engineer's estimate (shaded in the table) is removed, apparent savings is 26.8% below the total of the engineers' estimates. A skeptic might argue that WSDOT is merely overconservative in its DB project estimating process. However, that is not the case. WSDOT is the originator of the Cost Estimate Validation Process™, a risk-based estimating system that "first validates the cost of the project and its component parts … and then assesses estimate uncertainty in terms of cost variation and potential risk events" (Anderson et al. 2008). Hence, WSDOT's method to reach an engineer's estimate is recognized as one of the most sophisticated in the nation (Molenaar 2005).

The WSDOT document from which the table's details were drawn does not directly attribute all of the savings to the 152 approved ATCs. However, a check of the change in the *Engineering News Record* Construction Cost Index shows that, nationally, construction prices inflated 7% over the same period (Caltrans 2013a), and the California DOT Highway Construction Price Index shows that West Coast construction prices inflated 17% in that period (Caltrans 2013a). Thus, one could speculate that the price competition evident in highway construction during the recent recession was not a contributing factor to apparent savings. Indeed, the I-5 Joe Leary Slough to Nulle Road Paving Project had five bidders and recorded an award $4.1 million (38.6%) below the engineer's estimate. Four of the five bidders submitted 21 ATCs, of which 13 were approved. One of those requested to reuse portions of the existing guardrail rather than replacing all of it with new material as required in the RFP's baseline design criteria. This ATC was given to the successful proposer and "provided a savings to the contract in both time and dollars along with a transfer of responsibility to the design builder for evaluating which guardrail sections must be replaced and which could be reused" (Carpenter 2012).

Other examples of the benefits accrued by WSDOT from their ATC program are detailed in Table 15. The table shows that not all benefits are strictly monetary but, like the previous example from the I-5 paving project, can come in terms of enhanced sustainability by reusing or repurposing existing materials or by transferring risk from the agency to the design-builder. Finally it is worth noting that WSDOT has not had to defend a protest on a project that included ATCs (Carpenter 2012).

Summary: The earlier discussion leads to the conclusion that implementing ATCs can accrue tangible benefits in both cost and time savings, as well as intangible benefits such as enhanced safety during construction, decreased environmental impact, and reduced life-cycle costs for a project's useful life.

Case 11—California DOT (Caltrans) ATC Program

Project Delivery Method: DB

TABLE 14*
WSDOT ATC PROGRAM 2009–2012

Contract Name	# Proposers	Proposer	ATCs Submitted	ATCs Approved	Engineer's Estimate (millions)	Winning Proposal Amount (millions)	Apparent Savings (Loss) (millions)	Percent Savings from EE
I-405, NE 8th St to SR 520 - Braided Ramps Interchange	3	A	5	5	$175.1	$107.5	$67.6	38.6%
		B	2	2				
		C	4	4				
I-405, NE 195th St to SR 527 - Auxiliary Lane	4	A	1	1	$30.0	$19.3	$10.7	35.8%
		B	3	3				
		C	2	2				
I-5, Active Traffic Management System	2	A	5	3	$37.9	$34.6	$3.5	9.2%
		B**	1	0				
		C	8	3				
SR 520 Pontoon Construction	3	A	11	6	$600.0	$367.3	$232.7	38.8%
		B	5	4				
		C	1	1				
SR 520, Eastside Transit and HOV Project	3	A	27	15	$422.1	$306.3	$115.8	27.4%
		B	24	13				
		C	27	13				
SR 99, Bored Tunnel Alternative	2	A	8	4	$1,056.9	$1,089.7	($32.8)	-38.6%
		B	18	14				
I-5, Joe Leary Slough to Nulle Road Paving	5	A	9	7	$18.6	$14.5	$4.1	38.6%
		B	4	0				
		C	5	3				
		D	0	0				
		E	3	3				
SR 520 Evergreen Point Floating Bridge and Landings	3	A	17	12	$640.8	$586.5	$54.3	8.5%
		B	18	4				
		C	62	27				
US 2, Rice Road – Safety Improvements	3	A	1	0	$2.75	$2.17	$0.58	21.1%
		B	9	3				
		C	1	0				
I-405, NE 6th to I-5 Widening & Toll Lanes	4	*	*	*	$249.9	$155.5	$94.4	37.8%
SR 9/SR 92 – Intersection Improve	3	*	*	*	$3.90	$3.35	$0.55	37.8%
TOTALS			281	152	$3,238.1	$2,686.6	$551.5	17.0%

Note: EE = engineer's estimate.
* Contract not executed at this writing. Details not available.
**Nonresponsive.
Adapted from Carpenter (2012).

ATC Scope: Caltrans was legislatively authorized to conduct a DB demonstration program with up to 10 projects. The program came with a number of constraints such as requirements to award half using low-bid DB, half using best-value DB, and instructions to distribute the projects across the state on a geographic basis.

Procurement: Caltrans must use a two-phase selection process for all its DB projects, and ATCs are permitted to be proposed during the second phase as an integral part of the proposal preparation process. ATC requirements are included in every DB project's RFP. Two of the 10 demonstration projects did not allow for ATCs and are therefore excluded from the program case study.

At first, Caltrans restricted ATCs to selected aspects of DB projects. However, during the one-on-one meetings, proposers were offered opportunities to indicate other areas of interest they wanted to see open to ATCs. If a competitor chose to accept the opportunity, additional areas were considered and Caltrans added these to the solicitation through an addendum to the RFP. Recently, Caltrans reversed this

TABLE 15
EXCERPTS WSDOT ATC PROGRAM 2009–2012 ANNUAL SEP-14 REPORT

Project	ATC Description	Benefits
I-405 – 195th St to SR 527 Auxiliary Lane	"[based on a proposer's] field investigation [it] determined that the depth of pavement on an existing shoulder was greater than shown in the contract documents. In an ATC, they proposed that the shoulder be left in place instead of removed and replaced."	"This team was not the best value proposer, however. Once the contract was awarded and stipends paid, WSDOT received the right to use this idea. The idea that originated with an ATC was then implemented under the contract with a savings of $138,929."
I-405 – NE 8th St to SR 520 Braided Ramps	"… two ATCs that together shifted the ramp alignment and raised the ramp profile from the original concept."	"This eliminated the stacked roadway (and associated future maintenance costs), reduced excavation and wall quantities and reduced construction impacts to the neighboring regional hospital and medical center."
SR-520 – Pontoon Construction	"… ATC that reduced the size of the casting basin to be constructed…"	"… compensated for the smaller facility by building it faster and accelerating the pontoon casting schedule to meet the original delivery date specified. This resulted in a significant savings in bid price and still met the original delivery date for the pontoons."
SR-520 – Floating Bridge and Landings	"… two ATCs that provided an alternative bridge superstructure system that made extensive use of precast concrete columns, piers and roadway deck sections."	"… significantly reduced the amount of exposed steel as well as cast in place concrete work performed over Lake Washington. This resulted in significant cost and schedule savings as well as reduced environmental risk."
SR-520 – Floating Bridge and Landings	"… two ATCs that reconfigured the floating bridge maintenance facility and dock…"	"… more efficient use of the space available, reduce life cycle operating costs and further reducing impacts to the surrounding, sensitive community."

Source: Carpenter (2012).

approach, opening most aspects of the project to ATCs. Nevertheless, it chose to specifically restrict a handful of areas from being eligible for ATCs (R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013). In both cases, the maximum number of submittals was capped. Caltrans included both rejected ATCs and those found by Caltrans to not qualify as an ATC in the maximum number of ATCs allowed. The cap has never been reached by any proposer on any of the projects (R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013).

ATC Evaluation Process: Caltrans requires competing design-builders to include the following in their ATC submittal:

A) **Description.** A detailed description and schematic drawings of the configuration of the ATC or other appropriate descriptive information (including, if appropriate, product details [i.e., specifications, construction tolerances, special provisions] and a traffic operational analysis);

B) **Usage.** Where and how the ATC would be used on the project;

C) **Deviations.** References to requirements of the RFP documents that are inconsistent with the proposed ATC, an explanation of the nature of the deviations from said requirements, and a request for approval of such deviations;

D) **Analysis.** An analysis justifying use of the ATC and why the deviations from the requirements of the RFP documents should be allowed;

E) **Impacts.** Discussion of potential impacts on vehicular traffic, environmental impacts identified on appropriate environmental documents, community impact, safety and life-cycle Project impacts, and infrastructure costs (including impacts on the cost of repair and maintenance);

F) **History.** A detailed description of other projects where the ATC has been used, the success of such usage, and names and telephone numbers of project owners that can confirm such statements;

G) **Risks.** A description of added risks to Caltrans and other persons associated with implementing the ATC (e.g. maintenance, impacts to other design elements, etc.);

H) **Costs.** Estimated price and cost impacts.

(R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013)

For each ATC, Caltrans responds to the proposer with one of the following determinations:

A) The ATC is approved.

B) The ATC is not approved.

C) The ATC is not approved in its present form, but may be approved upon satisfaction, in Caltrans' sole judgment, of certain identified conditions that shall be met or certain clarifications or modifications that shall be made (conditionally approved).

D) The submittal does not qualify as an ATC but may be included in the proposal without an ATC (i.e., the concept complies with the baseline RFP requirements).

E) The submittal does not qualify as an ATC and may not be included in the proposal.

The proposer may incorporate zero, one, or more approved ATCs as part of its proposal (including conditionally approved ATCs) and Caltrans reserves the right to utilize all ATC concepts included in an unsuccessful proposer's

> proposal if the proposer accepts the stipend. Following award, ATCs from unsuccessful Proposers may, in Caltrans's sole discretion, be presented to the preferred proposer as a Department-directed change in accordance with the contract. (R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013)

Program Details: Table 16 provides a summary of the Caltrans DB ATC program. It shows the diversity of projects on which ATCs were proposed. It also illustrates the potential savings available from ATCs. The ATC value was submitted as a requirement but was not validated by Caltrans. Note that the value is not binding when the ATC is incorporated in the bid; the value of the ATCs may have been overstated to make it appear more appealing to Caltrans.

The analysis of this is synopsized in the following quotation:

> Among the 109 approved ATCs, 62 were incorporated in proposals including the unsuccessful proposals. Some of the approved ATCs from the same proposer were mutually exclusive and therefore couldn't be incorporated. In other cases, the conditions attached by

TABLE 16
CALTRANS ATC PROGRAM SUMMARY

Project	# Propose	DBr	# Sub	Sub ($M)	# App	App ($M)	# In Pro	In Pro ($M)	# On Proj	On Proj ($M)	Stipend ($K)	Winner ($M)
SM 101 Ramp Meter	3	A	0	$0	0	$0	0	$0	0	$0	$0	$10.6
		B	0	$0	0	$0	0	$0	0	$0	$25	
		C	0	$0	0	$0	0	$0	0	$0	$25	
			0	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$50**	
Fre 180 Braided Ramps	5	A	1	$1.6	0	$0	0	$0	0	$0	$0	$40.7
		B	0	$0	0	$0	0	$0	0	$0	$0	
		C	2	$1.2	0	$0	0	$0	0	$0	$25	
		D	6	$4.9	0	$0	0	$0	0	$0	$25	
		E	2	$2.0	2	$2.0	0	$0	0	$0	$25	
			11	**$9.7**	**2**	**$2.0**	**0**	**$0**	**0**	**$0**	**$75**	
LA I-10/ I-605 Inter-change	4	A	5	$9.5	3	$8.8	1	$7.8	1	$7.8	$0	$46.2
		B	9	$13.3	4	$6.9	4	$6.9	0	$0	$65	
		C	5	$1.5	2	$1.5	2	$1.5	0	$0	$65	
		D	8	$8.3	5	$6.2	5	$6.2	0	$0	$0	
			27	**$32.6**	**14**	**$23.4**	**12**	**$23.4**	**1**	**$7.7**	**$130**	
I-805 N HOV/BRT	6	A	5	$3.6	1	$1.3	1	$1.3	1	$1.3	$0	$71.9
		B	4	$2.2	4	$2.2	1	$0.7	0	$0	$75	
		C	6	$1.3	6	$1.3	3	$0.9	1	$0.7	$75	
		D	2	$2.6	1	$0.8	1	$0.8	0	$0	$0	
		E	4	$7.7	4	$7.7	4	$3.8	0	$0	$75	
		F	0	$0	0	$0.0	0	$0	0	$0	$0	
			21	**$17.4**	**16**	**$13.3**	**10**	**$7.4**	**2**	**$1.9**	**$225**	
Gerald Des-mond Bridge	4	A	38	$251.3	22	$119.0	18	$108.2	18	$108.2	$0.00	$649.5
		B	17	$44.6	9	$35.9	0	$0	0	$0	$1,000	
		C*	19	$56.2	9	$31.2	0	$0	0	$0	$0	
		D	37	$401.9	13	$179.9	0	$0	0	$0	$1,000	
			111	**$754.0**	**53**	**$366.0**	**18**	**$108.2**	**18**	**$108.2**	**$2,000**	
I-15/I-215 Devore Inter-change	4	A	10	$49.3	9	$28.4	8	$24.6	8	$24.6	$0.0	$208.2
		B	2	$8.8	2	$8.9	1	$8.6	0	$0	$250	
		C	14	$68.4	7	$38.6	7	$38.6	0	$0	$250	
		D	10	$26.9	6	$22.5	6	$22.5	0	$0	$250	
			36	**$153.5**	**24**	**$98.4**	**22**	**$94.3**	**8**	**$24.6**	**$750**	
Total	**44**		**206**	**$967.3**	**109**	**$502.8**	**62**	**$232.2**	**29**	**$142.5**	**$3,230**	**$1,027**

Adapted from Tritt (2013).
*Design-builder chose to not submit a final proposal.
DBr = Design-builder; Sub = Submitted; App = Approved; Pro = Proposal; Proj = Project; M = millions;
K = thousands; TOT = total

> Caltrans may have made the ATC less attractive than originally anticipated by the proposer. On the other end, 79 ATCs representing 38.4% of the total ATC submitted were rejected for various reasons, mostly because those alternatives were determined by Caltrans of not being equal to or better than the contract requirements. Twenty nine (29) ATCs representing 14.1% of all submitted ATCs or 26.6% of the approved ATCs were used on the projects. There is no way to account for those ATCs found not to be ATCs and which may or may not have been incorporated as innovative alternatives without deviation from the project requirements. (R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013)

Caltrans offered a stipend, and the solicitation documents stated that if the stipend is accepted, the concepts, ideas, and other information contained in the proposal become the property of Caltrans. The winning DB teams' ATCs were generally the only ones incorporated on the project after award. To date, Caltrans chose to incorporate only one ATC from other than the winning proposal on a project shown in the table.

Caltrans paid a total of $3.23 million in stipends on a total value of $502.8 million of approved ATC, of which $142.45 million of ATCs were incorporated in the projects shown in Table 16. This paid stipend represents 3.1% of the total winning proposal amount, whereas the approved ATCs represent 49% and the ATCs incorporated 14% of the same total winning proposal amount. "In comparing the ATC cost benefits to the stipends paid, Caltrans achieved a return on investment of 156:1, meaning $156 of ATCs incorporated or made available to Caltrans for every dollar spent on stipends" (R. Tritt, personal communication, "California DOT ATC Program," Aug. 14, 2013).

Summary: The program is being implemented on Caltrans' first DB projects. By contrast, the WSDOT study contained projects procured and built after nearly a decade of DB experience. Tables 14 (WSDOT) and 16 (Caltrans) are remarkably similar and testify to the potential for improving project performance through ATCs.

CONCLUSIONS

The following conclusions were drawn from the case studies:

- The successful implementation of programmatic and project-specific waivers under SEP-14 to eliminate the 23 C.F.R. 636.209(b) requirement to submit both a baseline proposal and an ATC proposal demonstrates that the "apples to apples comparison" requirement is not necessary for the following reasons:
  - Confidentiality may not be able to be maintained if the agency is required to amend the solicitation when it approves an ATC.
  - The cost of developing two proposals might chill the spirit of innovation during project proposal preparation.
  - Only one protest was found in the 18 case study projects and it was not lodged on an "apples to apples" basis.
- CMGC project delivery appears to simplify the ATC evaluation process because construction pricing has not been locked down.
- To ensure an unbroken chain of design responsibility, the agency may wish to consider the following in each project delivery method:
  - DBB ATC: The DOT will choose between advancing the ATC design to the point where quantities can be computed by either in-house designers or through its design consultant, awarding the contract as a lump sum, or requiring the contractor to furnish the design.
  - DB ATC: The DOT will want to consider the need to evaluate and approve the ATC before the DB contractor can submit its technical and price proposals.
  - CMGC ATC: No approval required before awarding preconstruction contract. ATC then becomes an evaluation factor for selection. Analysis of cost and schedule impact and subsequent evaluation and approval can be completed without the pressure of a letting or proposal due date.

EFFECTIVE PRACTICES

The following effective practices were identified in this chapter:

- Holding early confidential one-on-one meetings to screen potential ATCs and give competing contractors an initial indication whether a given approach is worth investing the time and effort to fully develop as a formal ATC submittal.
- Making design information available to industry before the design is complete in DBB to allow time for the development, evaluation, and approval of ATCs.
- Requiring an appropriate test regime to validate the effectiveness of proposed new technologies as a condition for approval of the ATC. Successful full-scale field testing was conducted in support of the MoDOT New Mississippi River Bridge DBB project (test cell), the MnDOT Hastings Bridge DB project (installation of settlement monitoring equipment), and in the USACE Tuttle Creek Dam ECI project (full-scale test samples). The testing condition shifts the performance risk to the contractor and serves as a risk mitigation measure for the owner.

FUTURE RESEARCH

Future research is recommended to examine the issue of design liability for contractor-designed ATCs. The MoDOT

DBB case study projects required the agency to heavily invest in advancing alternative designs associated with ATCs. Research is needed to determine first if design liability can be shifted to the DBB contractor in the same manner as in DB if the contractor is required to advance the ATC design at its own expense. Second, the study would also investigate just how far the ATC design should be developed to furnish the necessary information for its evaluation and approval.

CHAPTER SIX

CONCLUSIONS

INTRODUCTION

The criteria used in this report for drawing conclusions and identifying effective practices were detailed in chapter one. When two or more lines of information from the survey, literature review, case studies, and content analysis intersected, the juncture was considered significant and used to develop the conclusions and candidates for the list of effective practices. Subjects where only one source gave substantive information on alternative technical concept (ATC) success were used as a point of departure to explore the potential for future research. That process was followed rigorously throughout the entire report. The conclusions and effective practices reported in this chapter are based on the four research instruments used to collect the information contained in the synthesis: comprehensive literature review, survey of U.S. agencies, department of transportation (DOT) solicitation and policy document content analysis, and case studies. Lastly, when a gap in the body of knowledge was revealed, a recommendation for future research was made. Therefore, based on that foundation, the conclusions, effective practices, and recommendations for future research are presented in this chapter.

CONCLUSIONS

The conclusions documented in the preceding chapters are as follows:

1. Guaranteeing confidentiality of proposed ATCs under any project delivery method allows competing contractors to build a competitive edge with their ATCs.

2. Implementing ATCs on construction manager/general contractor (CMGC) and design-build-qualifications-based selection (DB-QBS) projects seems to be more cost-effective than design-bid-build (DBB) or DB because the ATCs can be incorporated directly into the final design without the loss of resources expended on the baseline design.

3. The fundamental definition of an ATC requires the agency to alter the baseline design or the baseline design criteria because if no deviation is required, the concept would be responsive if proposed as merely the given competitor's preferred design approach.

4. ATC usage has been successfully implemented in nearly all types of project delivery methods and is most commonly found in DB projects.

5. ATC use is not constrained by an agency's project delivery selection, and agencies can implement ATCs without being constrained by technical or procurement issues on virtually all types of transportation projects.

6. Limiting the total number of ATCs may limit the industry's ability to innovate and add value to the project. If the agency desires to impose a limitation, then it may consider selecting a relatively high number, such as Minnesota's limitation of 20.

7. The practice of publicizing all RFIs may stifle competitors' needs for clarification and interpretation of the baseline design. Incorporating ATCs in the procurement process creates a mechanism to clarify solicitation documents in a confidential manner.

8. Evaluation system transparency is important to avoiding protests that may spring from ATCs.

9. Implementing ATCs on DBB projects requires the agency to schedule a longer period before contract award to conceive, receive, review, and approve ATCs than DB ATCs, because the agency needs additional time to physically advance approved ATC design alternatives to biddable quantities.

10. Standard payment provisions need to be modified only for ATCs implemented on DBB projects.

11. Implementing ATCs does not create a requirement to adjust typical incentive/disincentive schemes that the agency may be considering for a given project.

12. Because no protest materialized on the four ICC contracts across a time span of more than 5 years, MSHA's notion that an approved ATC "constituted a change in the Contract requirement for only that Proposer and may be incorporated into only that Proposer's Proposal" appears to disprove the conventional wisdom that confidential ATCs constitute a threat of protest on the basis of there not being an "apples to apples" comparison.

13. Because the owner does not force the contractor to commit to a price before awarding the preconstruction services contract, CMGC allows full consideration of possible ATCs without the pressure of the letting schedule deadlines, and preserves the designer-of-record's liability for the performance of the design through privity of contract with the agency.

14. CMGC also provides an opportunity to manage ATC design/performance risk by requiring full-scale testing of the ATC on the project itself before approval. In DBB or DB, the ATC is approved before the contractors' bids are submitted, and to impose a field-testing condition before award could create an unacceptable delay in the procurement schedule. To impose it as a post-award condition may also increase the risk profile to the point where the contingency included to cover the risk could potentially eliminate the time and cost savings associated with the ATC.

15. ATCs provide a contractual mechanism in DBB and DB projects to approach the agency with possible design solutions and reduce the risk that an innovative design may ultimately be disapproved after award.

16. There are three types of ATC evaluation and approval:

    a. DBB ATC: Three variations:

        i. DOT advances the ATC design to biddable quantities.

        ii. Project can be bid as a lump sum fixed price contract.

        iii. Contractor furnishes and assumes liability for the ATC design.

    b. DB ATC: DOT approves the ATC before the DB contractor can include it in the proposal and finalize the price.

    c. CMGC ATC: No approval is required before awarding preconstruction contract. ATC then becomes an evaluation factor for selection, not merely an influence on cost and schedule.

EFFECTIVE PRACTICES

Effective practices are as follows:

1. The most well documented effective practice was the use of one-on-one meetings to provide an initial response to a potential ATC and to permit competitors to decide whether to invest the time and effort in fully developing the ATC per the RFP.

2. Many agencies have found it beneficial to leave the initiation of confidential meetings up to the competitors with no constraint other than a reasonable practice.

3. Including some form of ATC submittal process was found to be an effective practice for DB projects to identify errors, omission, and ambiguities, and to provide clarifications that might not be raised when all requests for information are published.

4. Separating the ATC evaluation team from the proposal evaluation team was found to be an effective practice to avoid the appearance of impropriety.

5. Publishing a detailed ATC evaluation system in the project's solicitation permits competing contractors to better understand the ATC process.

6. Requesting a programmatic waiver to eliminate the requirement to submit a baseline in addition to the ATC design was found to be an effective means of reducing proposal preparation costs and stimulating ATC submittal.

7. ATCs can be used in conjunction with incentives for both early completion and quality products.

8. Because ATCs often revise the design to be more compatible with a given contractor's means, methods, and equipment, schedule and performance risk appear to be reduced.

9. When on-site, full-scale testing to validate the contractor proposed design is necessary, CMGC project delivery involving ATCs can be used to provide this service and was found to be an effective practice for projects with troubling geotechnical or foundation risks.

10. ATCs create an opportunity to consider technical solutions that a DOT's engineers and consultants may not have contemplated. The extraordinary cost savings and the innovative solution to the Minnesota DOT Hastings Bridge geotechnical design is an example of the value of interactivity during DB proposal preparation.

FUTURE RESEARCH

Future research is suggested in the following areas:

1. The issue of design liability for contractor-designed ATCs bears examination. The Missouri DOT DBB case study projects required the agency to heavily

invest in advancing alternative designs associated with ATCs. Research is needed to determine first if design liability can be shifted to the DBB contractor in the same manner as in DB if the contractor is required to advance the ATC design at its own expense. Second, the study would also investigate just how far the ATC design must be developed to furnish the necessary information for its evaluation and approval.

2. Another future research need is for guidance on how to change an agency's procurement/technical culture when it adds ATCs to the project delivery process. The research would investigate the issue from concept through construction completion and provide effective practices for implementation throughout the ATC project's life cycle.

GLOSSARY OF TERMS AND ACRONYMS

GLOSSARY

Advertise: "To make a public announcement of the intention to purchase goods, services, or construction with the intention of increasing the response and enlarging the competition. The announcement must conform to the legal requirements imposed by established laws, rules, policies, and procedures to inform the public" (Shields 1998).

Alternative technical concept (ATC): A request by a proposer to modify a contract requirement, specifically for that proposer's use in gaining competitive benefit during the bidding or proposal process. An ATC must provide a solution that is equal to or better than the owner's base design requirements in the invitation for bid (IFB for DBB) or request for proposal (RFP for DB) document (also termed as "alternate" in many sources) (Actis et al. 2012).

Baseline design: "[A] project's scope, need and purpose … for organizing cost and performance data in order to compare value alternatives" (Caltrans 2007). "A project's original scope, cost and schedule … used to measure how [alternatives] deviate from the plan" (Ortiz 2008).

Construction manager/general contractor (CMGC): "A project delivery method where the contractor is selected during design and furnishes preconstruction services. Also called CM-at-Risk" (DBIA 2009).

Design-bid-build (DBB): "The 'traditional' project delivery approach where the owner commissions a designer to prepare drawings and specifications under a design services contract, and separately contracts for construction, by engaging a contractor through competitive bidding or negotiation" (DBIA 2009).

Design-build (DB): "The system of contracting under which one entity performs both architecture/engineering and construction under a single contract with the owner" (DBIA 2009).

Design-build qualifications-based selection (DB-QBS): DB project delivery where the design-builder is selected on a basis of qualifications and past performance with no price competition (DBIA 2009).

Early contractor involvement (ECI): A variant of CMGC where the contractor is selected before design begins and furnishes a robust set of preconstruction services.

Equivalent design: [A]n alternative … designed to perform equally, and provide the same level of service, over the same performance period, and has similar life-cycle costs (Wimsatt et al. 2009).

Integrated design: The idea of "giving equal consideration" to each of the parties in a construction project where the contractor is given equal opportunity to suggest means and methods that require a change in the proposed design to make the project more constructable (McMinimee et al. 2009).

Invitation for bids (IFB): "A solicitation for offers under sealed bidding" (Shields 1998).

Procurement: The combined functions of purchasing, inventory control, traffic and transportation, receiving, inspection, store keeping, and salvage and disposal operations (Minnesota 2011).

Request for proposals (RFP): "A solicitation for offers under negotiation procedures" (Shields 1998).

Request for qualifications (RFQ): "The document issued by the Owner prior to the RFP that typically: describes the project in enough detail to let potential proposers determine if they wish to compete; and forms the basis for requesting Qualifications Submissions in a 'two-phase' or 'prequalification process'" (DBIA 2009).

Solicitation: "The process used to communicate procurement requirements and to request responses from interested vendors. A solicitation may be, but is not limited to a request for bid and request for proposal" (Minnesota 2011).

Stipend: "A fee paid to unsuccessful firms for development of a responsive proposal" (WVDOH 2011).

Value analysis: "A systematic analysis of a project, product, or process aimed at improving quality and performance and reducing operation, maintenance, and life-cycle costs and environmental impacts" (Lee et al. 2011).

ACRONYMS AND ABBREVIATIONS

ABC	Accelerated bridge construction
ADOT &PF	Alaska DOT & Public Facilities
ATC	Alternative technical concept
CATC	Concept ATC
CMGC	Construction manager/general contractor
CMR	Construction manager at-risk
DB	Design-build
DBB	Design-bid-build
DBB-BV	Design-bid-build best-value
DBIA	Design-Build Institute of America
DB-QBS	DB-qualifications-based selection
DDI	Diverging diamond interchange
DOT	Department of transportation
EA	Environmental assessment
ECI	Early contractor involvement
FDOT	Florida DOT
FLHD	Federal Lands Highway Divisions
ICC	Intercounty Connector
IFB	Invitation for bids
ITP	Instructions to proposers
LD	Liquidated damages
MOT	Maintenance of traffic
MSE	Mechanically stabilized earth
MWAA	Metropolitan Washington Airports Authority
MnDOT	Minnesota DOT
MoDOT	Missouri DOT
MSHA	Maryland State Highway Administration
NCDOT	North Carolina DOT
NDOT	Nevada DOT
NEPA	National Environmental Policy Act
NYCDOT	New York City DOT
PAE	Preapproved elements
PDM	Project delivery methods
QA	Quality assurance
RFI	Request for information
RFP	Request for proposals
RFQ	Request for qualifications
ROW	Right-of-way
SCDOT	South Carolina DOT
SEP-14	Special Experimental Program 14
SPMT	Self-propelled modular transporters
SPUI	Single-point urban interchange
TxDOT	Texas DOT
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
UTA	Utah Transit Authority
VECP	Value engineering change proposal
WSDOT	Washington State DOT

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APPENDIX A

Survey Questionnaire and Results

Questionnaire for Web-based Survey
NCHRP Synthesis Topic 44-09: Alternative Technical Concepts (ATCs) for Contract Delivery Methods

INTRODUCTION/BACKGROUND:

The purpose of this questionnaire is to identify state highway agency policies and procedures for delivering construction projects using ATCs. The results of the study will be a synthesis of highway agency procurement procedures for employing ATCs with most traditional and alternative project delivery methods. Its specific focus is on the specific policies and contractual content used during procurements that include ATCs. It seeks to identify successful approaches to managing risks in the preaward phases of a project's life cycle.

DEFINITIONS:

The following definitions are used in conjunction with this questionnaire:

- Alternative technical concept (ATC): A procedure where the designers and/or contractors are asked to furnish alternative design solutions for features of work designated by the agency in its procurement documents.
- ATC project: A project delivered using any project delivery method that includes ATCs as part of the preaward process.
- Design-bid-build (DBB): A project delivery method where the design is completed either by in-house professional engineering staff or a design consultant before the construction contract is advertised. Also called the "traditional method."
- Construction manager/general contractor (CMGC): A project delivery method where the contractor is selected during design and furnishes preconstruction services. Also called CM-at-Risk
- Design-build (DB): A project delivery method where both the design and the construction of the project are simultaneously awarded to a single entity.
- Best value: An award method that utilizes cost and other factors to select the winning bidders. Examples are cost-plus-time bidding, qualifications, design approach, etc.
- One-on-one meetings: Confidential meetings between the agency and individual entities that are competing for the same project whose purpose is to propose, review, and approve/disapprove ATCs before the entity's bid or proposal is submitted.
- Open records act: A statutory requirement to disclose all information pertaining to public project upon request by a member of the public. Also termed "Sunshine Law."

Please e-mail, fax, or post this questionnaire by one of the following means:

Doug Gransberg, PhD, PE
Civil, Construction, and Environmental Engineering
Iowa State University

General Information:

1. U.S. state in which the respondent is employed: _____

2. You are employed by what type of organization?

   ☐ State department of transportation

   ☐ Other public transportation agency; name of agency: _____

   ☐ Federal agency; name of agency: _____

   ☐ Other; please describe: _____

3. What group/section do you work in?

☐ Design group/section

☐ Construction group/section

☐ Operations group/section

☐ Maintenance group/section

☐ Alternative project delivery group/section

☐ Materials group/section

☐ Contracts/procurement group/section

☐ Other, please specify: _____

4. On average, how many projects using the ATC process does your agency deliver each year?

In the past year, approximately how many projects allowed for the submission of ATCs?	
On average, how many ATCs were submitted for each project?	
On average, how many ATCs were submitted by each proposer?	
What percentage of ATCs is approved? Rough estimate is acceptable.	

If your agency does not use ATCs in project delivery please skip to the final question.

ATC Procurement Policies and Procedures:

5. For which project delivery methods is your organization allowed to use for typical versus projects using the ATC process? Check all that apply.

Project Delivery Method	**Typical Project**	**ATC Project**
DBB	☐	☐
CM-at-Risk or CMGC	☐	☐
DB	☐	☐
Other, please specify:	☐	☐
Procurement Method		
Low Bid	☐	☐
Best Value	☐	☐
	☐	☐
Other, please specify:	☐	☐

6. Does your agency have a manual or document that specifically describes the procedures to be used with projects using the ATC process? ☐ Yes ☐ No

If yes, please add the URL where it can be accessed or e-mail Dr. Gransberg at dgran@iastate.edu so he can arrange to get a copy. _____

7. How does your agency define a contractor proposed change to the solicitation documents that qualifies as an ATC? Check all that apply.

☐ Concept must not comply with the existing criteria, specifications, etc.

☐ Concept must comply with existing permits

☐ Concept must be chosen from a list of preapproved alternates

☐ Concept complies with standard agency practice, no design variation is possible

☐ Concept complies with standard practice from other state or agency, no design variation from other agency standards is possible

☐ Concept requires a design variation from standard agency practice

☐ Concept requires a simple variation from a contract requirement unrelated to design

☐ Concept must generate a cost, time, or life-cycle benefit to the agency

☐ Concept must be publicized to other competing entities if approved.

☐ Other, please specify: _____

8. Do cost estimates for proposed ATCs include a deductive amount for the contract scope that is being replaced?
☐ Yes, always ☐ Yes, sometimes ☐ No

9. Do you employ any formalized risk allocation techniques to draft the contract provisions regarding ATCs?
☐ Yes, always ☐ Yes, sometimes ☐ No

If yes, please describe: _____

10. Do your ATCs that promise time savings trigger liquidated damages if the revised completion is not met?
☐ Yes, always ☐ Yes, sometimes ☐ No

11. Which of the below policy or procedure changes apply to a project delivery method that uses ATCs?

(Check all that apply)	**DBB**	**CMGC**	**DB**	**Does not apply**
The scope of what can be submitted as an ATC is limited	☐	☐	☐	☐
Confidential one-on-one meetings are held	☐	☐	☐	☐
Stipends are paid and permit the agency to use ATCs proposed by entities other than the winner	☐	☐	☐	☐
Stipends are paid and do NOT permit the agency to use ATCs proposed by entities other than the winner	☐	☐	☐	☐
ATCs are reviewed and approved by the project evaluation, selection, and/or award panel	☐	☐	☐	☐
ATCs are reviewed and approved by personnel other than the project evaluation, selection, and/or award panel	☐	☐	☐	☐
The number of ATCs submitted by a single entity is limited	☐	☐	☐	☐
The number of ATCs submitted by a single entity is not limited	☐	☐	☐	☐
Design concepts/standards/specifications from other states/ agencies are permissible	☐	☐	☐	☐

12. How does your local open records act impact the use of ATCs by your agency?

☐ No impact, we are able to adequately protect the confidentiality of the content of all ATCs submitted regardless of if they come from a winning or losing proposer.

☐ Minimal impact, we are able to adequately protect the confidentiality of the content of all ATCs submitted throughout the procurement process and only the contents of ATCs that are included in the winning proposal are exposed to the public record after award.

☐ Minimal impact, we are able to adequately protect the confidentiality of the content of all ATCs submitted throughout the procurement process and only the contents of ATCs that are included in the winning proposal plus those from losing proposers who accept a stipend are exposed to the public record after award.

☐ Major impact, all ATCs submitted as parts of the procurement are exposed to the public record after award.

☐ Major impact, all ATCs submitted as parts of the procurement are at risk of being exposed to the public record before award.

☐ Our open records act makes it functionally impossible to reasonably consider ATCs in a manner that is fair and equitable to our industry partners.

ATC Procurement Selection Information

13. How do you advertise and award contracts with ATCs?

Advertise/Award Method	DBB	CMGC	DB
IFB, full open competition, low bid	☐	☐	☐
IFB, competition restricted to prequalified entities, low bid	☐	☐	☐
1-step full open competition RFQ, QBS, no price competition	☐	☐	☐
1-step full open competition RFP, includes qualifications, technical, and price	☐	☐	☐
2-step full open competition, RFQ/RFP	☐	☐	☐
1-step competition restricted to prequalified entities RFQ, QBS, no price competition	☐	☐	☐
1-step competition restricted to prequalified entities RFP, includes qualifications, technical, and price	☐	☐	☐
2-step competition restricted to prequalified entities, RFQ/RFP	☐	☐	☐
Sole source	☐	☐	☐
Other, please specify:			
Other, please specify:			

14. What is the disposition of an approved ATC? Check all that apply.

☐ Approved ATC remains confidential through award of final contract.

☐ Approved ATCs of winning contractor are revealed upon award.

☐ Approved ATCs from losing contractors are revealed upon award.

☐ Approved ATCs from losing contractors remain confidential.

☐ Approved ATC triggers an addendum to the solicitation to all competitors

☐ Other please describe: _____

15. Have you had a protest of a contract award related to the ATC process? ☐ Yes ☐ No

16. If yes, what was the basis of the protest? Please describe: _____

17. What was the result of the protest?

☐ Protest was upheld ☐ Protest was overturned ☐ Protest was dropped

Comments?

18. Rank the following factors as to importance to the success of the ATC during the procurement process.

Factor	Essential	Important	Not Important	Don't Know
Confidential one-on-one meetings	☐	☐	☐	☐
Confidentiality of preproposal communications between agency and contractors ***on matters other than*** ATCs	☐	☐	☐	☐
Ability to safeguard ATCs containing proprietary content	☐	☐	☐	☐
Ability to guarantee ATC confidentially	☐	☐	☐	☐
Offering a stipend to use ideas from losing entities	☐	☐	☐	☐
Ability to grant design criteria variances	☐	☐	☐	☐
Excluding ATCs that would exceed permitting constraints	☐	☐	☐	☐
Ability to measure the benefits	☐	☐	☐	☐
Independent technical review of ATC designs	☐	☐	☐	☐
Independent review of ATC cost estimates	☐	☐	☐	☐
Agency buy-in to the ATC process	☐	☐	☐	☐
Industry buy-in to the ATC process	☐	☐	☐	☐
Incentives/disincentive schemes	☐	☐	☐	☐

ATC Project Contracting Information

19. Does your agency currently have a contract document that has incorporated ATCs?

☐ Yes

☐ No

20. Please check all of the applicable features that describe the process you use for your confidential one-on-one meetings that involve ATCs.

One-on-one Meeting Features	Yes	No	Don't Know
One or more one-on-one meetings are required for all competing contractors	☐	☐	☐
One or more one-on-one meetings are optional for all competing contractors	☐	☐	☐
Each contractor can ask for a one-on-one meeting if it wants one	☐	☐	☐
Agency members at the meeting are from the evaluation panel	☐	☐	☐
The evaluation/approval of all ATCs is done by member of the evaluation panel	☐	☐	☐
The number of ATCs that can be proposed is limited	☐	☐	☐
The ATC must save a specific amount of money to be considered	☐	☐	☐
The features of work where changes from ATCs may be proposed is specified	☐	☐	☐
If required, the agency can refer an ATC to a third party for technical review	☐	☐	☐
If an ATC is approved, it must be included in the proposal	☐	☐	☐

Table Continued on p.73

Table Continued from p.72

One-on-one Meeting Features	Yes	No	Don't Know
The contractor may choose to include or not include any of its approved ATCs in its proposal	☐	☐	☐
If the ATC is a design change, the contractor must prove that it has been reviewed by an engineer licensed in the agency's state	☐	☐	☐
ATCs must be submitted with an estimate of costs	☐	☐	☐
Cost estimates from ATCs are reviewed by an independent cost estimator	☐	☐	☐
ATCs must be submitted with an estimate of schedule impact	☐	☐	☐
ATCs must not require a deviation from the published design criteria to be considered	☐	☐	☐
ATCs must require a deviation from the design criteria to be considered	☐	☐	☐
Only changes to the technical design of the ATC project can be proposed	☐	☐	☐
ATCs can be used to propose changes to the sequence of work/phasing plan	☐	☐	☐
ATCs can be used to propose changes to the general provisions to the contract	☐	☐	☐
ATCs can be used to propose changes to the special provisions to the contract	☐	☐	☐

21. Do the project cost and schedule control procedures differ on an ATC contract from those used in a typical contract?

    ☐ Yes

    If yes: what are the differences? _____

    ☐ No

22. How do you assign design liability to ATCs?

Assignment	DBB	CMGC	DB	Don't Know
Agency retains liability	☐	☐	☐	☐
Liability is shifted to contractor	☐	☐	☐	☐
Liability is shifted to the contractor's design consultant	☐	☐	☐	☐
Other; please specify	☐	☐	☐	☐
	☐	☐	☐	☐

23. What has been the biggest challenge with implementing ATCs in your agency? _____

24. If you have experience with projects using the ATC process, would you be willing to allow the consultants to contact you to do a structured interview and collect case study information? ☐ Yes ☐ No

    Contact information:

    Contact name:_____ Phone number: _____ E-mail address:_____

25. Do you have anything else you would like to share regarding the procurement procedures on your projects using the ATC process? _____

General Survey Results

Surveys were chosen to identify state highway agency policies and procedures for delivering construction projects using ATCs. A cross-sectional survey design was utilized. The population for this study was the state department of transportation. The sample for the study consisted of employees working at DOTs during the year 2013 who were involved in the procurement/innovative contract delivery process.

A web-based questionnaire was developed, using an online survey tool. The survey was pilot tested for functionality and ease of use by sending it to the highway agency panel members before being sent out to participants. The survey was administered online to all 50 DOTs, American Samoa, and the District of Columbia during the months of February, March, and April 2013.

Details of the survey mode are listed here:

- First wave: The employee was sent an e-mail incorporating the cover letter that described the survey's purpose requesting their participation and a link to a web survey.
- Second wave: After sending the first e-mail, one week later, a follow-up e-mail was sent to non-respondents, emphasizing the importance of their participation and requesting their response.
- Third wave: Non-respondents were re-contacted by e-mail and phone this time, requesting their participation.

Survey instrument

The survey consisted of four major sections. The first section included 13 questions regarding general information on the participant and ATCs' use, frequency, and implantation in various work types. The second section involved 13 questions regarding ATC procurement policies and procedures. The third section involved 6 questions regarding ATC procurement selection information. The last section included 7 questions regarding ATC project contracting information. The survey and cover letter are included in Appendix A.

- Surveys were e-mailed to 50 DOTs, American Samoa, and the District of Columbia. Of these 52, 41 responded; 2 of which were partial responses. Figure 2 shows the group/section the survey respondents work in; almost 80% of the respondents either work at the alternative project delivery section or the design section. Other respondents work in Special Projects Team, Design/Construction/ Contracts, Operations/Construction/ Alternative Contracting, Engineering Division, and Finance.

ATC USE

As per Figure A1, of the 41 states that responded, 25 reported using ATCs, whereas 16 reported they did not. Figure A2 shows the respondents' disciplinary group.

- Other than DOTs employing ATCs, respondents also reported other local public agencies using ATCs such as Riverside County Transportation Commission, Los Angeles County Metropolitan Transportation Authority in California, city of Denver in Colorado, NYS Thruway Authority in New York, UTA and Park City in Utah, and Sound Transit in Washington. Both Ohio DOT and Virginia DOT reported they did not use ATCs while other local agencies did (Figure A3).

- Of the 25 DOTs that use ATCs, an average of 37% of the ATCs are approved. Highest was reported by Rhode Island DOT with 80% being approved, whereas Idaho DOT reported zero percent of ATCs are approved.
- As per Figure A4, 15 DOTs (of 21) deliver 1–5 projects each year, Colorado, North Carolina, and Missouri deliver 5–10 projects, and Utah, Texas, and Florida deliver more than 10 projects. Georgia DOT reported delivering none each year.

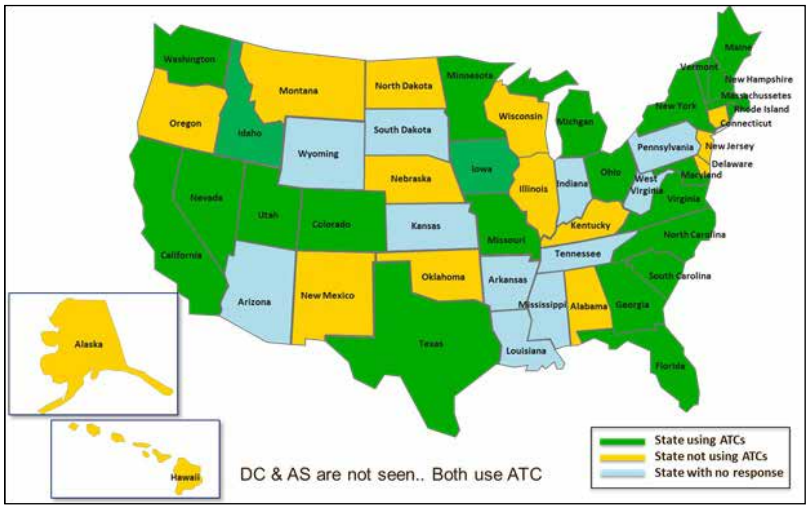


FIGURE A1 Use of alternative technical concepts.

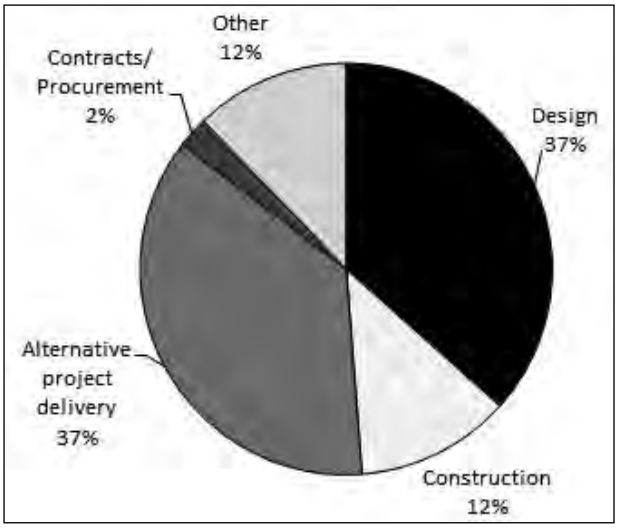


FIGURE A2 Group/section that survey respondents work in.

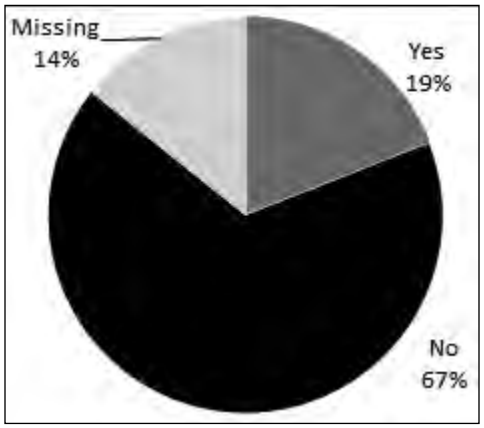


FIGURE A3 Percentage of DOTs reporting that local public agencies in their state use ATCs on transportation projects.

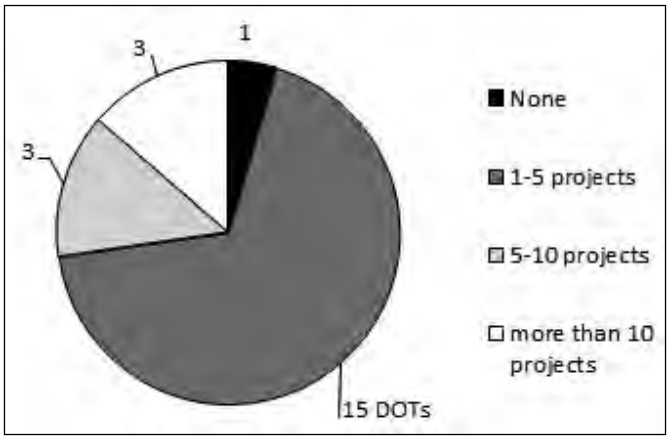


FIGURE A4 Frequency of number of ATC projects delivered each year by number of DOTs.

- As per Figure A5, 13 DOTs had 1–5 projects allowing for ATCs submission last year. Three DOTs (Colorado, North Carolina, and Missouri) had more than five projects while five had more than 10 projects allowing for ATCs submission last year.

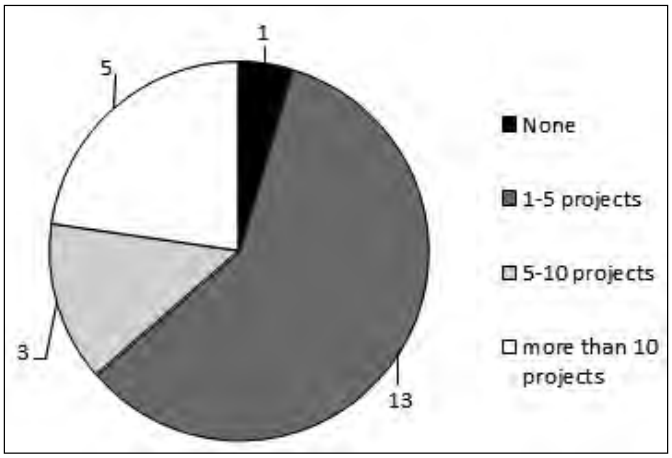


FIGURE A5 Frequency of number of ATC projects allowing for ATC submission in the past year by number of DOTs.

- As per Figure A6, 20 DOTs (of 22) reported having more than three ATCs submitted for each project whereas two (American Samoa and Missouri) reported having 1–2 ATCs for each project.

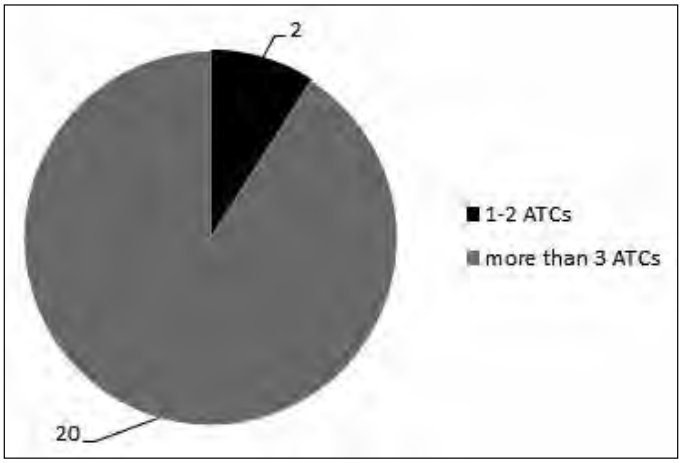


FIGURE A6 Average number of ATCs submitted by each project by number of DOTs.

- Per Figure A7, 15 DOTs (of 22) reported having more than three ATCs submitted by each proposer, five DOTs reported having 2–3 ATCs submitted by each proposer, whereas two (American Samoa and Missouri) reported having 1–2 ATCs for each proposer.

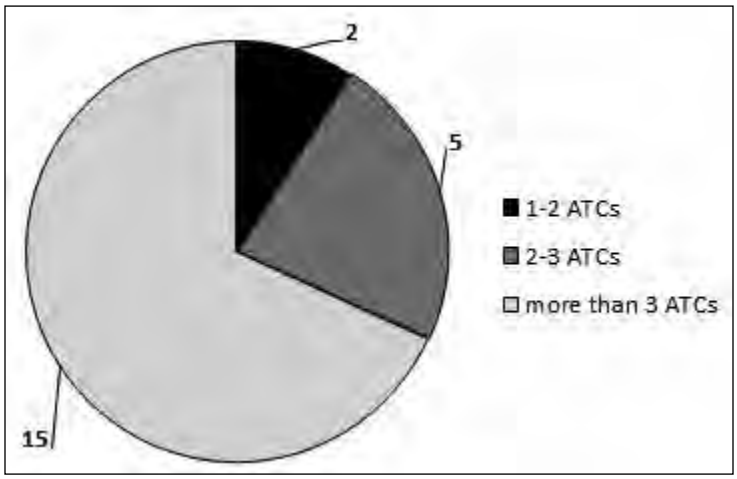


FIGURE A7 Average number of ATCs submitted by each proposer by number of DOTs.

Work Types Addressed in ATCs

- Translating the results of the work types used from numbers to frequency (none to most of the time), the most addressed work type seen is bridge construction followed by incidental construction, concrete structure/pavements, and geotechnical foundation features. The least addressed work type is earthwork, aggregate bases, and asphalt pavement (Figure A8).
- Other work types that are mentioned include:
  - Alignment, interchange location, interchange type, aesthetics
  - Traffic control, traffic handling/closures
  - Maintaining traffic concepts
  - Design variations: typical section, project limits, design features
  - Operational improvements
  - ITS

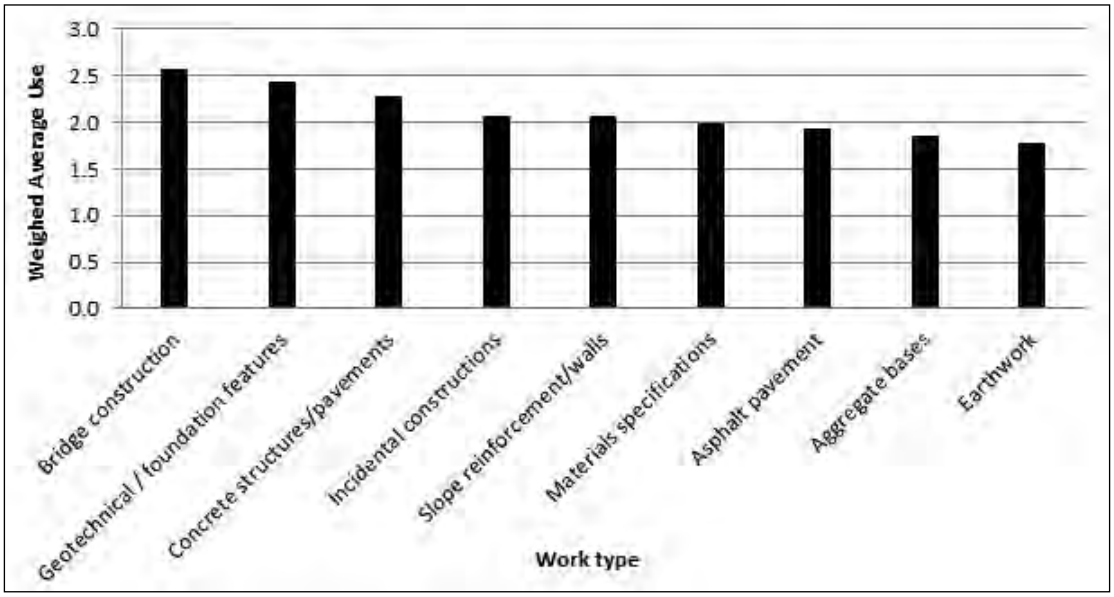


FIGURE A8 Average use of different work types in ATC submissions.

State Laws & Policies

- Seven DOTs (of 17) reported that state laws/policies do not address the use of ATCs in contracts awarded to the lowest responsible bidder. Of those, five would be reluctant to apply without legal opinion supporting it while two think it requires extensive coordination with industry. Three DOTs reported their policies do not allow for use of ATCs with DBB. However, six states reported their interpretation of State law/policy allows for the use of ATCs with DBB (Figure A9).

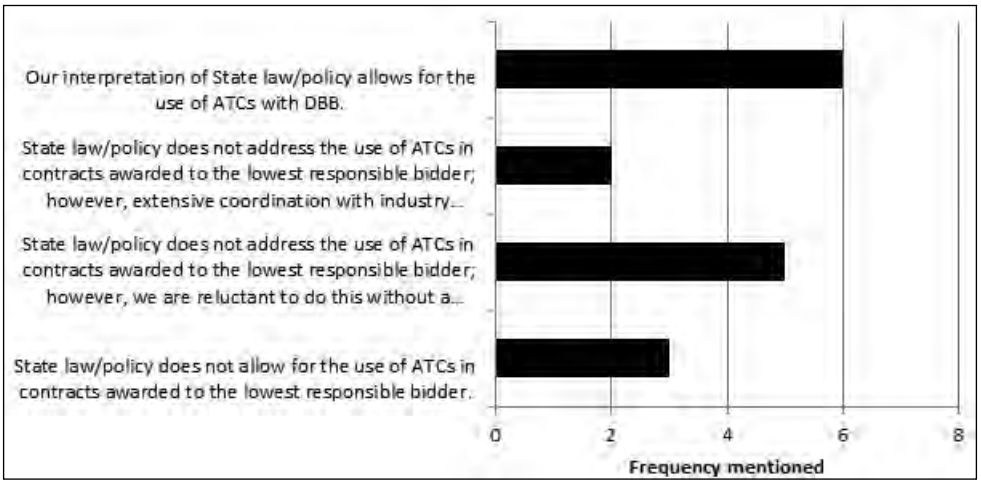


FIGURE A9 Which statement best reflects the DOT's policy regarding the use of ATCs and DBB?

Open Records

- 12 DOTs (of 18) reported that the open records act has either no impact or minimal impact on protecting the confidentiality of the content of all ATCs submitted AND only the contents of ATCs that are included in the winning proposal PLUS those from losing proposers who accept a stipend are exposed to the public record after award (Figure A10). Six reported it had a major impact as all ATCs submitted as parts of the procurement are exposed to the public record AFTER award.

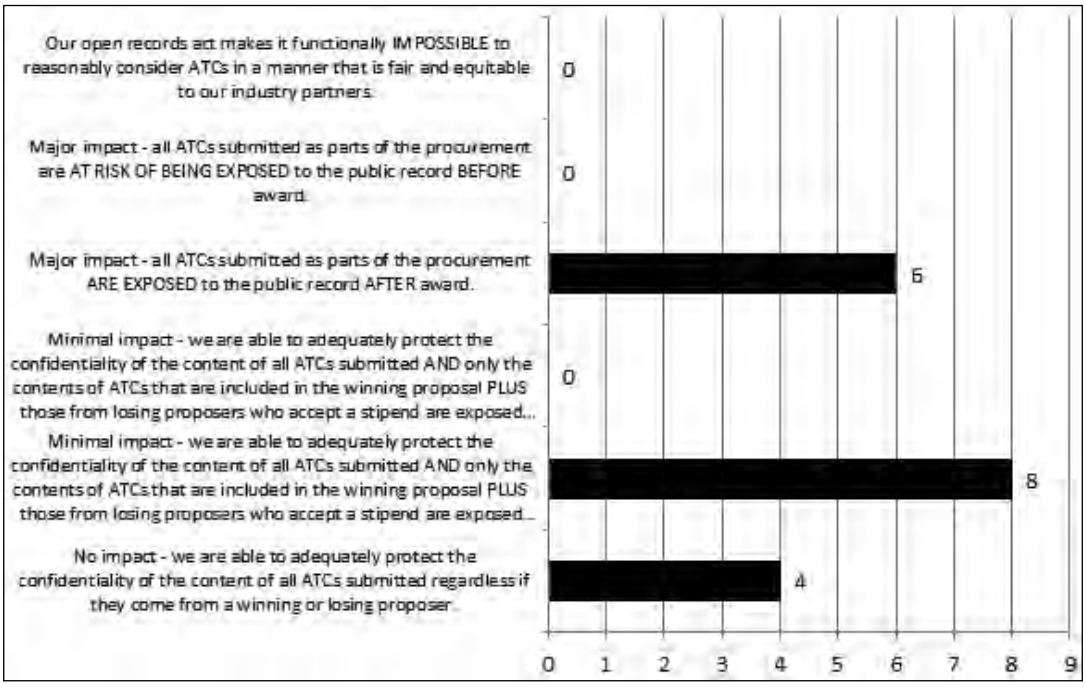


FIGURE A10 Local open record impact on ATC.

Protests

- Four of 20 state DOTs reported they had protests on awards of contracts related to ATCs (Figure A11). Minnesota reported that the unsuccessful contractor thought the winning contractor should have submitted an ATC. They believed winning contractor is nonresponsive. The protest was upheld. Ohio reported that during confidential ATC meeting, losing proposer claimed to have asked and was denied. Winning proposer submitted a similar design without asking. The protest in their case was upheld. American Samoa ("we allowed previously") reported they had a protest which was overturned.

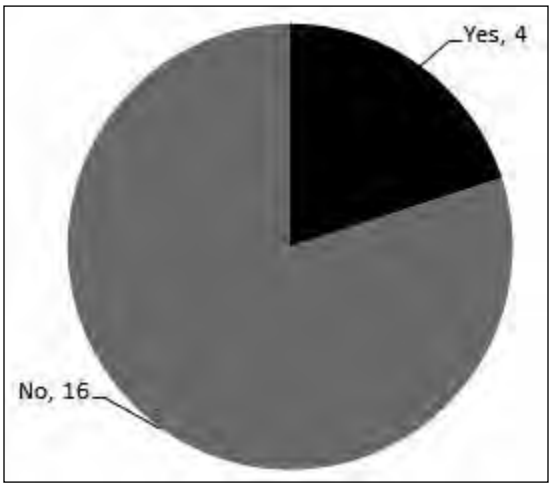


FIGURE A11 Have you had protests on awards of contracts related to the ATC process?

Policies/Procedures Used to Utilize ATCs with Specific Project Delivery Methods

- As per Figure A12, ATCs are primarily used in DB projects followed by CMGC followed by DBB. 17 DOTs of the 25 responding to the survey allow the use of ATCs in DB whereas only Minnesota uses ATCs in DBB. ATCs are used in CM-at-Risk projects in three DOTs (Iowa, American Samoa, and Utah). ATCs were also used in DBF under P3 Best Value projects in Georgia DOT, and in Streamlined DB in Colorado. Michigan DOT mentioned they will be piloting the use of ATC on a DBB project in 2013.

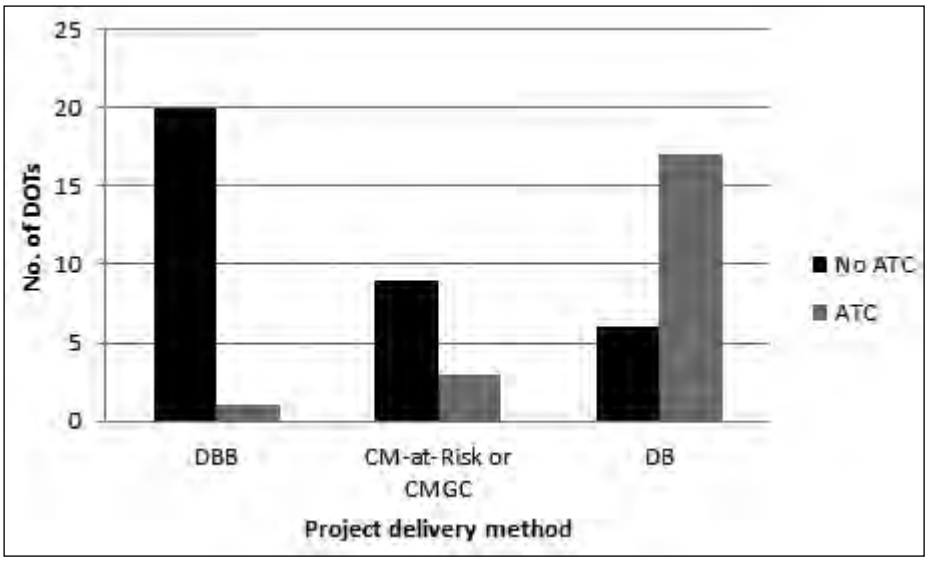


FIGURE A12 Number of DOTs allowing the use of ATCs in different project delivery methods.

- As per Figure A13, only six DOTs allow the use of ATCs in low bid projects, whereas 19 DOTs use ATCs in best value.

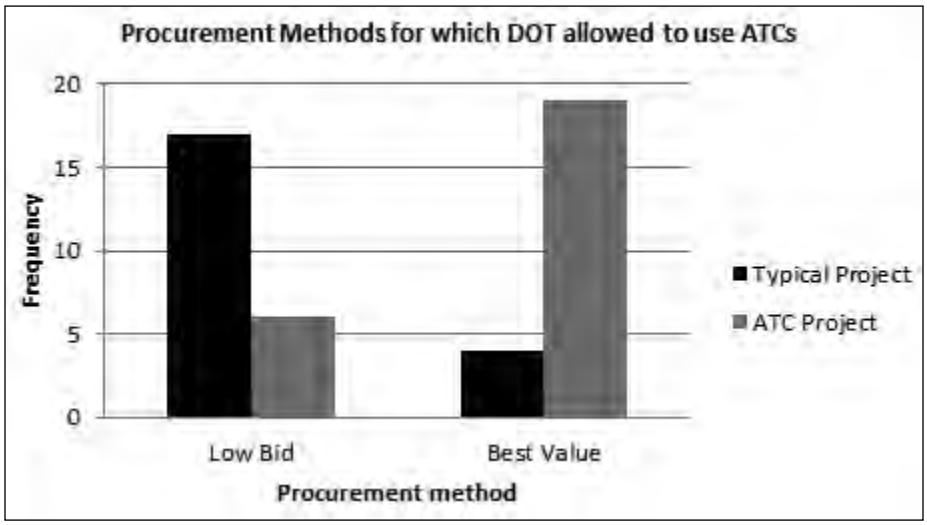


FIGURE A13 Number of DOTs allowing the use of ATCs in different procurement methods.

Liability with Project Delivery Methods Using ATCs

- In DB, DOTs reported that liability is mostly shifted to the contractor or the contractor's design consultant Figure A14. This was also reported by three DOTs to apply to CMGC. In DBB, three DOTs reported that it is either shifted to contractor or contractor retains it. Also, two DOTs (American Samoa and Michigan) mentioned that it is shifted to contractor's consultant. Georgia reported that in DB ATCs the agency shares certain schedule risks in order to invite contractor risk on ATCs.

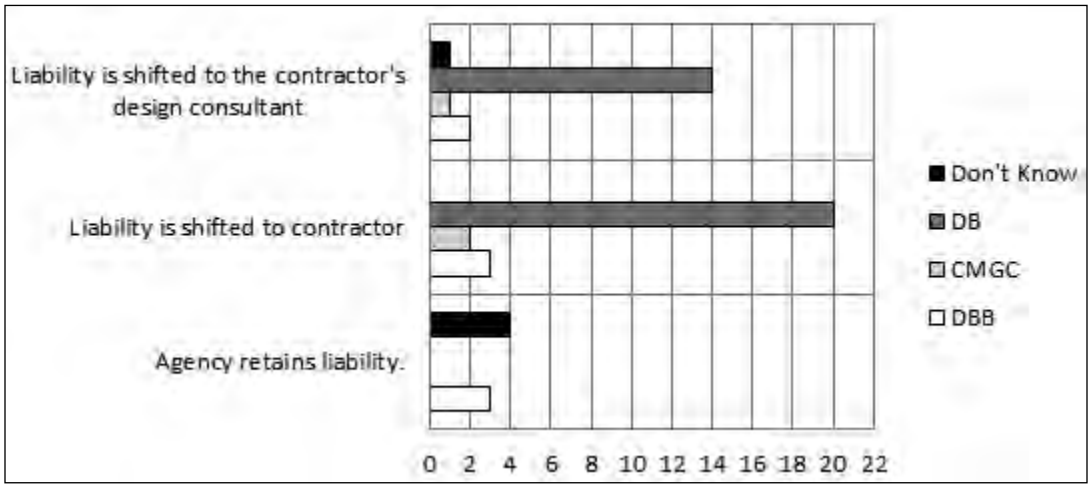


FIGURE A14 How do you assign design liability to ATCs?

Changes to the Traditional Planning and Design Processes for ATC Procurement Projects

- As per Figure A15, the most mentioned policy/procedure changes (by four DOTs) that apply to DBB projects employing ATCs included confidential one-on-one meetings and scope of what can be submitted as ATCs is limited.

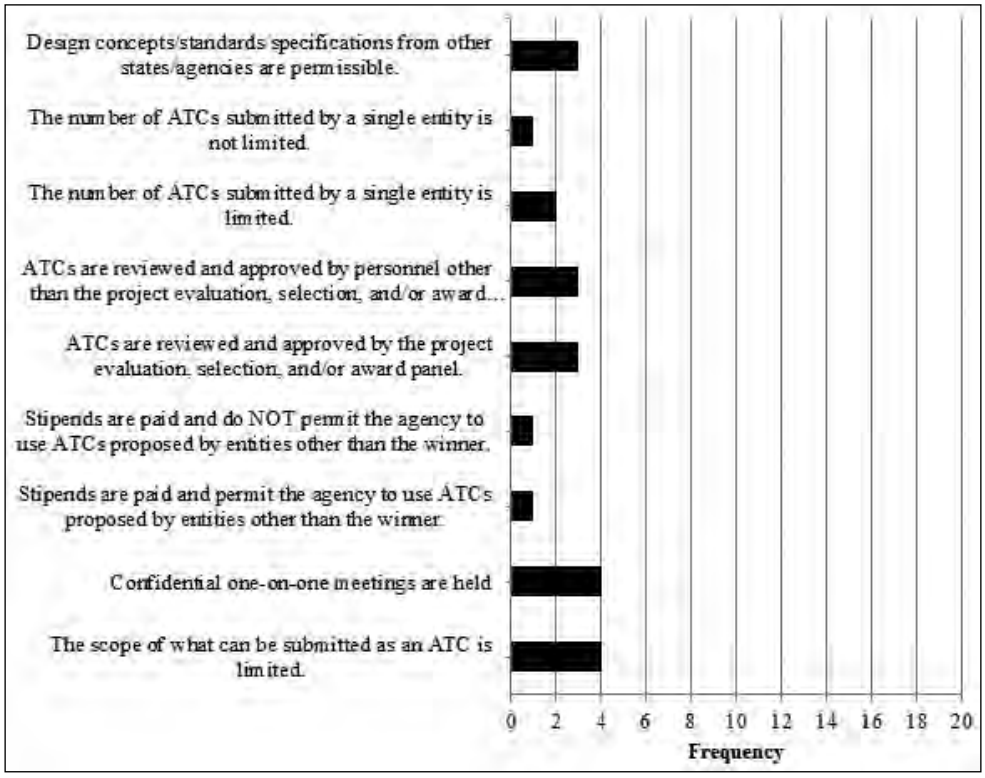


FIGURE A15 Which policy/procedure changes apply to DBB projects employing ATCs?

- As per Figure A16, the most mentioned policy/procedure changes (by three DOTs) that apply to CMGC projects employing ATCs are confidential one-on-one meetings.

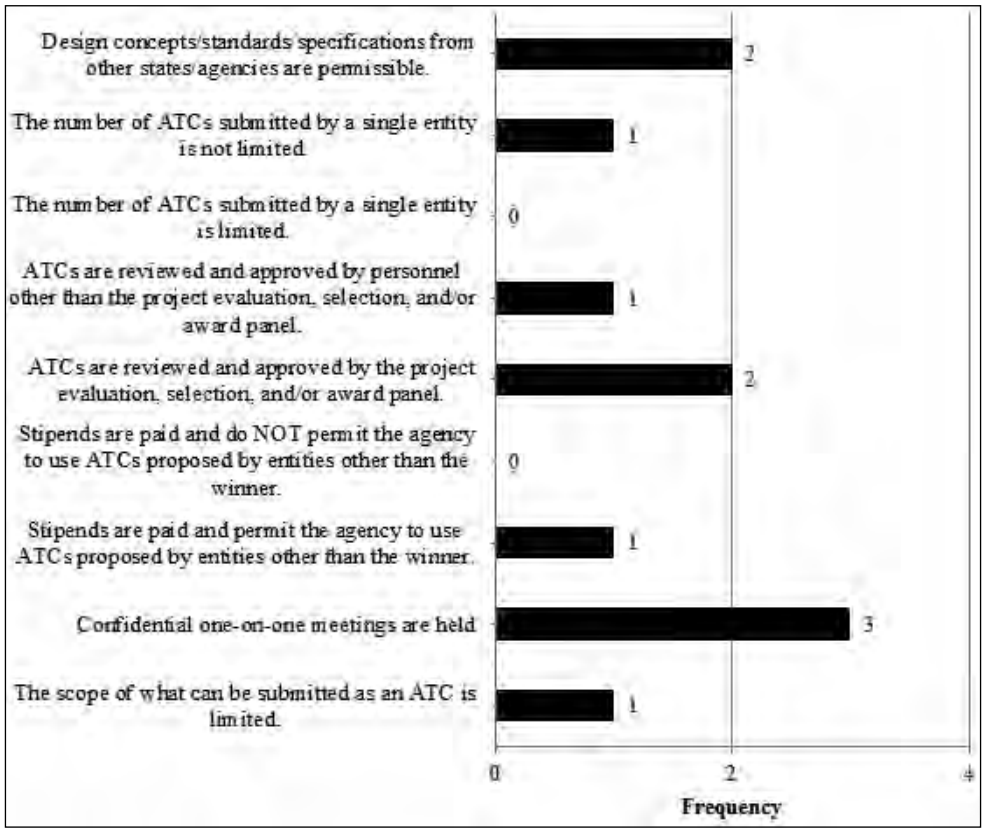


FIGURE A16 Which policy/procedure changes apply to CMGC projects employing ATCs?

- As per Figure A17, the most mentioned policy/procedure changes (by 20 DOTs) that apply to DB projects employing ATCs included confidential one-on-one meetings and stipends are paid and permit the agency to use ATCs proposed by entities other than winner. This was followed by "ATCs are reviewed and approved by the project evaluation, selection, and/or award panel" and "design concepts/standards/specifications from other states/agencies are permissible." (Georgia mentioned that the selection of DB is based on P3 DBFOM or DBF procurement.)

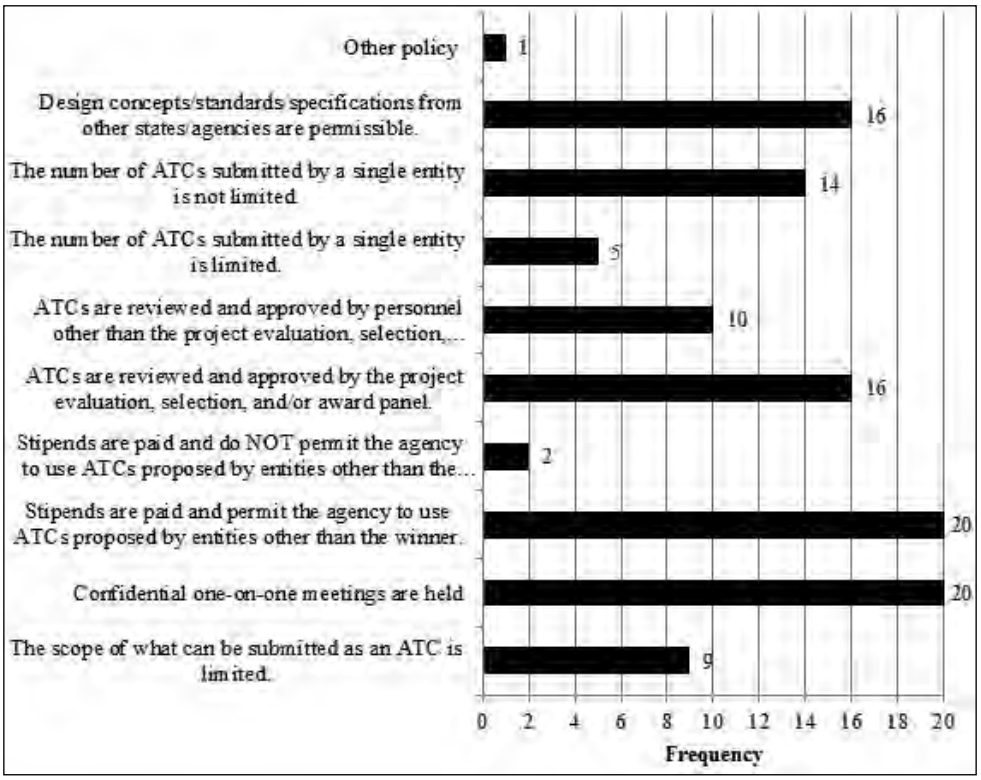


FIGURE A17 Which policy/procedure changes apply to DB projects employing ATCs?

TABLE A1

POLICY/PROCEDURE CHANGES THAT APPLY TO DIFFERENT PROJECT DELIVERY METHODS EMPLOYING ATCS GIVEN BY FREQUENCY MENTIONED BY DOTS

Policy/Procedure Change	Frequency Mentioned			
	DBB	CMGC	DB	N/A
The scope of what can be submitted as an ATC is limited.	4	1	9	7
Confidential one-on-one meetings are held.	4	3	20	1
Stipends are paid and permit the agency to use ATCs proposed by entities other than the winner.	1	1	20	1
Stipends are paid and do NOT permit the agency to use ATCs proposed by entities other than the winner.	1	0	2	15
ATCs are reviewed and approved by the project evaluation, selection, and/or award panel.	3	2	16	0
ATCs are reviewed and approved by personnel other than the project evaluation, selection, and/or award panel.	3	1	10	9
The number of ATCs submitted by a single entity is limited.	2	0	5	12
The number of ATCs submitted by a single entity is not limited.	1	1	14	5
Design concepts/standards/specifications from other states/agencies are permissible.	3	2	16	3

- Only seven of 20 DOTs reported using different project cost and schedule control procedures on an ATC contract from those used in a typical contract (Figure A18). They stated differences such as ATC having the potential to modify the schedule (Michigan), primarily used on DB with cost loaded schedules (Ohio), DBB are not allowed to use them (Texas). Depending on the nature of the ATC, the cost controls reflect that if the contractor is unable to make the ATC work during the contract execution phase, he is required to provide the baseline scope of work at no additional cost. On items that the government is taking some risk on certain approval durations, schedule relief will be granted if it is unable to achieve (Georgia). DBB, we share the risk with the contractor because we are the engineer of record while with DB, contractor is responsible for controlling cost and schedule (Washington).

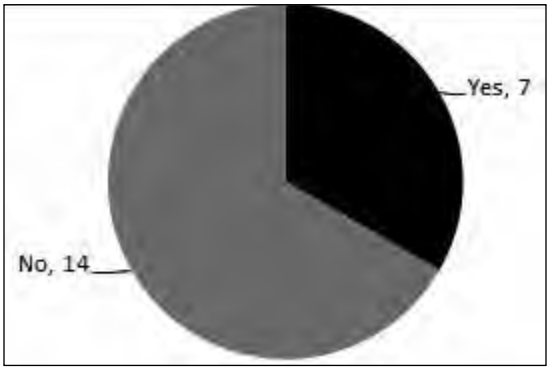


FIGURE A18 Do the project cost and schedule control procedures differ on an ATC contract from those used in a typical contract?

What Qualifies as an ATC

- On being asked which proposed changes qualify as an ATC, the most frequently stated answer is that concept must generate a cost, time, or life-cycle benefit to the agency and does not have to comply with the existing criteria, specifications, etc. (Figure A19). The next one mentioned is that concept requires a design variation from standard agency practice followed by concept requires a simple variation from a contract requirement unrelated to design. American Samoa was the only DOT reporting that the concept must comply with standard agency practice and no design variation is possible. None of the DOTs reported that the concept must be publicized to other competing entities if approved to qualify as an ATC.

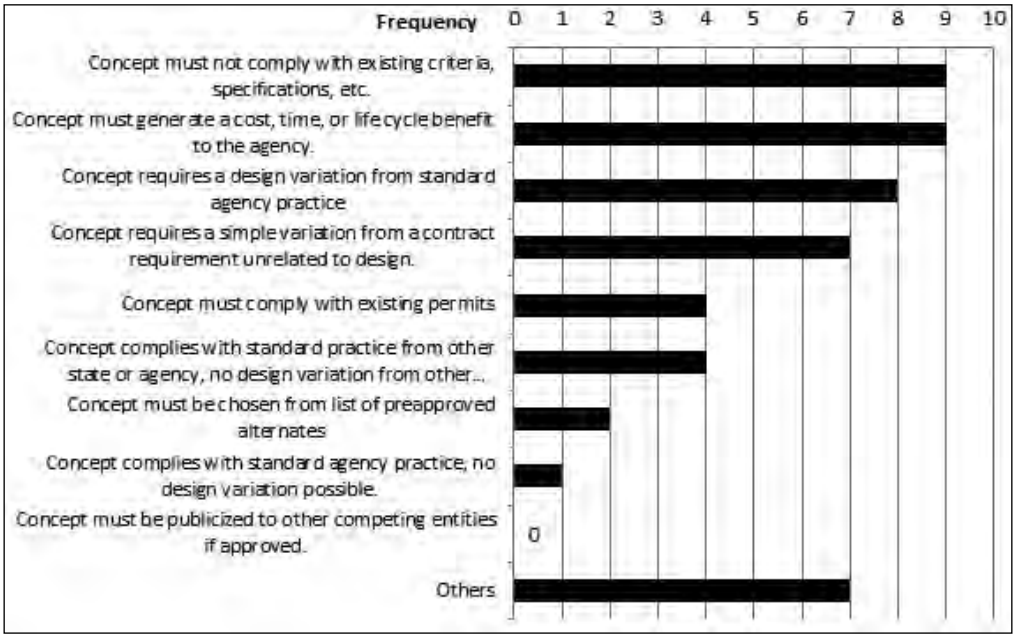


FIGURE A19 How does your agency define a contractor proposed change to the solicitation documents that qualifies as an ATC?

- Other states mentioned the following as proposed changes that qualify for ATCs:

  1. Georgia, Michigan, Minnesota, New York, Utah, Washington, and Maryland DOTs reported that the ATC must demonstrate it is "equal to or better" in performance of the item's function in the project that is not already allowed by the scope of work. Maryland reported that ATCs may also be submitted to determine if technical concepts are consistent with the requirements of the RFP. Utah clarified that no scope reductions resulting in cost savings are allowed to be submitted as ATCs.

  2. Michigan DOT allows ATCs on almost any item on DB projects (typically anything related to the pavement design cannot be an ATC). Better value could be cost, time, traffic impacts, aesthetics, etc. DBB ATC projects restrict ATCs to maintaining traffic concepts only.

  3. Minnesota: Contractor may propose different designs that impact permits or stray from design requirements.

Advertise and Award

- Figure A20 shows the frequency of the different methods used to advertise and award contracts with ATCs in various PDMs.
  - Idaho awards only DB ATC contracts based on RFQ to shortlist 3 to 5 firms, then RFP that includes technical and price.
  - 10 DOTs reported that DB ATCs mostly use a 2-step competition, either full open competition including RFQ/RFP or restricted to prequalified entities.
  - American Samoa DOT was the only DOT that reported that IFB, full open competition, low bid is used in both DBB and CMGC.
  - IFB, competition restricted to prequalified entities, low bid in all PDMs. American Samoa mentioned it is used in both DBB and CMGC. Minnesota DOT used it in DBB. Maryland, Idaho, and California used it in DB.
  - 1-step full open competition RFQ, QBS, no price competition is reported by American Samoa to be used in all PDMs.
  - 1-step full open competition RFP includes qualifications, technical and price in all PDMs (reported by American Samoa in DBB and DB; by Minnesota in DB only).
  - 2-step full open competition, RFQ/RFP is the mostly used in DB projects, whereas it was reported only by American Samoa to be used in DBB ATC projects.
  - 1-step competition restricted to prequalified entities RFQ, QBS, no price competition is only reported to be used with DBB ATCs in one DOT.
  - 1-step competition restricted to prequalified entities RFP, includes qualifications, technical, and price is only used DB ATCs and was reported only by two DOTs (American Samoa).
  - 2-step competition restricted to prequalified entities, RFQ/RFP is stated by one DOT to be used with CMGC ATCs (American Samoa) and mostly used in DB ATC projects.
  - Sole source is not used in any of the project delivery methods employing ATCs.

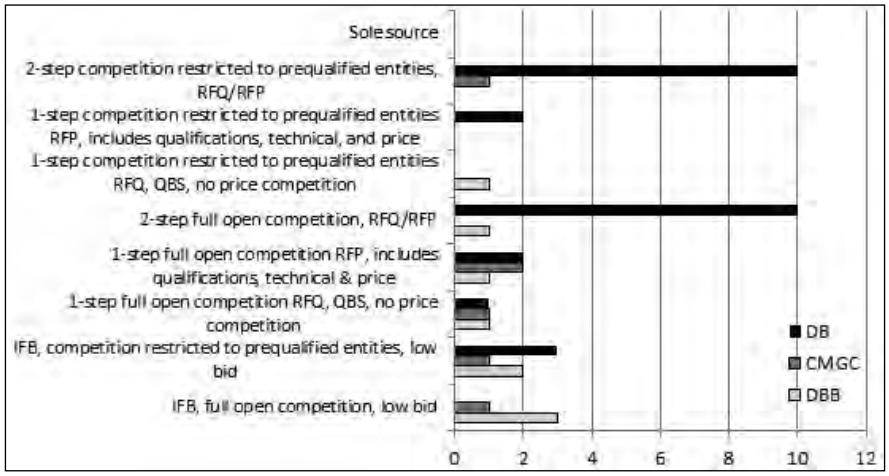


FIGURE A20 How do you advertise and award contracts with ATCs.

- Most DOTs (14 of 23) reported that approved ATC remains confidential through award of final contract (Figure A21). 13 reported approved ATCs of winning contractor are revealed upon award, while nine reported that approved ATCs from losing contractors are revealed upon award. Six states reported that ATCs from losing contractors remain confidential. Only two (Washington and Idaho) reported that approved ATC triggers an addendum to the solicitation to all competitors.
- Idaho, Georgia, and New York DOTs stated that approved ATCs from losing contractors only revealed/available if they accept a stipend, also known by Georgia as "payment for work." Georgia DOTs also clarified that ATCs from losing contractors, if Department Property, may be incorporated into preferred bidder's contract by a negotiated supplemental agreement. Proprietary items may be retained as confidential, if satisfying certain criteria. Michigan reported that ATCs remain confidential up to award; after award they can be disclosed through a Freedom of Information request. North Carolina DOT reported that if more than one ATC is submitted on the same concept, as determined by the department, the department reserves the right to revise the RFP to permit the concept presented in the ATC.

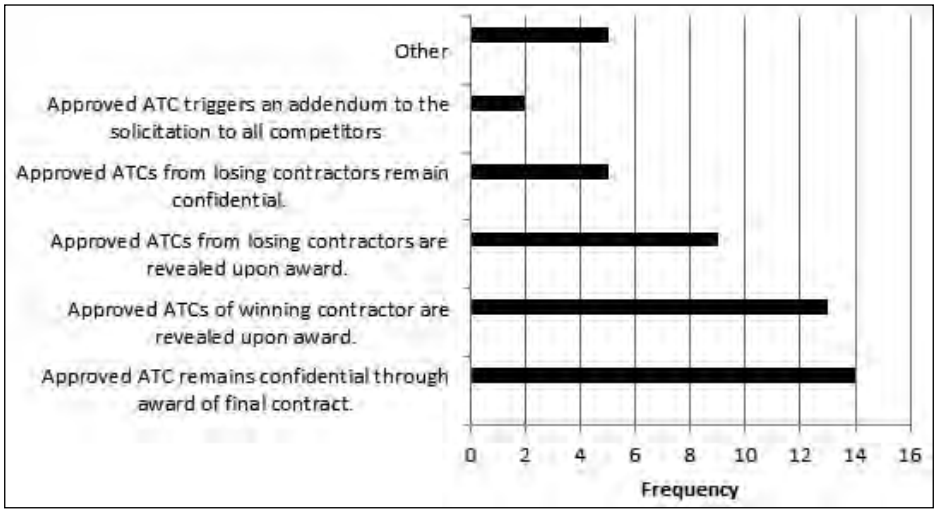


FIGURE A21 What is the disposition of an approved ATC?

- Three of the 12 DOTs reported that their ATC policy addresses circumstances that trigger a solicitation **addenda** to be issued to all proposers:
  - Florida: Currently every approved ATC results in a contract addendum to allow the ATC.
  - Idaho: DB RFP, Section ITP.3.2.1 Paragraph 2.
  - Washington: ATCs requiring design deviation.

Confidential One-on-One Meetings

- All 21 DOTs reported they use confidential one-on-one meetings.
- As per Table 17, the most used features reported by 19 of 20 DOTs in confidential one-on-one meetings is that the contractor may choose to include or not include any of its approved ATCs in its proposal followed by ATCs being used to propose changes to the sequence of work/phasing plan (18 of 19) or even to special provisions of the contract (17 of 20). This was followed by 16 DOTs reporting the following features:

  1. one or more one-on-one meetings are optional for all competing contractors,
  2. each contractor can ask for a one-on-one meeting if it wants one,
  3. agency members at the meeting are from the evaluation panel, and
  4. if required, the agency can refer an ATC to a third party for technical review.

- The least feature reported by DOTs included:

  1. Cost estimates from ATCs are reviewed by an independent cost estimator (1 DOT of 20).

2. ATC must save a specific amount of money to be considered (1 DOT of 19).
3. Only changes to the technical design of the ATC project can be proposed (2 DOTs of 19).
4. ATCs must not require a deviation from the published design criteria to be considered (2 DOTs of 18).
5. If an ATC is approved, it must be included in the proposal (2 DOTs of 18).

TABLE A2
FEATURE THAT DESCRIBE THE PROCESS USED FOR CONFIDENTIAL ONE-ON-ONE MEETINGS THAT INVOLVE ATCS GIVEN BY FREQUENCY MENTIONED BY DOTS

Feature That Describe the Process Used for Confidential One-on-one Meetings That Involve ATCs.	Yes	No	Don't know
The contractor may choose to include or not include any of its approved ATCs in its proposal.	19	1	0
ATCs can be used to propose changes to the sequence of work/phasing plan.	18	1	1
ATCs can be used to propose changes to special provisions to the contract.	17	3	0
One or more one-on-one meetings are optional for all competing contractors.	16	3	1
Each contractor can ask for a one-on-one meeting if it wants one.	16	3	1
Agency members at the meeting are from the evaluation panel.	16	4	0
If required, the agency can refer an ATC to a third party for technical review.	16	2	2
ATCs must be submitted with an estimate of schedule impact.	14	6	0
The evaluation/approval of all ATCs is done by member of the evaluation panel.	13	7	0
ATCs must be submitted with an estimate of costs.	13	7	0
ATCs can be used to propose changes to general provisions to the contract.	12	7	1
The features of work where changes from ATCs may be proposed is specified.	11	6	3
If the ATC is a design change, the contractor must prove that it has been reviewed by an engineer licensed in the agency's state.	6	12	2
The number of ATCs that can be proposed is limited.	5	15	0
ATCs must require a deviation from the design criteria to be considered.	4	15	1
One or more one-on-one meetings are required for all competing contractors.	3	15	1
The ATC must save a specific amount of money to be considered.	2	16	2
Cost estimates from ATCs are reviewed by an independent cost estimator.	2	16	2
ATCs must not require a deviation from the published design criteria to be considered.	2	17	1
Only changes to the technical design of the ATC project can be proposed.	1	18	1
If an ATC is approved, it must be included in the proposal.	1	19	0

ATCs Other

- 13 of 20 DOTs have a **manual** that specifically describes the procedures to be used with projects using the ATC process.
- Figure A22 shows that only two DOTs' cost estimates always include a **deductive amount** for proposed ATCs for the contract scope that is being replaced, eight sometimes do whereas 10 DOTs do not.

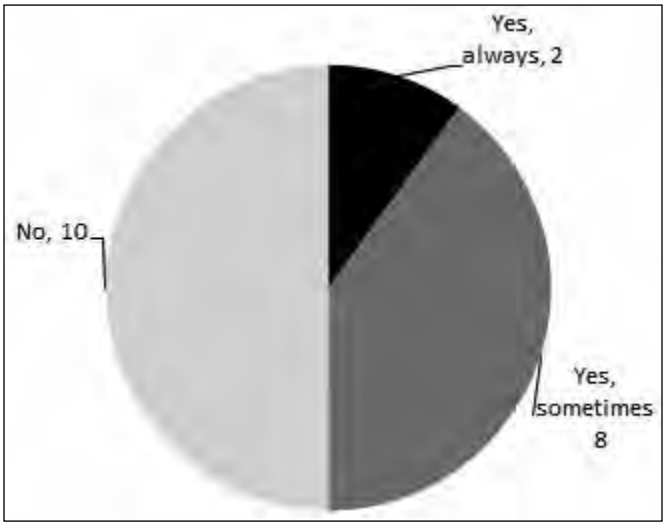


FIGURE A22 Do cost estimates for proposed ATCs include a deductive amount for the contract scope that is being replaced?

- 12 of 21 DOTs (58%) do not employ any **formalized risk allocation** techniques to draft contract provisions regarding ATCs; only six sometimes do, whereas only two always do (Figure A23).

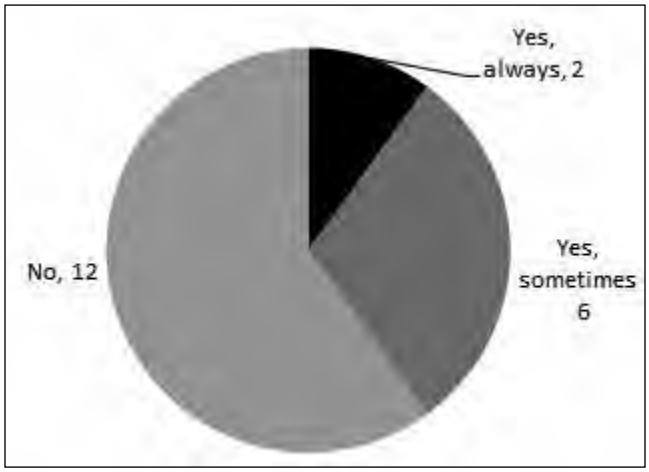


FIGURE A23 Do you employ any formalized risk allocation techniques to draft the contract provisions regarding ATCs?

- Risk allocation techniques mentioned included the following:

Maryland	These are project specific. However, if there are elements such as detour routes or phasing that cannot be adjusted then these must be identified prior to issuance of the RFP as non-negotiable.
Utah	A risk workshop is held prior to drafting the RFP wherein project goals are refined, and selection criteria, factors, and subfactors of the RFP are prioritized.

Missouri	We typically perform a half- to full-day risk assessment to determine the best contracting method.
Washington	Please see our instruction to proposers at the following link http://www.wsdot.wa.gov/Projects/delivery/designbuild/Default.htm.
Georgia	For ATCs that require a subsequent NEPA approval, the department will provide an overall schedule allocation that it believes it can achieve the approval for, assuming the contractor provides all the supporting information. Schedule relief will be granted if the department is unable to achieve the approval by the specified timeframe. In the event the contractor is unable to make the ATC work during the contract duration, the contractor is required to provide the baseline scope requirements outlined in the RFP at no additional cost. The risk allocation is described in the RFP documents in the Instructions to Proposers.

- Eight of 21 DOTs reported that the ATCs that promise time savings do not trigger **liquidated damages** (LDs) if the revised completion is not met. However, six reported it always does whereas seven reported it sometimes does trigger LDs if completion date is not met (Figure A24).

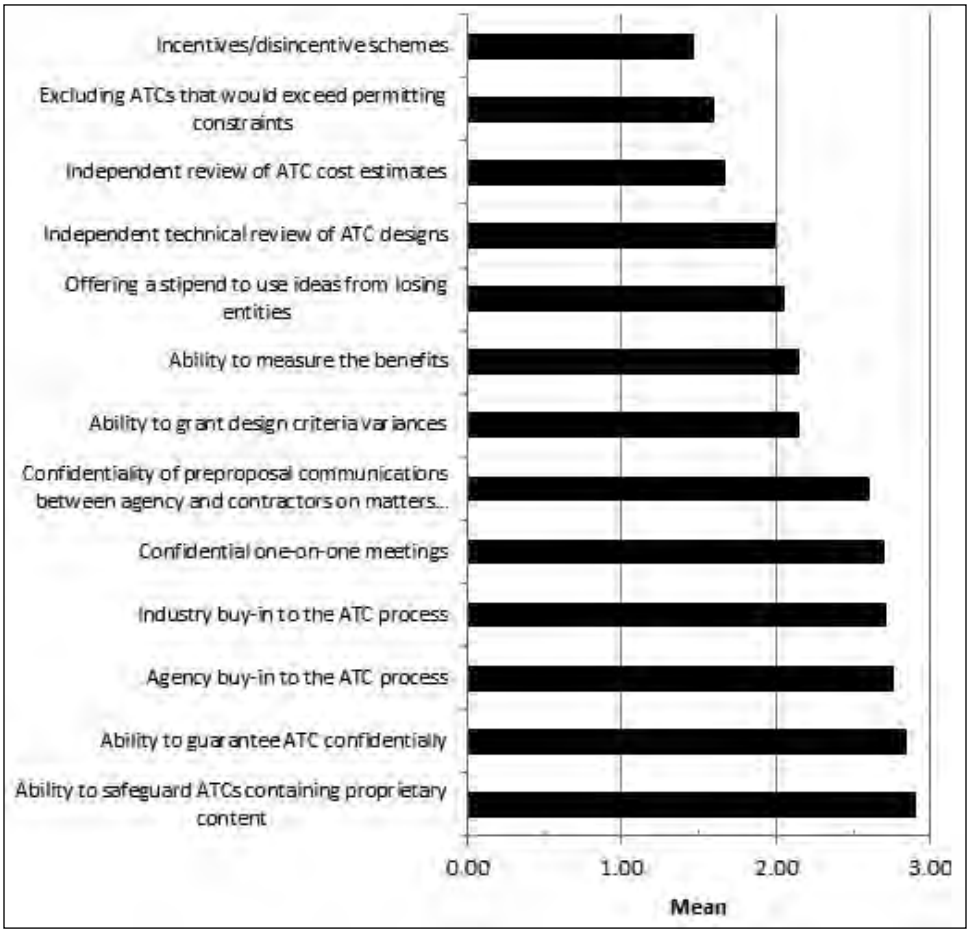


FIGURE A24 Do your ATCs that promise time savings trigger liquidated damages if the revised completion is not met?

- 18 of 20 DOTs reported currently having contract documents that incorporate ATCs (Figure A25).

Success of ATCs

- DOTs were asked to rate factors in terms of importance to success of ATC procurement process from essential to not important (3 being essential to 1 being not important). The highest factor was reported as the ability to safeguard ATCs containing proprietary content followed by guaranteeing ATC confidentially, which was

almost of equal importance with agency and industry buy-in to the ATC process, confidential one-on-one meetings, and confidentiality of preproposal communications between agency and contractors on matters other than ATCs. The least factor of importance was having an incentive/disincentive scheme (Figure A26).

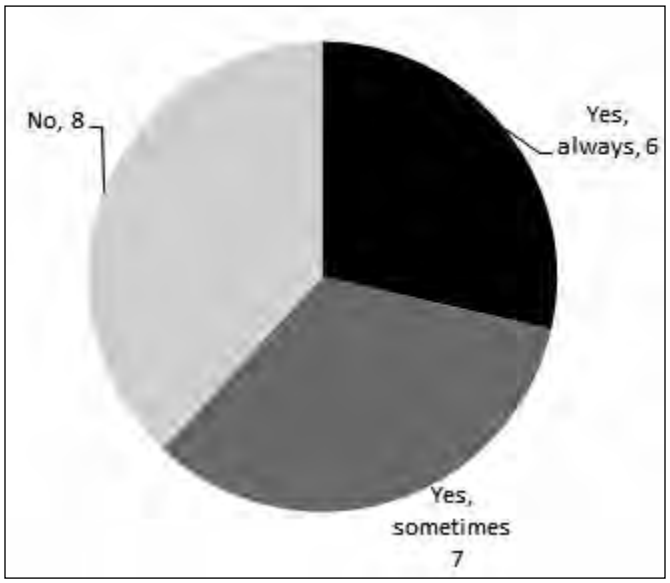


FIGURE A25 Number of DOTs currently having contract documents that have incorporated ATCs.

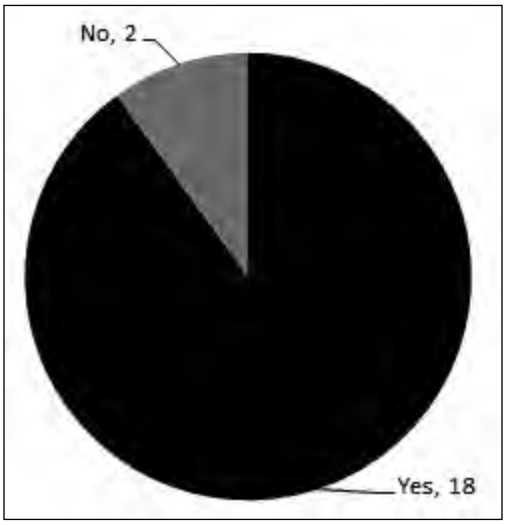


FIGURE A26 Rate of importance of factors in terms of success of ATC project procurement process.

Challenges

- **Four major broad challenges are mentioned by the DOTs, which are:**

1. Buy-in from internal staff, industry

   - MN Getting buy-in from internal staff. Timely review of ATCs.
   - MO Education/communication with industry for their buy-in and support of the process.
   - ID Education of local contractors to utilize the ATC process.
   - GA Opening the institutional "mind" to alternative technical concepts is a challenging task. Most DOTs are used to being in the driver's seat with decisions and this takes time and effort to make this change in mindset. Important to not dismiss longstanding wisdom achieved through

experience by entertaining new ideas in effort to consider ATCs. Realizing the value from the ATC process requires a significant investment in agency and consultant staff reviewing and keeping up with ATC turnaround commitments. Having the right people weigh in on the ideas, with top-down support, is essential for sound agency decision-making.
- CA Keeping an open mind to potential ATCs and clearly communicating conditions for conditionally approved ATCs. Also, third party approvals.
- FL Agency buy-in.
- NY Education...increasing the knowledge of the ATC process...and getting buy-in!

2. Development of process
   - MD Some offices are not willing to be as flexible as the ATC process allows in the consideration and approval of design deviations.
   - MO Developing the process and moving past traditional DBB low bid selection contracts, potential impact to the design schedule, designer being married to their design.
   - MI The need for a quick evaluation and response.
   - NC Responding to ATCs in a prompt manner with multiple projects under procurement. Some projects will receive 70 to 80 ATCs.
   - WA Determining the equal or better status of ATCs.
   - SC Paying stipends is critical to the ATC process. As a state DOT, stipends are often political and difficult to gain approval to pay.
   - CA Clearly communicating conditions for conditionally approved ATCs. Also, third party approvals.
   - OH Time constraints in reviewing and implementing during the already constrained time period. Would also like to implement on DBB, but have not advanced.
   - FL Release of addendum and consistency.
   - NV Conditional approval of ATCs because it sometimes gives the contractor the sense that it is approved when there still has to be more work performed to get ultimate approval.
   - MA Having adequate information to make a determination. The use of confidential one-on-one meetings has made a significant improvement to the process.

3. Confidentiality
   - UT Confidentiality.

4. Limited number and type of projects applicable
   - ID Limited number and type of projects.

Other Comments

- **Other comments mentioned by DOTs included:**
  - MN MnDOT has an ATC library that has statistics on all DB projects using ATCs. We would be happy to share this and other lessons learned with you.
  - MO ATCs for DBB has proven to be a great contracting tool for MoDOT incorporating a contractor's innovation to a project pre-bid and rewarding them for their ideas.
  - NC ATCs have saved the NCDOT tens of millions of dollars.
  - KY We have looked at it. KY is on an indefinite hold for the ATC process.
  - MT Montana is developing a process to use ATCs in Design Build.
  - WA In general, the use of ATCs has been well received and supported by both industries and the agency.
  - CT We recently passed legislation permitting the use of alternative contracting so we anticipate using ATCs in the future. Recent legislation enabled Conn DOT to utilize Alternative Project Delivery.
  - GA We are using this procedure on a P3 project using a DBF procurement, but many of the lessons and work to get the process established for the larger project we hope to scale into smaller Design Build program. Sharing some schedule risk regarding the NEPA relevant ATCs appears to allow the agency to see more ATCs. There are healthy agency benefits to engaging in ATC process, including challenging the old way of doing things.

- CA Our ATC process for design-build projects can be found in any of our Instructions to Proposers documents.
- OH We have used ATC meetings on one project, and chose not to use on another project. I was only involved with the project that did not have confidential meetings, and the feedback from the DBTs was that this was very restrictive. It caused much delay in developing the ATCs due to written submissions and written responses. Open discussions would have made the process faster.
- NY Extensive experience with one project (Tappan Zee Bridge); incorporating into a second project (Kosciuszko Bridge). Attempting to get approval for DBB projects.
- NH We have not done a CM/GC project and we do not use ATCs for DBB.
- OK I wish we were able to use ATCs.
- DC Eastern Federal Lands Highway Division is part of FHWA and we do not use a formal ATC process on our design-build projects; however, contractors do have the flexibility of proposing alternative technical concepts to us. We can then hold proprietary meetings to discuss the viability of them proposing something and whether it meets the requirements of our RFP or would be considered non-responsive.
- RI Use mandatory ATCs for pricing purposes even if you are not sure they are used
- ND North Dakota does not have any experience with Alternative Technical Concepts. The closest we came was that we allowed the contractor to propose innovations or alternates on our first and only Design/Build pilot project. Recently in our current Legislative session, our Legislature didn't pass a bill that would have given authority to the state to continue Design/Build or anything other form of contracting other than Design/Bid/Build.

APPENDIX B

Sample Alternative Technical Concept Contract Language

This appendix contains three examples of alternative technical concept (ATC) contract content. The first comes from the Virginia Department of Transportation (DOT) and is a concise clause describing the contents of an ATC submittal for a design-build (DB) project. The second is the ATC guidelines and contract language from the Washington State DOT for DB projects. The last one is the ATC guideline package for the Missouri DOT's Hurricane Deck Bridge DBB (design-bid-build) project.

VIRGINIA DEPARTMENT OF TRANSPORTATION

U.S. ROUTE 460 CORRIDOR IMPROVEMENTS DESIGN-BUILD PROJECT

REQUIRED CONTENTS OF AN ATC SUBMITTAL PACKAGE

Each ATC submittal shall include:

1. A sequential ATC number identifying Offeror and the ATC number (ATCs containing more than one concept shall be submitted as separate individual ATCs with unique sequential numbers).

2. A description and conceptual drawings of the configuration of the ATC or other appropriate descriptive information.

3. The locations where, and an explanation of how, the ATC will be used on the Project.

4. Any changes (as compared to the Core Requirements) in operations and maintenance requirements associated with the ATC.

5. Any changes (as compared to the Core Requirements) in the anticipated life-cycle cost applicable to the item(s) comprising the ATC.

6. References to any aspect of the ATC that is inconsistent with the Core Requirements, an explanation of the nature of the deviations from the Core Requirements, and application for approval of any deviations using VDOT's standard processes for waivers and exceptions where appropriate.

7. A preliminary analysis of potential impacts on vehicular traffic (both during and after construction), environmental permitting, community impact, and safety.

8. Identification of any additional right-of-way that will be required to implement the ATC as compared to the Core Requirements.

9. A description of other Projects where the ATC has been used, together with evidence of the success of such usage.

10. A description of any additional risks to VDOT or third parties (as compared to the Core Requirements) associated with implementing the ATC.

11. An estimate of any additional VDOT costs associated with implementation of the ATC such as additional oversight or testing.

12. A description of how the ATC is equal or better in quality and performance than the Core Requirements.

Washington State Department of Transportation

Revised April 7, 2010

Introduction

This guidance statement establishes WSDOT policy regarding the use of Alternative Technical Concepts (ATCs) on design-build contracts.

What Are Alternative Technical Concepts?

An ATC is a confidential request by a Proposer to modify a contract requirement, specifically for that Proposer, before the Proposal due date. ATCs are evaluated for approval or denial by WSDOT within the deadline set forth in the Instructions to Proposers (ITP), which is usually set to occur several weeks before the Proposal due date. The Proposer may only incorporate unconditionally approved ATCs into a Proposal. Except as noted herein, any contract requirement can generally be subject to consideration for an ATC. In order to be approved, an ATC must be deemed, in WSDOT's sole discretion, to provide a Project that is "equal or better" on an overall basis than the Project would be without the proposed ATC. Concepts that simply delete scope, lower performance requirements, lower standards, or reduce contract requirements are not acceptable as ATCs. In addition, WSDOT generally allows the ATC process for all design-build contracts in order to promote innovation, find the best solutions, and to maintain flexibility in the procurement process.

One-On-One Meetings

One-on-one meetings between WSDOT and each Proposer may be held to discuss the feasibility of ATCs. To the extent provided by law, all discussions at these meetings shall be strictly confidential, and all WSDOT employees or consultants shall sign a confidentiality agreement prior to participating. A representative from HQ Construction shall be invited to all one-on-one meetings with a Proposer. At the one-on-one meetings, it is appropriate for WSDOT to give the Proposer an indication of whether or not the ATC is likely to be approved, with the understanding that the official WSDOT determination cannot be made until the ATC is formally submitted. However, it is not appropriate for WSDOT to indicate in any manner to a Proposer that a particular ATC would favorably or unfavorably affect the technical score.

Submittal

In order to allow sufficient time for review, all proposed ATCs must be submitted to WSDOT no later than the time specified in the ITP. This deadline applies to both initial submissions and revised submissions in response to WSDOT's comments. Each ATC submittal package shall address the elements required by the IT? Each of the elements is intended to facilitate one of the following purposes: (1) help WSDOT understand what is being proposed; (2) help WSDOT understand specifically what changes to the RFP are being requested; (3) establish an understanding from the design builder on the change in risk exposure associated with the requested changes; and (4) help WSDOT determine whether or not the ATC will provide a Project that is "equal or better" on an overall basis to what the Project would be without the proposed ATC. At no time during the ATC submittal and review process shall the Proposer disclose any pricing information related to the ATC, including but not limited to, estimated increases or decreases to the Proposer's Price Proposal, if any. The Proposer shall not share or disclose any portion of an ATC to third parties (such as other governmental agencies that may have an interest in the ATC) without first gaining WSDOT's permission. This will allow WSDOT an opportunity to terminate potentially controversial ATCs.

Review

Incomplete ATC submittal packages may be returned to the Proposer without review or comment. WSDOT may, in its sole discretion, request additional information regarding a proposed ATC. WSDOT may, in its sole discretion, deny any ATC. ATCs that do not meet the "equal or better" standard shall be rejected. ATCs that would require excessive time or cost for WSDOT to review, evaluate, or investigate will not be considered. WSDOT will not consider contract cost savings in the "equal or better" determination. To the extent permitted by law, all discussions with Proposers regarding ATCs and information contained in an ATC submittal will remain confidential. Due to the confidential nature of ATCs and the need to respond in a timely manner, the WSDOT Project Manager shall

minimize the number of staff involved in the ATC review process. When technical issues and questions arise that are outside the Project team's expertise, HQ Construction should be consulted. All staff that is to be involved in the review shall sign a confidentiality agreement before beginning the review.

WSDOT shall refrain at all times during the ATC submittal review process, including one-on-one meetings, from indicating in any manner to a Proposer that a particular ATC would favorably or unfavorably affect the Proposers technical score. To do so can not only short circuit the Proposal evaluation process, but it can also interject the owner's bias into the Proposal process. When measured in terms of the competitive process, this could provide advantages to a single Proposer to the detriment of the remaining Proposers. The Proposer should be advised that if approved, the ATC will be evaluated in accordance with the ITP. Design deviations, as defined in the WSDOT Design Manual Section 330.03, are not categorically prohibited from consideration in an ATC. Any ATC must be, in total, "equal to or better" than what was originally required. In addition, design deviations that are approved for inclusion into an ATC, to the extent provided by law, shall not be disclosed to other Proposers until such time as the contract is executed and WSDOT takes full ownership and control of the unsuccessful Proposal that includes the design deviation. Any question that may arise regarding conducting an "apples to apples" comparison of Proposals is resolved by requiring the ATC to meet the "equal or better" standard.

Matters that are specifically not eligible for approval as an ATC include the following:

1. Concepts that are not deemed, in WSDOT's sole discretion, to meet the "equal or better" criteria. When making this determination, consider the Project as a whole. Ask the following question: "Is the Project with this ATC 'equal or better' than the Project without the ATC?"

2. Any change that would require excessive time or cost for WSDOT review, evaluation, or investigation. WSDOT reserves the right in its sole discretion to reject any ATC.

WSDOT Response

WSDOT will respond to each Proposer within the timeframe stipulated in the ITP. The WSDOT Project Manager shall obtain approval from the State Construction Engineer or his delegate, and FHWA concurrence as appropriate on federal oversight contracts, before providing a final response to an ATC. The format for the response should include the ATC number, brief description, and shall be limited to one of the designated responses provided in the ITP.

Incorporating ATCs into the Proposal

A Proposer has the option to include any or all approved ATCs in its Proposal and the Proposal Price should reflect such incorporated ATCs. If WSDOT returned an ATC stating that certain conditions must be met before granting approval, the Proposer must satisfy the stated conditions and obtain WSDOT's approval of the ATC prior to incorporating the ATC in the Proposal. Except for approved ATCs, the Proposal shall not otherwise contain exceptions to or variations from the requirements of the RFP. WSDOT will not advise Proposers on whether or not to include ATCs in their Proposals.

Evaluating ATCs in the Proposal

In order to avoid potential conflicts and ensure the objectivity of the evaluation process, WSDOT employees or consultants that participate in pre-Proposal one-on-one meetings with Proposers shall not evaluate Proposals. Once an approved ATC is included in a Proposal, it is the responsibility of the Proposal evaluation team to determine how the ATC fits within the evaluation criteria. Technical scoring shall be the sole province of the Proposal evaluation team, and shall be based solely on the scoring criteria in the ITP.

WSDOT Use of Concepts Contained in an ATC

By submitting a Proposal in compliance with the ITP, all unsuccessful Proposers acknowledge that on payment of the designated Stipend, all ATCs incorporated into a Proposal, as well as any ATCs that were approved by WSDOT but not included in the Proposal, shall become the property of WSDOT without restriction on use.

Implementing Language: Instructions to Proposers (ITP)

In order to implement this Guidance Statement, the Instructions to Proposers shall include the following language, unless approved otherwise by HQ Construction:

ALTERNATIVE TECHNICAL CONCEPTS (ATCS)

To promote innovation by Proposers and to maintain flexibility in the procurement process, WSDOT will allow Proposers to submit to WSDOT for consideration ATCs that modify the Basic Configuration or other Contract requirements. In order to be approved, an ATC must be deemed, in WSDOT's sole discretion to provide a Project that is "equal or better" on an overall basis than the Project would be without the proposed ATC. Concepts that simply delete scope, lower performance requirements, lower standards, or reduce contract requirements are not acceptable as ATCs. Proposers are reminded that the Contract contains restrictions on the Design-Builder's ability to obtain an adjustment in the Contract Price or Contract Time relating to differing site conditions and/or unknown utilities in relation to ATCs.

PRE-PROPOSAL SUBMITTAL OF ATCS

To be considered, a proposed ATC must be submitted to WSDOT no later than XXX a.m./p.m. Pacific Time on the date set forth in Section XXX of this ITP. This deadline also applies to revised submissions in response to WSDOT's comments. Each ATC submittal package shall consist of an original and two copies and shall address all of the following elements:

- Brief description: A few words identifying the ATC, for future reference;
- Detailed description: A detailed description and schematic drawings of the configuration of the ATC or other appropriate descriptive information including, if appropriate, product details, and specifications;
- Usage: A description of where and how the ATC would be used on the Project;
- Subsurface investigation: Describe Proposer's plan for conducting and completing a pre-proposal geotechnical investigation;
- Proposed RFP modifications: References to all requirements of the RFP that are modified by the proposed ATC with an explanation of the nature of the modification from said requirements and a request for approval of such modifications;
- Design Deviations: If the ATC requires "design deviation(s)" as defined in Section 330.03 of the WSDOT Design Manual, the submittal package shall include documentation for the design deviation(s) which conforms to the WSDOT Design Manual and is in the same format as the Preapproved Design Deviations included in the RFP. No design deviation shall be incorporated into an ATC without receiving WSDOT approval, and FHWA approval as applicable.
- Analysis: An analysis justifying use of the ATC and demonstrating how the Project with the ATC is "equal or better" than the Project without the ATC. The "equal or better" analysis shall address the following:

  (1) Functionality, which when appropriate shall require a traffic operational analysis;

  (2) Structural adequacy;

  (3) Safety;

  (4) Comparison of life-cycle costs including repair and maintenance;

  (5) Aesthetics;

  (6) Impacts on construction traffic;

  (7) Effect on or changes to environmental commitments identified in the RFP;

  (8) Impacts to surrounding and adjacent communities;

  (9) Changes needed in the location, length, height, or number of noise walls;

  (10) Impact on utilities and rail; and

  (11) Discussion of additional right of way or easements required;

Do not require any data indicating the effect that approval of the ATC will have on the Proposal Price. If a Proposer wishes to make any announcement or disclosure to third parties (such as other governmental agencies that may have an interest in the ATC) concerning any ATC, it must first notify WSDOT of its intent to take such action, including details as to date and participants and obtain WSDOT's prior approval to do so.

PRE-PROPOSAL REVIEW OF ATCS

Incomplete ATC submittal packages may be returned by WSDOT without review comment. WSDOT may, at its discretion, request additional information regarding a proposed ATC, conduct one-on-one meetings with Proposers to discuss ATCs, and/or establish such protocols or procedures as it deems appropriate for conducting one-an-one meetings. Subject to the Washington Public Records Act, and to WSDOT's right to use proposed concepts following award of the Contract based on payment of the Stipend, all discussions with Proposers regarding ATCs will remain confidential. Although WSDOT reserves the right in its sale discretion to reject any ATC, ATCs specifically not eligible for approval includes the following:

1. ATCs that are, in WSDOT's sale discretion, deemed not to provide a Project that is "equal or better" on an overall basis than the Project would be without the ATC.

2. Any ATC that would require excessive time or cost for WSDOT review, evaluation, or investigation.

In order to be approved, an ATC must be deemed, in WSDOT's sale discretion, to provide a Project that is "equal or better" on an overall basis than the Project would be without the proposed ATC. Potential changes to the Proposal Price will not be considered by WSDOT in the "equal or better" determination.

WSDOT Response

WSDOT will respond to all ATCs within 14 calendar days of ATC receipt, provided that WSDOT has received all requested information regarding the ATC. The format for response should include the ATC number, brief description, and shall be limited to one of the following:

1. The ATC is approved;

2. The ATC is not approved;

3. The ATC is not approved in its present form, but may be reconsidered for approval upon satisfaction, in WSDOT's sole discretion, of certain identified conditions that must be met or certain clarifications or modifications that must be made as described hereunder. The proposer shall not have the right to incorporate this ATC into the Proposal unless and until the ATC has been resubmitted within the time limits in the ITP, with the conditions stated below satisfied, and WSDOT has unconditionally approved the revised ATC; or

4. The submittal does not qualify as an ATC but appears eligible to be included in the Proposal without an ATC (i.e., the concept appears to conform to the Basic Configuration and to be consistent with other contract requirements).

WSDOT approval of an ATC extends solely to the information contained in the ATC submittal.

INCORPORATION INTO PROPOSAL

The Proposer may include any or all approved ATCs in its Proposal. The Proposal Price shall reflect any incorporated ATCs. Except for incorporating approved ATCs, the Proposal shall not otherwise contain exceptions to or variations from the requirements of the RFP. If WSDOT responded to an ATC by stating that certain conditions must be met before granting approval, the Proposer shall not have the right to incorporate the ATC into the Proposal unless and until the ATC has been timely resubmitted with the conditions satisfied and WSDOT has approved the ATC in writing Once an ATC has been approved, only the entire ATC is eligible for inclusion into the Proposal. The inclusion of partial ATCs into a Proposal is not allowed.

WSDOT's geotechnical investigation and subsurface utilities investigation conducted for this Project and included in the RFP was based on the WSDOT Conceptual Design and Basic Configuration. Therefore, the geotechnical information and subsurface utilities information provided in the RFP does not purport to represent site conditions for an ATC. Consequently, with respect to geotechnical investigations, the Proposer is responsible for conducting its own geotechnical investigation before the Proposal due date, for changes to the Conceptual Design or Basic Configuration, if any, that are approved as part of an ATC. Proposer's geotechnical investigation shall comply with the requirements of the WSDOT Geotechnical Design Manual When conducting the geotechnical investigation, Design-Builder may take into consideration the geotechnical information provided in the RFP to supplement its analysis to the extent that said information meets the investigation requirements of the Geotechnical Design Manual as applied to the Design-Builder's design addressed in the approved ATC The Proposer's pre-proposal geotechnical investigation will form the basis upon which differing site conditions will be addressed under the Contract for Work implemented as part of an ATC Failure of the Proposer's investigation to meet the Geotechnical Design Manual standard will result in the Proposer assuming all geotechnical risks in terms of both cost and time associated with the ATC.

Work Addressed in the ATC

With respect subsurface utilities, WSDOT has performed preliminary investigations of existing utilities located within the Project's Right-of-Way as designated in the RFP absent modification by an ATC. The Proposer will be responsible for conducting its own investigation relating to all utilities located outside of said Right-of-Way.

Implementing Language: General Provisions

In order to implement this Guidance Statement, the General Provisions shall include the following language, or other as approved by HQ Construction:

1-01.3(1) DEFINED TERMS

Alternative Technical Concept (ATC)—Concepts proposed by a Proposer and approved by WSDOT which modify the Basic Configuration or other Contract requirement.

1-02.4(2) SUBSURFACE INFORMATION

WSDOT has made subsurface investigation of the site of the proposed Work. The boring log data and soil sample test data accumulated by WSDOT are available for inspection by the Design-Builder. The boring logs shall be considered as part of the Contract. However, WSDOT makes no representation or warranty expressed or implied that:

1. The Design-Builders' interpretations from the boring logs are correct;

2. Moisture conditions and indicated water tables will not vary from those found at the time the borings were made; and

3. The ground at the location of the borings has not been physically disturbed or altered after the boring was made.

WSDOT makes no representations, guarantees, or warranties as to the condition, materials, or proportions of the materials between the specific borings regardless of any subsurface information WSDOT included in the RFP or otherwise made available to Proposers. The availability of subsurface information from WSDOT shall not relieve the Design-Builder from any risks or of any duty to make examinations and investigations as required by Section 1-02.4(1) or any other responsibility under the Contract or as may be required by law.

The geotechnical information in the RFP does not represent site conditions for an ATC. The Design-Builder is responsible for conducting its own geotechnical investigation, prior to the Proposal due date, for changes to the Conceptual Design or Basic Configuration, if any, that are approved as part of any ATC included in the Proposal. Proposer's geotechnical investigation shall comply with the requirements of the WSDOT Geotechnical Design Manual. When conducting the geotechnical investigation, Design-Builder may take into consideration the geotechnical information provided in the RFP to supplement its analysis to the extent that said information meets the

investigation requirements of the Geotechnical Design Manual as applied to the Design-Builder's design addressed in the ATC.

1-04.1(2) GENERAL OBLIGATIONS OF THE DESIGN-BUILDER

The Design-Builder, in addition to pel/arming all other requirements of the Contract Documents, shall:

(1) Obtain and pay the cost of obtaining all Governmental Approvals including Governmental Approvals required to implement any approved ATC(s) incorporated into the Contract Documents;

(2) Obtain and pay the cost of obtaining any third party approvals required to implement any approved ATC(s) incorporated into the Contract Documents; and

(3) Unless otherwise noted in the Contract, be responsible for all costs and/or delays of any nature associated with the implementation of any approved ATC incorporated into the Contract Documents.

1-04.4(2) MATTERS NOT ELIGIBLE FOR CHANGE ORDERS

The Design-Builder acknowledges and agrees that no increase in the Contract Price is available except in circumstances expressly provided for in the Contract, that such price increases shall be available only as provided in Section 1-04.4, and that the Design-Builder shall bear full responsibility for the costs of all other changes. Matters which are the Design-Builder's exclusive responsibility include the following:

(1) Delays in obtaining or failure to obtain any third party approvals required to implement any approved ATCs incorporated into the Contract Documents; and

(2) Unless noted otherwise in the Contract, any increases in costs or time incurred implementing an ATC.

1-04.4(8) BASIC CONFIGURATION CHANGES

Upon the Design-Builder's fulfillment of all applicable requirements and limitations relating to Change Orders specified herein, if a Necessary Basic Configuration Change increases the cost and/or time to perform the Work, the Design-Builder shall be entitled to an increase in the Contract Price and/or an extension of the Contract Time, excluding any costs and/or time that could have been avoided by the Design-Builder; provided, however, the Design-Builder shall not be entitled to an increase in the Contract Price or an extension of the Contract Time in connection with any error, omission, inconsistency or other defect in the Conceptual Plans.

1-04.7 DIFFERING SITE CONDITIONS (CHANGED CONDITIONS)

For Work unrelated to an ATC, Differing Site Conditions shall mean (a) subsurface or latent physical conditions encountered at the Site differing materially from those indicated in the Geotechnical Baseline Report (RFP Appendices G1 and G4) and/or the Supplemental Boring Project (RFP Appendix G5) and which are not discoverable from a reasonable investigation and analysis of the site including subsurface conditions, or (b) physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the type of Work provided for in the Contract and the Work site characteristics, provided in all cases that the Design-Builder had no actual or constructive knowledge of such conditions as of the Proposal Date. For Work related to an ATC, Differing Site Conditions shall mean (a) subsurface conditions encountered at the Site differing materially from those indicated in the Design-Builder's geotechnical investigation conducted for purposes of the ATC prior to the Proposal due date (to the extent said investigation complies with the WSDOT Geotechnical Design Manual), and which are not discoverable from a reasonable investigation and analysis of the site, or (b) physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the type of Work provided for in the Contract and the Work site characteristics, provided in all cases that the Design-Builder had no actual or constructive knowledge of such conditions as of the Proposal Date.

1-07.17(5) RELIANCE ON UTILITY INFORMATION

WSDOT has performed preliminary investigations of existing Utilities located within the Project's Right-of-Way. RFP Appendix U4 provides the results of a Subsurface Utility Engineering (SUE) investigation of certain types of Utilities existing within the Project's Right-of-Way, which investigation was performed based on the parameters indicated in the SUE report. Additional information with respect to Utilities existing within the Project's Right-of-Way is primarily provided in RFP Appendix UI-U9, although relevant to Utilities can also be found throughout the RFP documents. The Design-Builder acknowledges that (a) the Utility Information does not identify Service Lines impacted by the Project, and (b) information contained in the Utility Information, including the descriptions of the affected Utilities and their locations, is preliminary and may not be accurate. The Design-Builder shall verify all Utility Information included in the RFP, and shall perform its own investigations in accordance with the Contract Documents. The Design-Builder shall not proceed with any construction Work at any location until such investigations have been completed for that location. If the Design-Builder's investigations identify Utilities (excluding Service Lines) not described in the Utility Information, or if the Design-Builder determines that any Major Underground Utility was not described in the Utility Information with Reasonable Accuracy (as defined in Section 1-7.17(9)), the Design-Builder shall notify WSDOT immediately upon such discovery. If any such unidentified Utility is installed within the Project's Right-of-Way pursuant to a franchise or permit, WSDOT shall execute an assignment of rights and delegation of obligations there under in the same form as RFP Appendix Xl, in favor of the Design-Builder. The Design-Builder shall be responsible for confirming the exact location (horizontal and vertical) of each Utility (including Prior Relocations) potentially affected by the Project, regardless of whether information with respect to such Utility has been provided by WSDOT or by the Utility Owner.

The Design-Builder shall comply with RCW 19.122 et seq. regarding underground Utilities. The Design-Builder shall refresh and maintain the location ground markings in all areas on a daily basis where excavation is in progress. The Utility Information in the RFP does not purport to identify utilities outside of the Project's Right-of-Way. Consequently, the Design-Builder is responsible for conducting its own subsurface utilities investigation Jar changes to the Conceptual Design or Basic Configuration, if any, that are approved as part of an ATC, for any Work area located outside the Project's Right-of-Way as designated in the RFP absent modification by an ATC.

1-07.17(9).4 LIMITATIONS AND EXCLUSIONS

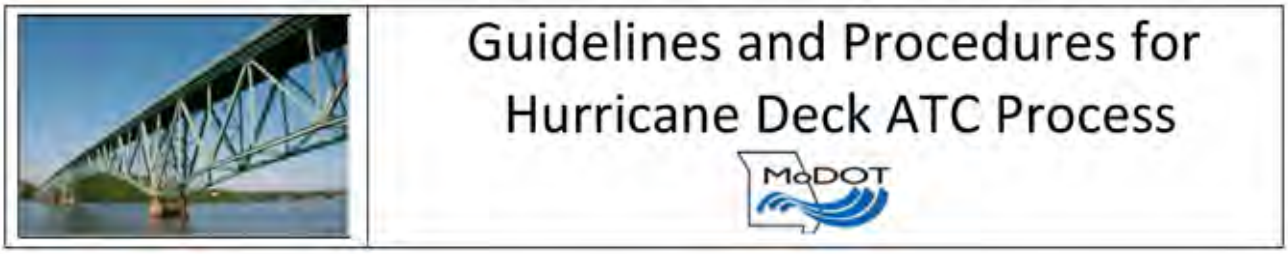
Increased costs or time attributable to inaccuracies or omissions in the Utility Information, where the impacted Work (a) is part of an approved ATC incorporated into the Contact Documents, and (b) the Work area designated in the ATC is outside the Project's Right-of-Way as designated in the RFP absent modification by an ATC.

Implementing Language: Stipend Agreement

In order to implement this Guidance Statement, the Stipend Agreement shall include the following language, or other as approved by HQ Construction:

Services and Performance. Department hereby retains Proposer to prepare a responsive Proposal in response to the RFP. A "responsive" Proposal means a Proposal submitted by a qualified Proposer, which conforms in all material respects to the requirements of the RFP, as determined by Department, and is timely received by Department. Subject to the provisions of the RFP documents regarding ownership of EPDs, all work performed by Proposer and its team members pursuant to this Agreement shall be considered work for hire, and the products of such work shall become the property of Department without restriction or limitation on their use. Such work shall include, but is not limited to all ATCs approved by WSDOT whether or not included in a Proposal. Neither Proposer or any of its team members shall copyright any of the material developed under this Agreement. Capitalized terms used but not otherwise defined herein shall have the meanings set forth in the RFP.

REVISED JUNE 9, 2011



Description

This project will allow contractors the opportunity to include in their bid proposal, pricing for a pre-approved Alternate Technical Concept (ATC) that differs from the Commission-furnished bid proposal. ATCs allow for innovation, project schedule reduction and cost savings to obtain the best value for the project that meets or exceeds the project goals, and which provides a product, which is equal to or better than the concept it replaces. ATCs may address, but are not limited to, specifications, materials, products, design standards, design solutions, staging or traffic control.

For this request-for-bid, the contractor may submit a bid for the Commission-furnished proposal, including the Commission-furnished design solution or a bid that includes pricing for the pre-approved ATC.

General Conditions

The Commission-furnished proposal documents contain all of the proposed work for the project to be bid. The contractor may propose an ATC to do the work. The minimum requirements for the finished project are listed below. If an ATC is pre-approved by the Commission, the contractor has the option of submitting a bid for the pre-approved ATC proposal or the Commission furnished proposal. The contractor will only be allowed to submit one bid for this project.

The Commission will be responsible for completing all roadway and structural design plans for approved ATCs.

Process for Submittal of Alternate Technical Concepts

Submittal and evaluation of ATCs will include the following three step process:

Step 1: This will consist of one-on-one confidential meetings between the contractor and the Hurricane Deck ATC team to discuss what portion of the project their ATC impacts. If the Commission confirms this portion of the design has been finalized, then the ATC process proceeds to Step 2.

The Commission warns that any idea submitted by the contractor, in which the Commission design has not yet been completed, may possibly be the design direction that was intended for the Commission- furnished plans. To avoid discussing concepts on portions of the design that have not been completed; the contractor will be asked to describe which portion of the design their ATC will impact. If the ATC proposal impacts an incomplete portion of the base design, the contractor will have the option of delaying their ATC submittal until after the final design solution has been selected. If a contractor chooses to proceed with submitting an ATC on an incomplete portion of the base design that ends up being the same solution as the base design, the contractor shall have no ownership or right to that specific ATC. The contractor will be informed of this situation if it occurs.

Step 2: The ATC team will be available to review contractor's Conceptual Alternate Technical Concepts (CATC). CATCs will require minimal engineering and are intended to allow contractors to present their ideas to the ATC team in a confidential environment prior to investing time and resources into detailed engineering of their concept.

The Commission will review submitted CATCs and respond back to the contractor as soon as possible, but not to exceed 2 weeks. Yet, the Commission reserves the right to take longer depending on resources and evaluation

needs of the specific CATC. The contractor will be notified prior to completion of the 2 week time period if more time will be required.

Although there is not a limit to the number of CATC submittals, the Commission reserves the right to limit the number of CATC submittals if in its own determination it feels that a contractor is abusing the process by not limiting their submittals to reasonable concepts. The contractor will receive a written warning from the Commission before being limited on the number of CATC submittals.

Step 3: Once a CATC is approved, the contractor may choose to pursue the ATC in more detail and submit it for final approval and inclusion in the bidding documents.

All inquiries regarding ATCs for this project should be directed to the contact as listed below: Nicole Kolb Hood, PE

Transportation Project Manager

Missouri Department of Transportation

1511 Missouri Blvd. Jefferson City, MO 65102

Email: Nicole.hood@modot.mo.gov

Hurricane Deck ATC Process Schedule	
February 10, 2011	An informational meeting will be held at the MoDOT District 5 Office to explain the ATC process.
March 1, 2011	Commission confirms direction for base design.
March 18, 2011	30% base plans will be posted to the Project website.
March 21, 2011	Start date of confidential one-on-one contractor meetings. CATCs will be accepted for review.
May 27, 2011	60% base plans will be posted to the Project website. Guidelines for Hurricane Deck ATC Process and Procedures finalized and posted to website.
August 15, 2011*	Last day to submit ATCs.
November 10, 2011*	ATC biddable set of plans available to contractor.
December 16, 2011	Bids due.
* Dates subject to change depending on the number and complexity of ATC design.	

Requirements for **Step 2** Conceptual Alternate Technical Concept Submittal

Requirements for the CATC submittal shall include at a minimum:

a) Detailed narrative of the CATC being proposed (detailed to at least enough information for the Commission to estimate cost and time savings).

b) Estimate of cost savings.

c) Estimate of time savings.

d) Impact to the environment, utilities and right of way and any previous permits or approvals.

e) A description of any previous use or submission of similar technical concepts or value engineering proposals, including dates, job numbers, results, and/or outcome of the ATC/VE if previously submitted, as known by the contractor. This would include ATCs/VEs from any state DOT.

CATCs may propose specifications and design standards that differ from MoDOT standard practice. MoDOT understands that, at times, MoDOT manuals, specifications and standards do not allow for maximum flexibility.

Contractors are encouraged to propose Additional Applicable Standards (AAS) as part of the CATC/ATC process. The proposed manuals, specifications and standards, shall be limited to those already reviewed by FHWA, for example, standards from other state departments of transportation. The Contractor shall provide the Additional Applicable Standards including but not limited to construction specifications, special provisions, design requirements (by discipline), standard drawings, materials and testing requirements, and manuals for review and approval with CATC and ATC submittals. MoDOT will have sole authority to approve or disapprove any AAS. If an AAS is disallowed, the contractor will be notified as to why.

Evaluation of Step 2 - Conceptual Alternate Technical Concepts

The minimum basis of acceptance for a CATC shall adhere to the project specific minimum requirements, general requirements and submittal requirements. Any CATC failing to include the required submittal information or one that fails to meet the project minimum requirements will be rejected and returned to the contractor.

If a CATC is accepted, the Commission will provide written approval of the CATC. The Commission will estimate a cost to develop the CATC into a biddable set of plans. A CATC proposal must produce an estimated net savings after design costs are deducted greater than $100,000 to be considered for design. Approval of the CATC to the contractor will include the Commission's maximum redesign cost and redesign time for the ATC.

If a CATC is disallowed, the contractor will be notified as to why.

Requirements for Step 3 Alternate Technical Concept Submittals

ATC submittals will only be considered if accompanied with a pre-approved CATC. The contractor shall request and submit four copies of the ATC form with the following information:

a) All original CATC submittal documents with a copy of the approval letter acknowledging the Commission's acceptance.

b) Deviation: Reference all requirements of the Commission-furnished proposal that are inconsistent with the proposed ATC, an explanation of the nature of the ATC deviations from said requirements, and impacts to other design elements.

c) Description: Provide a detailed description of the ATC including specifications and conceptual drawings, and a description of where and how the ATC would be used on the Project.

d) Justification: An analysis justifying the ATC and demonstrating why modifications or revisions to requirements of the Commission-furnished proposal should be allowed. Include information on how the ATC meets the project goals.

e) Cost Savings: A detailed statement of the cost savings associated with the implementation of the ATC. Include an itemized list of impacted bid items and quantities supporting the cost savings for the ATC.

f) Schedule Impact: A discussion of the effect the ATC will have on the contract completiontime including design, construction, right of way, utility relocation and permitting issues.

g) Certification that the ATC meets all applicable federal and state design standards, or conforms to a pre-approved AAS.

h) Utilities: A discussion of utility (public and private) impacts.

i) Permits: A discussion of permit changes, additional permits and/or agency approvals that may be required for the ATC.

j) Right of Way: A discussion of the right of way requirements (both temporary and permanent) for the ATC.

k) Traffic and Safety Impacts: A discussion of the impacts the ATC will have on maintenance of traffic during construction.

l) Environmental Impacts: A discussion of the ATC environmental impacts as compared to the approved project Environmental Document including impacts to environmental commitments and community impacts.

m) Maintenance: A discussion of the maintenance impacts over the 75 year life of the project.

n) History: A detailed description of other projects on which the proposed ATC has been used including contact information (name, title, phone number, address and email) for project owners that can confirm ATC implementation.

o) Inspection: Any additional testing and construction inspection requirements.

p) Risks: A discussion of added risks to MoDOT and other parties associated with implementing the ATC.

q) A description of both the existing contract requirements for performing the work and the proposed ATC (if more information has become available since CATC narrative).

ATC submittals shall include enough roadway and structural design details to determine acceptance of the ATC which shall include if applicable, but not limited to: geometrics, hydraulic calculations, profiles, typical sections, and traffic control concepts; and structures to include type, size and location superstructure information, substructure information, and any other significant information. Where different from the Commission-furnished bid proposal, the ATC submittal shall also identify the contractor's specific approach to the following, as applicable:

a) Mechanically stabilized earth (MSE), the contractor shall define the MSE system to be used and its associated application criteria.

b) Describe the corrosion protection measures for structural steel and concrete reinforcing steel subject to chloride exposure, such as decks, elements under joints and locations within splash zones. The definition of splash zone shall be included if utilized.

c) The application limits and material requirements for structures for protective coatings such as graffiti protection to be used.

d) The specifications for the application of proposed coatings for bridge superstructure, signs, message boards, steel piling and miscellaneous steel.

e) The types of bridge expansion joints and bearings to be used.

f) Specify what materials will be used for drainage pipes in various applications.

g) For traffic related items the proposer shall define how they will interpret the 'guidance' recommendations in MUTCD.

Evaluation of Step 3 - Alternate Technical Concepts

ATCs will be evaluated based on compliance to the requirements of these guidelines. ATCs that do not meet these requirements will fail and not be considered for bid. The Commission and FHWA shall be the sole judges in determining compliance with these requirements. If a CATC is proposed and approved based on the requirements, but does not fulfill these requirements when it is submitted as an ATC, it will not be considered for bid.

ATCs will be evaluated using the following criteria. If any of the following criteria are not met, the ATC request fails.

a) The ATC meets or exceeds the minimum requirements and engineering standards listed in these guidelines. The ATC was first evaluated and accepted as a Conceptual ATC (CATC).

b) The ATC does not adversely affect the long-term maintenance of the project.

c) The ATC is consistent with the overall project goals, which include but are not limited to the following:

   a. Deliver the project on budget

   b. Minimize public impact by keeping regional and local traffic flowing efficiently and safely through the impacted area

   c. Incorporate innovative design including faster/better construction techniques, quality control & inspection

   d. Coordinate with all partners and the local community resulting in a project that is viewed as successful

   e. Demonstrate quality construction, encourage green techniques and provide a long lasting facility that complies to ADA requirements.

d) The ATC is equal to or better than the original design proposal. The ATC shall not cause a decrease in engineering standards for any safety related items, including but not limited to: reduction in shoulder widths, reduction in lane widths, decrease in design speed, decrease in clear zone,, or reduced traffic control performance, etc. To be considered for approval, all safety related elements of the ATC must meet or exceed the MoDOT design. Evaluation of ATC proposals may, at MoDOT's discretion, take into account the overall project design including increases and decreases in safety related items throughout the project. For example a decrease in engineering standard may be allowed in one area if, in MoDOT's and FHWA's sole discretion, it is determined that the overall safety of the project, as compared to the original MoDOT baseline design, is increased by increasing the engineering standard of other parts of the project.

e) Direct or secondary cost and/or delay related to utility conflicts.

The Commission will make every effort to evaluate the ATC within 10 working days of submittal, and give the contractor a pass or fail decision. The Commission will, in writing, notify the contractor of the ATCs pass/fail status. If an ATC with a promising concept is submitted with insufficient information, it will be rejected. A rejected ATC response will include a list of one or more of the criteria listed above as to why the ATC failed. The contractor will be allowed to address the Commission's cause for rejection and resubmit the ATC prior to the ATC submittal deadline. All specific ATC discussions shall be written or in-person with minutes recorded by the contractor, and approved by the Commission. In no way will the Commission discuss specific ATCs without documentation. The Commission and Federal Highway Administration will be the sole judges of acceptability of the ATC. The Commission and Federal Highway Administration reserve the right to reject any ATC request for any reason.

A request from the Commission for additional information from the contractor will be considered a response and allows for extension of the evaluation period.

If the proposed ATC is given a "pass" recommendation the concept is considered pre-approved and may be submitted by the contractor along with bids for the other items of work contained in the request for proposal. If the ATC is given a pass recommendation the Commission will provide a date for completion of the final re-design, i.e. construction plan set, with the ATC approval letter. The contractor shall notify the Commission in writing within 5 calendar days of approval of the ATC their intent to pursue the ATC. An approved ATC which is comprised of multiple elements must be bid as a whole, selective implementation of less than all the elements will not be accepted.

The contractor will have no claim for additional costs or delays, including development costs, loss of anticipated profits, or increased material or labor costs, if the ATC is rejected.

An approved ATC that is not submitted with the bid will not be considered a pre-approved value engineering change proposal (VECP). The awarded contractor may submit their approved ATC as a VECP, however, the fact that it was approved as an ATC shall have no bearing on potential approval as a VECP, and it will be reviewed independently in accordance with Sec 104.6.

In the event that the awarded contractor utilized a sunshine request to obtain information about approved ATCs submitted by other bidders, these ideas shall not be considered eligible for submittal as a VECP, unless the awarded contractor has an agreement letter from other bidders stating it is permissible.

Confidentiality

The Commission expressly reserves the right to adopt any specific CATC or ATC as standard practice for use on other contracts administered by the Commission, whether the CATC or ATC is accepted or rejected. The CATC or ATC shall not be used by the Commission until after the award of the Hurricane Deck bridge project.

Other than as listed above, all CATC and ATC submittals are considered confidential and will not be shared with other bidders. All members of the review team (except FHWA) will be required to sign a confidentiality agreement before reviewing any submittals. A copy of the form to be used for this purpose may be requested.

Design Requirements

The Commission will be responsible for completing all roadway and structural design plans for approved ATCs. The Commission will work with the contractor on any ATC that requires design and/or plan changes. If necessary, weekly meetings will be held. The plans will be developed to a degree such that the Commission and contractor are satisfied that biddable quantities are established. If the successful low bidder's proposal contains an ATC, their ATC will be developed into a finalized set of construction plans.

Plans shall be complete before any construction related to the ATC can begin. The Commission will not be responsible for any cost associated with project delays due to the redesign and production of plans, specifications and quantities as needed for implementation of the ATCs or any additional construction cost not foreseen prior to the ATC design completion.

Bidding Requirements

If the successful bidder's pre-approved ATC is abandoned by the contractor or fails to be constructed for any reason, the contractor is obligated to complete the project utilizing the original design at the awarded cost.

Basis of Payment

The proposal documents contain all of the proposed work for the project to be bid as designed by the Commission. Contractors choosing not to participate in the ATC process must bid the base set of plans furnished by the Commission.

Contractors submitting an ATC bid will receive modified bidding documents with separate pay items for the pre-approved ATC and other applicable bid items. If the contractor elects to bid the project with pre-approved ATCs, the contractor shall enter the unit prices in the modified bidding document. If the successful contractor's pre-approved ATC is abandoned by the contractor or fails to be constructed for any reason, a no cost change order will be processed to re-adjust the bid items to the original design quantities. The contractor is obligated to complete the project utilizing the original design at the awarded cost.

No direct payment will be made for any change in quantity of pay items not included in the ATC that are affected by the contractor's decision to use an ATC on this project.

No direct payment will be made for delay of schedule due to the use of an ATC, including but not limited to delay resulting from the design, review, implementation or construction of an ATC. Additionally, if the ATC causes conflicts with utilities that were not previously identified in the original ATC submittal, the contractor's sole remedy for the effects of the presence of utilities, delay in their relocation or any other effects they have on delivery of the project shall be a non-compensable, excusable delay as provided in Section 105.7.3 of the Missouri Standard Specifications for Highway Construction. No time delay will be granted for any utility conflicts identified in the original ATC submittal.

The following are requirements and limits that will be placed on the Alternate Technical Concepts for this project.

General Design Specifications – Minimum Requirements

1. Roadway and Structural designs shall be in accordance with any state and all federal requirements, unless otherwise specified elsewhere in these contract documents.

2. Utilities shall not be disturbed except at the contractor's expense.

3. There are many factors that limit the options in altering the horizontal alignment. Prior to investing an extensive amount of time in any Conceptual ATC proposal that would affect the horizontal geometry of the base design; the contractor is strongly encouraged to contact MoDOT to discuss these limitations as noted in Step 1 of submittal process.

4. ATCs proposing changes in maintenance of traffic should maintain traffic as good as or better than the Commission base design. Closures exceeding that of the base plan will be considered depending upon impacts to the traveling public and local input.

5. If a proposed ATC is beyond the limits of the Commission's existing right of way, it is the contractor's responsibility to coordinate with property owner's to obtain the necessary right of way. The contractor shall comply with all applicable federal laws, rules and regulations, including 42 U.S.C. 4601-4655, the Uniform Relocation Assistance and Real Property Acquisition Act, as amended and any regulations promulgated in connection with the Act, and with Chapter 523 of the Revised Statutes of Missouri. MoDOT will audit and review the contractor's right of way acquisition process and will in its sole discretion determine if a right of way acquisition has been obtained in accordance with all applicable federal laws, rules and regulations. If MoDOT determines that right of way was not purchased in accordance with all applicable federal laws, rules and regulations, the contractor is obligated to complete the project per the original design at the awarded cost or complete the approved ATC within the existing right of way.

6. ATCs may not result in a net increase in the acreage of disturbed wetlands.

7. ATCs requiring new Design Exceptions must receive both MoDOT and FHWA approval. Any new design exceptions must be offset by elimination or reduction of existing design exceptions elsewhere in the project. Any combination of existing and new design exceptions must produce a design that is judged to be equal to or better than the existing design as determined by MoDOT and FHWA. MoDOT in its sole discretion may reject any design exception proposal that it feels does not provide a suitable or safe design prior to FHWA's review.

8. Any proposed ATCs requiring modifications to previously approved actions for this project (ie NEPA, Design Exceptions, Conceptual Reports, permits, etc.) must receive MoDOT and FHWA approval. This information is available upon specific request to the MoDOT contact person. MoDOT in its sole discretion may reject any proposal that will require modifications to previous approvals. Any work required for modification of previously approved actions shall be the responsibility of the Commission.

Bridge Design Specifications – Minimum Requirements

1. Alternate bridge designs shall be in accordance with the 2010 - AASHTO LRFD 5th Edition and 2010 Interims, Load and Resistance Factor Design, for Seismic Performance Category A, as modified and interpreted by the MoDOT Engineering Policy Guide (EPG). Bridge deck drainage design shall be in accordance with the 1986 FHWA Report "Bridge Deck Drainage Guidelines", and the May 1993 FHWA Report "Design of Deck Drainage, Hydraulic Engineering Circular No. 21."

2. Alternate designs shall meet the following LRFD loading requirements:

    - HL-93
    - 35-lb/sf future wearing surface

3. Drainage spread shall be limited to the shoulder width plus 3 ft. The design storm event shall be a 25-year (8.5" per hour) frequency and five-minute time period. Draining water directly over the edge of the bridge (i.e. curb outlets) is not allowed.

4. Minimum vertical clearance for finished structure shall be 45'-0" clear over normal pool elevation of 660.0 ft. for a minimum distance of 200'.

5. Design life for finished structures shall be 75 years minimum.

6. The minimum number of lanes and shoulder widths for finished structures, as shown on the contract plans, shall not be reduced from the original design.

7. A reinforced concrete overlay is required for prestressed voided slab or prestressed box girder superstructures.

8. If drilled shafts are used for intermediate bents, all requirements in the MoDOT Engineer Policy Guide or equivalent drilled shaft requirements contained in a pre-approved AAS shall be met.

Structural Wall Design Specifications – Minimum Requirements

These minimum Bridge Design Specification requirements apply to alternate wall designs.

1. Alternate wall designs shall be in accordance with the 2002 – AASHTO 17th Edition Load Factor Design, as modified by MoDOT Bridge Design Manual Section 3.6.2.

2. An aggregate shear key shall be used below MSE Walls.

Roadway Design Specifications – Minimum Requirements

1. This project has a Traffic Management Plan (TMP) that has been approved by FHWA. ATCs that impact the Traffic Control Plan or the TMP will require the preparation and approval, by MoDOT and FHWA, of a revised TMP. The revised TMP and Traffic Control Plan shall provide an equivalent impact to traffic during construction when compared to the one described for the base plans. The determination of equivalent impacts or acceptable impacts to traffic shall be at the sole discretion of the Commission and FHWA.

2. Alternate pavement designs must be consistent with the AASHTO Mechanistic-Empirical Design guidelines. Any alternate pavement designs must be determined, by the Commission, to provide an equivalent design and performance to the design included in the base Commission plans.

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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