A score of D+ on the American Society of Civil Engineers’ (ASCE’s) 2017 Infrastructure Report Card is not exactly stellar (1). Transportation infrastructure grades for the United States include a D for roads and aviation, a B for rail, a C+ for bridges and ports, and a D− for transit. A tremendous amount of work is needed from all stakeholders to renew the nation’s transportation systems.

Tragic failures, like the I-35W bridge collapse in Minnesota in 2007 (2), underscore the need to renew transportation infrastructure; this momentous objective will require technological solutions, workforce solutions, procurement solutions, and more. Alternative contracting methods (ACMs)—also referred to as alternative delivery methods or alternative project delivery methods—is an area that has experienced continuous innovation since the 1990s.

A contracting method defines the roles, responsibilities, and timing of the engagement of project stakeholders—including owners, design engineers, and constructors—working together to design and build a facility. The traditional design–bid–build contracting method offers limited opportunities for collaboration between project stakeholders. Such ACMs as design–build (DB) and construction manager–general contractor (CM/GC) evolved over past decades to allow more collaboration and innovation in designing and building a facility.

ACMs rely heavily on early contractor engagement to inform design. In 1990, the Federal Highway Administration (FHWA) established Special Experimental Project 14 (SEP-14): Innovative Contracting to encourage and enable state transportation agencies to test and evaluate these methods on an experimental basis (3). With the success of SEP-14 pilot projects, the methods were no longer deemed experimental; in 2012, the next transportation authorization bill strongly promoted the use of “innovative contracting methods, including the design–build and the construction manager–general contractor contracting methods” (4).

Research funded by many organizations—including TRB’s Cooperative Research Programs, the U.S. Department of Transportation, FHWA, the Charles Pankow Foundation, the Design–Build Institute of America, and several state and local transportation agencies—played a considerable role in the national rise of ACMs. This research was supported strongly...
The collapse of the I-35W Mississippi River Bridge in Minnesota magnified the critical need for infrastructure improvements.

ACMs encourage collaboration and innovation and can help control cost and schedule growth. Washington State’s use of DB allowed the state to widen the Snoqualmie Pass and build elevated bridges to replace avalanche snow sheds, eliminating $37 million in long-term operations and methods.

by government, industry, and academic stakeholders over the past two decades, resulting in the discovery of new knowledge and its widespread implementation, and is gaining national visibility, with many organizations benefiting from various types of delivery methods. Projects and research findings are featured regularly in diverse venues, conferences, and publications by such organizations as ASCE, TRB, the American Bar Association, and others.

Among the local and national committees dedicated to ACM is TRB’s Standing Committee on Project Delivery Methods, which is supporting this special issue of TR News. This issue will highlight ACM innovations and case studies taking place across the country and internationally, covering the most prominent ACM methods through the eyes of practitioners and researchers.

**Performance, Performance, Performance**

ACM performance research results have been overwhelmingly positive, with many distinguished researchers contributing to this literature from the United States and abroad. Ample empirical performance data support ACMs as effective methods; a team from Arizona State University (ASU) recently conducted a meta-analysis to combine and compare the quantitative results of 30 project delivery performance studies over the past two decades and collectively analyzed data from thousands of projects (5). This technique presents a significant aggregate sample to even out the effects of different research methods and project samples, producing more representative results and further confidence in the published performance studies.

The results show that some ACMs—particularly DB—are more effective at controlling cost and schedule growth than the traditional design–bid–build method. Interestingly, no delivery system was significantly superior in terms of unit cost, but the data showed that, on average, ACM projects were delivered 35 percent faster. A recent FHWA Tech Brief shows even better performance of ACMs on...
federally funded highways (6).

It is worth noting, however, that these reported values are based on averages. Some agencies did not have the same experiences with ACM, especially when trying a new project delivery method for the first time. Some pitfalls include not working closely with industry partners on these new methods or not training or preparing internal agency staff for the new processes. These and other lessons learned point to prospective research areas to ensure ACMs are used to their full potential.

Record of Growth

Many project successes have fueled ACMs’ growth in popularity. In fact, revenue growth of ACM firms has increased significantly on a yearly basis for the past decade, according to Engineering News Record’s (ENR’s) annual “Top 100 Construction Project Delivery Firms” list as well as a recent study that statistically analyzed published ENR data over the past decade (7–8).

Some of the latest research investigates whether ACMs can affect the quality and performance of a facility itself over its life cycle. Designing and building a highway faster is significant, but it would be even more powerful if the pavement itself were to show improved performance and require less maintenance—saving more cost, time, fuel, and materials over its life. To that end, the ASU team investigated the effect of delivery systems on the operational performance of highways built in the past 10 years (9). Early findings show a significant improvement in pavement life-cycle performance for DB projects.

Recently, research investigating the efficacy of ACM for transportation projects has included public–private partnerships (PPP) in the mix. A system that allows public agencies to attract private financing to fund the capital needs of a project, with repayment over the life of the facility, PPPs were shown to provide superior project cost and schedule performance—even compared to other ACMs (10).

This specific result is in line with literature about ACMs and was expected, given the increase in team integration inherent in PPPs. What was surprising, however, was the extent of funding invested in PPPs. Recent findings disclosed a one-to-one ratio of public and private funds used in some types of PPP transportation projects (11). This means that leveraging private funds using PPP can nearly double the amount of infrastructure delivered.

Delivering a Brighter Future

Many ACM research studies focus on specific methods and their variations, performance, and implementation. These ongoing studies are charting new territory, providing the evidence for practitioners to make the case for effective employment of ACMs on their projects. One example is National Cooperative Highway Research Program Project 08-104, which is developing new FHWA guidebooks for ACM post-award contract administration (12).

Proponents of ACM have been changing national and state legislation to allow ACMs on a greater number of public projects. The transportation industry is well aware of labor shortages and needs at all levels and so is helping to expose students to ACMs through national competitions and ACM student chapters. Students also are assisting faculty members with ACM research and are offered new ACM courses at universities and by professional organizations. Certifications have emerged as a training and education tool to ensure that experienced ACM professionals are recognized and can pursue education to stay current in the field.

With the current administration’s support of a
potential infrastructure package and the possibility of broader PPP use in delivering infrastructure projects, ACMs offer proven alternatives to enhance and optimize prospective investments. The economic impact of improved infrastructure for industry and business is crucial in a competitive global market.

ACM research helped fuel innovative practices for delivering infrastructure faster and with improved cost certainty—resulting in facilities that can last longer—and helped to identify new funding resources. This line of research strengthens transportation infrastructure with novel integrated and efficient methods to deliver projects. Together with technological, labor, and other solutions, ACMs will continue to support the renewal of the nation’s transportation infrastructure. The timing for successful implementation of ACM could not be any better.

References


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3 INTRODUCTION
Transportation Project Delivery: Alternative Contracting Methods Research
Mounir El Asmar
The critical objective of transportation infrastructure renewal will require innovative solutions in technology, workforce, procurement, and more. For many years, alternative contracting methods (ACMs)—also called alternative delivery methods or alternative project delivery methods—have shown continuous promise and have delivered results. In this issue, experts examine the latest research in, and application and implementation of, ACMs for “better, faster, smarter” project delivery.

7 Risk Sharing and Transfer Using Alternative Project Delivery Methods and Contracting
Nancy C. Smith and Stephanie W. Kam
Risk-based quality management plans are crucial when deploying ACMs. In this article, authors investigate how risk is addressed, both in the traditional project delivery method—design–bid–build—and in the three primary ACMs used by departments of transportation (DOTs) across the country—design–build (DB), construction manager–general contractor (CM/GC), and design–build–finance–operate–maintain. The risk management benefits of ACMs also are explored.

10 Alternative Contracting Methods Leverage Construction Dollars: FHWA Perspective
R. David Unkefer

13 Innovation via Early Contractor Involvement: Missouri DOT Experience with ATCs
Ghada M. Gad and Kevin McLain
Alternative technical concepts (ATCs) in project delivery offer many opportunities but also pose legal and contractual challenges, from concerns about bidder confidentiality to determining responsibility for design defects. In this article, authors describe how Missouri DOT emphasizes early contractor collaboration and involvement to address these challenges.

Doug Gransberg

18 Delivery Success: Best Practices in Design–Build
Lisa Washington, Erin Donovan, Jim Avitabile, and Shailendra Patel
Examples of successful DB projects are presented in this article, along with the design management tactics deployed in each: systematic design management in Maryland’s Intercounty Connector, procurement transparency in Florida’s Alternative Contracting Program, and Virginia’s use of ATCs.

25 Devore Interchange: California Design–Build Success Story
Raymond Tritt

26 Leveraging Early Contractor Involvement: Construction Manager–General Contractor Project Delivery
Randall Park and Doug Gransberg
The use of CM/GC project delivery in the transportation industry is on the rise. In this method, the construction contractor is selected before the design is complete, the construction price is fixed, and then the contractor is awarded the contract. Authors relay Utah DOT’s experience using CM/GC and the agency’s success with qualifications-based selection and best-value selection with unit pricing.

30 Value of Early Contractor Involvement: Sellwood Bridge Replacement Project
John Carlson and Doug Gransberg

COVER: The twin bridges of the I-460 Connector project are the tallest in Virginia. The state transportation agency deployed alternative technical concepts such as design–build for better and more streamlined infrastructure renewal. (Photo: Trevor Wrayton, Virginia DOT)
31 **Alliance Contracting: Advancing Collaboration and Integration in International Project Delivery**

*Eric Scheepbouwer and Bryan Pidwerbeschky*

In New Zealand, alliance contracting—a delivery model in which the owner, contractor, and consultant form a project team—has met with success. Similar to integrated project delivery methods used in the United States, alliance contracting increases collaboration and streamlines communication. This article analyzes two successful alliances in New Zealand: the Waterview Connection Alliance and the SCIRI Alliance.

34 **Project Delivery Selection Matrix: Colorado Department of Transportation’s Project Delivery Selection Process**

*Christopher M. Harper and Nabil Haddad*

Selecting the right project delivery method is a complex process. The decision about which method to use often is made in the scoping phase, before the project design is complete—thereby increasing risk. This article examines a project delivery selection tool, developed and in use by Colorado DOT, that allows agencies to evaluate risk and to address the limited design available early in the process.

37 **TCRP REPORT 131**

*Project Delivery Method Selection Tool for Transit Projects*

*Ali Touran and Ildefonso Burgos*

The selection system framework presented in this article and in TCRP Report 131: A Guidebook for the Evaluation of Project Delivery Methods outlines how to document a project delivery selection via a decision report, which provides a clear and defensible documentation of the decision process and a flexible framework that can be tailored to the specific needs of a transit agency—or any other modal agencies.

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Factors in crashes involving hazardous materials trucks, data on the role of drowsy driving in crashes, the use of dredged sediment in paving, and the empty container problem.

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In the September–October issue of TR News, Canadian activity in connected and automated vehicles technology testing and development—including government and industry associations and research facilities and programs—is examined. Also explored are automated vehicles for transit—driverless metro, automated people movers, and personal rapid transit technologies—in various planning, construction, and operation stages in jurisdictions across the globe. Other articles offer a look at lessons learned from the traffic congestion related to the August 2017 solar eclipse, state department of transportation project selection case studies, finding the balance in freight mobility, and achieving rural health equity and well-being.

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A changeable message sign warns travelers on Utah’s I-15 of impending traffic congestion from the total solar eclipse in August 21, 2017.