



DESIGN-BUILD IS GOOD FOR YOUR PROJECT— AND YOUR COMMUNITY

MANY ORGANIZATIONS ARE SWITCHING TO USING DESIGN-BUILD CONSTRUCTION FOR THEIR TRANSPORTATION PROJECTS. HERE'S HOW YOU CAN USE IT TO REAP MAXIMUM BENEFITS.

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Just a few decades ago, using a design-build process for infrastructure projects was considered radical; today, many expect that nearly [half of all American construction projects will be utilizing design-build](#) by 2026. Highway and street projects (18%), educational projects (13%), and manufacturing projects (14%) are anticipated to represent the greatest percentage of design-build construction spending over the next three years.

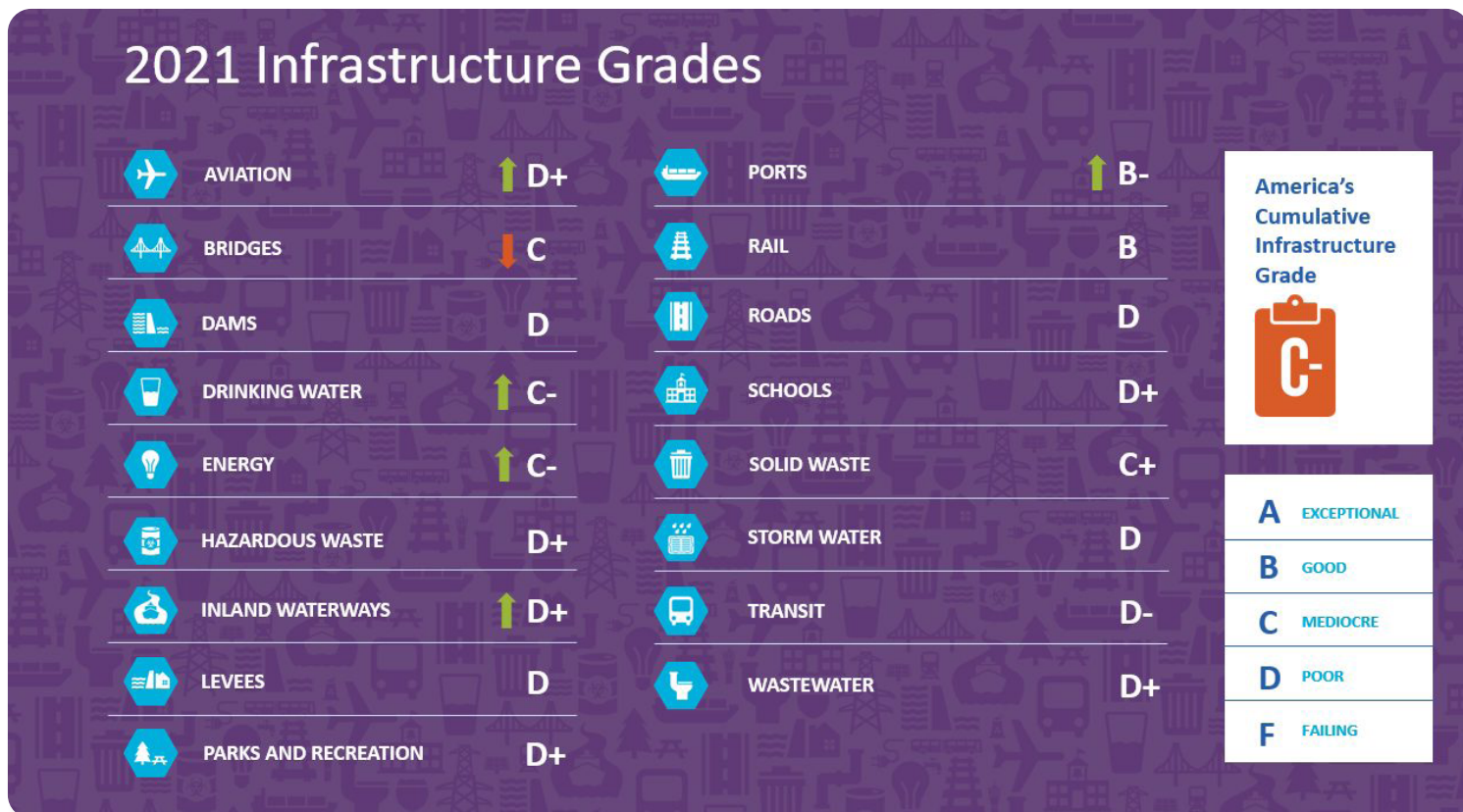
The growth in this model is driven by design-build's unique ability to concurrently leverage the benefits of design and construction for clients (including a compressed construction timeline that includes final design); deliver innovative solutions; and perhaps most importantly, create significant cost reductions when compared to traditional methods.

Design-build is a system that is simultaneously both *high risk* and *high reward*. For clients, using the design-build approach is often preferable because it allows them to outsource risks to the contractor (including the risk of missing deadlines, by building in incentives for early or on-time project completion and daily fines for late completion). It can also provide clients with much more innovative final projects, as the engineering and contracting team can submit alternative project design concepts in their original proposals.

Successfully managing risks is key for the engineering and construction team, particularly managing cost increases, labor issues and delays that could negatively impact project schedules. But if these risks are planned for and managed correctly, and the proposal includes innovative designs, an efficient process and the right team members, design-build can be much more lucrative (and potentially more interesting for the engineering and construction team) than traditional infrastructure construction.

Fostering Adaptation

Design-build doesn't just deliver benefits to individual companies, governments, or organizations; it creates benefits at a societal scale. The United States already has below average grades on infrastructure, and worse, is unprepared for the pressure that accelerating climate change will place on that infrastructure. Examples of infrastructure failures due to climate change fueled extreme weather include uninsulated [water pipes failing on a mass scale during record cold in Texas](#), levee breaks in New Orleans due to unprecedented rainfall and wind during Hurricane Katrina, and [historic and deadly flooding in Vermont](#). Rebuilding the devastated town of Lahaina after the devastating Maui wildfires could take decades using a traditional design-bid-build approach; using design-build for reconstruction could help the community in a much faster time frame.



Link: [2021-Grades-Chart.jpg \(1267x702\)](#) ([infrastructurereportcard.org](#) - which is updated every four years)

Our current infrastructure is failing because it was not built to withstand the climate extremes that are coming and because we are not maintaining and upgrading infrastructure at the pace of other countries. Solving this issue will require both innovation and the ability to finish quick-turn projects—exactly the kind of innovation and speed that a design-build process can foster.

Design-build for Transportation

Too often, today's traditionally designed and constructed transportation projects are completed so slowly that by the time they are built, they no longer solve the problem for which they were designed and during that same time, that problem has become more expensive to fix. Design-build process allows transportation agencies to get ahead with solutions, while quickly improving safety and resiliency, and most importantly, building transportation infrastructure that solves community problems while delivering broad benefits to communities.

It is not enough to simply “switch over” to a design-build process, however. Reaping the benefits of design-build requires preparation on both the client side and the design and engineering and construction firm side, with both needing a nuanced understanding of projects by all parties and the collaborative ability to manage risks.

One way design-build improves final projects is through the allowance of ‘Alternative Technical Concepts’ by agency clients, which happens during the request for proposal (RFP) process. This allows the engineering and construction team to propose innovative solutions in design and function of the project, solutions which the agency can select and embed into the project’s final construction contract. The engineering/construction team thinks creatively about how to solve a problem, proposes solutions and these solutions are selected because they are cheaper to build and work better than the agency’s initial ideas.

For example, engineers on a recent transportation-oriented design-build team were planning to build a structure that protected a section of highway from snow slides. The structure was a shed over the road, which allowed snow to pass over the road without impeding traffic. After deliberation, the engineering team realized they could move the roadway to an alignment that allowed for the building of a faster to complete structure to direct snow under the road—an idea acceptable to the agency client and one that saved money and time on the overall project.

It’s important to remember that design-build is not just about the design of a particular roadway or a single piece of transportation infrastructure. Our transportation system is a network, and as traffic congestion returns to urban areas, agencies will never have the land or money to build roads wide enough to carry all of the vehicles, all of the time. An engineering and construction teams’ project designs and assumptions must include alternative ways to reduce, accommodate and smooth out traffic flow, including trip reduction programs and technologies like ramp metering, ATMS, flow control, tolling, and full surveillance.

A highly skilled team of people who work well together, appreciate each other’s innovative solutions, and trust each other is the final (and potentially most important) factor to a design-build project’s success. This trust should be built through previous experience working on previous design-build projects, because high-functioning teams are best able to deliver high-quality projects that reap the biggest financial benefits.



Steps to success: public sector agency side

For agency representatives looking to use a design-build process to complete transportation projects, a well-prepared RFP and contracting process is key. The RFP should clearly spell out the technical requirements of the project, include the option for alternative technical concepts to be proposed and incentivize innovation through innovation points and a budget for new ideas.

An agency should test out its design-build process on smaller projects, before the stakes (and budgets) become too high. Many of the most successful public agencies using design-build today gained expertise on smaller projects, before moving on to larger ones.

Agency staff who understand and cover the biggest schedule risk elements (like right of way, wetlands, environmental processes, and geotechnical studies) help to reduce risk to their engineering and construction teams. In short, they understand that time is money. Covering these risks requires knowledgeable client teams on the project, people who are flexible and open to new ideas, in addition to a well-designed contracting process.

Design-build can lower the risk of a project for public agencies, but only if staff have done their due diligence in understanding the biggest risks in a project before they hire a project team. For example, if agency staff understand that the biggest risk to a bridge project is likely the geotechnical (underground) instability, but do not confirm the soil properties, that risk does not necessarily shift to the design-build team. Due diligence requires an adequate understanding of the type, size and location of the site, along with a reasonable solution for the structure being built.

Steps to success: design and engineering firm side

Design and engineering firms who wish to use design-build for projects should first pay particular attention to their human capital, and create a team of creative, flexible people who can work at a fast pace and communicate well. Ideally, these team members will have previous design-build experience that gives them the ability to coordinate across disciplines, from planning to operations to engineering.

These disciplines are commonly separated, yet an individual who understands all three (Agency, Construction, and Consulting) is able to solve complicated problems more easily, for example translating the importance of traffic flow and signal timing in ways that allow for the correctly locating the signal heads on a new traffic signal.

People who have both an engineering and construction background can improve the quality control of drawings significantly. This is because they understand the sequence in different construction processes and how to best communicate this in the engineering drawings. These are examples of how team members who can “think outside the box” in finding solutions for clients are ideal.

One of the biggest challenges of the process for firms is the conflict that arises during a project—a sometimes uncomfortable, but necessary part of the process. Rather than reduce conflict, teams and their leaders should be able to manage the conflict and understand how to preserve working relationships throughout.

An important piece of learning for engineering members of the team comes from the construction firm team members, who are usually much more adept at conflict (and conflict resolution) than designers and engineers. In construction, conflicts are often the most efficient way of getting to the root of a problem. Learning how not to take conflict personally, and how to work through conflict with the larger team is an important part of the path to a successful project.



Efficient, effective and better for all

DKS has had the opportunity to be part of a design-build team working to create the nation's first major European-style active transportation management system (ATM) on some of the biggest freeways and highways leading to and from downtown Seattle. The design included implementing hundreds of dynamic message signs for lane use management control, variable speed limits and improved freeway detection systems during a period of major capital construction projects throughout the Puget Sound region. The team was able to complete work in less than a two years' time, shaving months off of the construction schedule and saving money.



ATMS DESIGN BUILD TEAM MEMBERS

FROM LEFT TO RIGHT: MICHAELA ROBERTS, JASON HOLDRIDGE, TELEGRA EMPLOYEE, ERIC SHIMIZU, BARNABY PETERS, CHRIS LONG

This is just one example of how design-build has the potential to speed up the completion of public sector transportation projects, and deliver more safety and better infrastructure [at a time when the United States badly needs it](#). While design-build is not easy, with proper planning and the right team, it can provide a pathway to more efficient and effective projects that will deliver a host of community benefits for years to come.

Eric Shimizu is a Principal Engineer who leads DKS's design-build practice. He has over 30 years of specialized experience in transportation design-build projects, leading illumination, signals, and Intelligent Transportation System design on some of the most complicated design-build projects in the Puget Sound, Washington area.

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