

How NYSDOT took design-build from minor pilot to major procurement in three years

New processes bridge the knowledge gap and become best practices



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In 2011, the New York State Department of Transportation received legislative authority to let design-build contracts. Three years later, we selected design-build to deliver the largest project in state history: the \$555 million first phase of the Kosciuszko Bridge Replacement Project, the largest single contract ever awarded by our department and the first major bridge crossing to be constructed in New York City in 50 years.

A critical link in New York City's transportation network, the Kosciuszko Bridge carries Interstate 278, the only north-south directional interstate in western Brooklyn and Queens, and more than 160,000 vehicles a day over Newtown Creek. Replacing the existing 1939 combined through-truss and deck-truss bridge was a high-profile job that would impact thousands of motorists, surrounding businesses and neighborhoods. The new replacement bridge spans are being constructed in two separate phases to minimize impact to the traveling public. Once complete, the new Kosciuszko Bridge will improve traffic flow by improving travel speeds on the highway and eliminating recurring delays on this segment of Interstate 278.

Letting a project of that scale when our design-build program still was in its infancy was a risk, but the potential rewards were too compelling to ignore. We had to seize the opportunity. Originally, the bridge was slated as a design-bid-build job. Due to fiscal constraints, the estimated total cost of the project would far exceed what the New York City regional office could anticipate in its total annual funding program. To allow the department the opportunity to advance this critical project and other projects that would address the New York City region's deteriorated bridges, we chose to divide the project into several smaller, more manageable contracts that would be let individually two to three years apart. As a result, the project was estimated to take 10 years to complete. Design-build could accelerate delivery by as much as four years.

In May 2014, we awarded the phase 1 contract, which included construction of the Queens-bound span of the new bridge and the demolition of the old bridge.

Three years later, in April 2017, the Queens-bound span of the new bridge opened to traffic, becoming the first cable-stayed structure in New York City. At the writing of this article, the Brooklyn-bound span of the new bridge, under construction as part of the phase 2 contract, is anticipated to be complete in 2019.

When completed, the twin cable-stayed structures will create a signature skyline between Brooklyn and Queens and will provide a dramatic visual experience for bridge users and for the local communities. The entire project is expected to be delivered on schedule and on budget.

Processes become best practices

Growing design-build from adoption to advanced application in three years required wholesale shifts in thinking and processes within our DOT that since have become the standards for delivering large, complex design-build projects in New York state. Following are some of them:

- **Operated out of our Albany office.** Naming the NYSDOT Commissioner's Albany, New York, office as project headquarters sent a message about the project's priority, urgency and executive staff's all-in commitment. There could be no failure on the largest project in state history, and DOT staff at the highest levels would ensure it.
- **Educated staff.** We provided multiple day-long workshops that helped shift the department's mindset from how we've always delivered projects to thinking about delivery in a new way. Our workshop covered — among other things — project initiation, request for qualification, draft/final request for proposal and proposal technical evaluation. Today, we offer the same training for other New York state agencies interested in adding design-build to their delivery toolboxes.
- **Retained subject-matter experts.** We sought the help of structures, environmental and geotechnical specialists and others to ensure consistency in developing the RFP and procuring a contractor.
- **Developed a high-quality request for proposals.** We chose design-build not only for its accelerated pace but also for its innovative nature. Designer and contractor collaboration often results in innovations that save money and time. Plus, we benefited from design-build's promise of cost certainty at award.
- **Emphasized multiple one-on-one, confidential meetings.** We instituted two-way, confidential dialogue with bidders to improve RFP requirements, risks and contingency costs. We also discussed early alternative technical concepts as innovative solutions.

To reap those benefits, however, the DOT had to be willing to give up the long-time practice of providing detailed specifications. To ensure we received the product we envisioned, we invested significant time and energy to create an RFP that clearly communicated not only a clear scope but also described what we wanted and, more importantly, what we didn't want. Detailed specifications make the RFP too prescriptive and stifle innovation.

During these one-on-one meetings, design-build teams often will propose an innovation that could improve quality, accelerate schedule or lower the construction cost. For example, the winning team for Route 17 at Route 32, Exit 131, Woodbury Commons Reconstruction Project proposed a diverging diamond in place of a cloverleaf interchange because of the diamond's smaller footprint and better traffic flow.

After hearing a team's idea, we internally discuss risks and contingency costs, and, if we find the concept to be supported by facts, we allow the specific design-build team to include the innovation in its proposal, while keeping their idea confidential.

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We approved two innovations or alternative technical concepts for the Kosciuszko Bridge:

1. The phase 1 design-builder proposed fusion welding the circular hoop bars used to confine the vertical reinforcement for the main span pylon drilled shafts, which created a cage that could be lifted and inserted into the foundation shafts. At the time, our department had limited experience with fusion welding, and the method was not identified in our specifications. With a large number of hoop bars required for the eight drilled shafts supporting the main span pylon, the phase 1 design-builder noted that to use conventional welding methods to connect the hoop bars would be both costly and time-consuming. Further, because they had experience using fusion welding on other projects outside of New York state, they proposed its use on the phase 1 project.

After performing the necessary testing that confirmed its durability and quality, we approved the use of fusion welding. As it turned out, the technique was a cost-effective solution that provided a high-quality connection and allowed the phase 1 design-builder to quickly complete the work.

2. By welding a tapered end section to a conventional steel pipe pile, the phase 1 design-builder proposed a solution for the approach structure foundations that avoided impact to an environmentally sensitive clay layer in Brooklyn. Due to the historic use of the project site as an industrial area since the early 1900s, contaminated soil and groundwater were present throughout the project limits. The project's RFP requirements restricted the design-builder from penetrating the clay layer, which existed 50 to 60 feet below ground, because it could lead to cross contamination. Due to its unique tapered shape, this pile system allowed the design-builder to develop significantly greater capacities at much shallower depths than similar-sized conventional pipe or H-piles, thus allowing them to avoid the clay layer. The tapered piles densify the soil as they are driven. By increasing pile capacity, they reduced the number of piles required and reduced the pile cap size, which also reduced the amount of contaminated soil to be excavated. In addition, the phase 1 design-builder had a very high productivity rate, as they were able to drive the tapered piles quickly and efficiently, keeping this activity on schedule and reducing risk of schedule delay.

The twin-span design dictated the Brooklyn-bound span (phase 2) of the Kosciuszko Bridge be identical to the Queens-bound span (phase 1). In fact, part of the phase 1 scope required the design-builder to develop the preliminary design of the Brooklyn-bound span to a meaningful level to ensure it could be constructed with the new Queens-bound span already in place. That preliminary design served as the basis for the final engineering design completed for the Brooklyn-bound span in phase 2. In addition, all the aesthetic elements and features needed to be consistent on both structures.

Because the Queens-bound span (Phase 1) was completed meant, theoretically, the design of the Brooklyn-bound span (phase 2) was completed, too. Because speed still was critical but innovation was no longer necessary, we procured phase 2 using design-bid-build "best value" procurement, where schedule remained a priority. The technical criteria (50 percent weight) emphasized the firm's schedule, key personnel, construction approach, experience, past performance and presentation. The contractor proposing the fastest schedule won the job.

Moving New York forward

The Kosciuszko Bridge undoubtedly will rank among the most successful infrastructure projects in modern state history, largely because of design-build and the best practices that supported its smooth implementation.

Since then, we have added 37 more design-build projects to our portfolio, totaling more than \$3 billion. On average, more than a quarter of our annual budget uses the design-build delivery method.

Design-build is not always appropriate, but when speed and innovation are paramount to delivering a critical mobility project, NYSDOT will use alternative delivery methods.

The Kosciuszko Bridge Replacement Project is proof that with the right processes, we can move visionary projects from traditional design-bid-build to design-build as the design-build program continues to be refined.

ABOUT THE AUTHOR

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Hunts Point Project Record of Decision and Request for Proposals in parallel

In hopes of further collapsing the design-build delivery approach, NYSDOT plans to overlap the environmental process with procurement on the Hunts Point Interstate Access Improvement Project, valued at \$555 million.

The federally funded project will construct interstate ramps, taking more than 13,000 commercial vehicles a day off local streets by connecting them directly to the Hunts Point Food Distribution Center, the largest food distribution center of its kind in the world.

Typically, Federal Highway Administration requires a DOT to have a Record of Decision before releasing a Request for Proposals. In this case, the RFP was released prior to having a NEPA ROD, which was signed on April 9, 2019. Had the process not been overlapped, the project would have been approximately five months behind schedule.

The project currently is on track to meet the target best-value designation date. The request for proposals is being finalized via addendums, and the confidential one-on-one meetings with the shortlisted design-build teams have concluded.