

WHITE PAPER / EPC FOR MUNICIPAL PROJECTS

EFFICIENCY AND SCHEDULE CERTAINTY DRIVE PROJECT DELIVERY SELECTION

BY Esteban Martinez, PE, AND Jamison Parker, PE

Critical improvements at electrical substations call for timely repairs, but traditional project delivery methods can take years to complete. The engineer-procure-construct (EPC) approach leverages efficiencies to deliver important work cost-effectively in less time for municipal utilities.



While design-bid-build (DBB) is a tried-and-true project delivery method readily accepted by municipal electric facilities in Florida, the engineer-procure-construct (EPC) approach is increasingly being used for large-scale projects and programs — and is delivering benefits at a smaller scale as well.

Beaches Energy Services is a relatively small municipal electric utility, serving 35,000 customers in Ponte Vedra Beach, Jacksonville Beach and Neptune Beach, Florida. Faced with the need to replace a transformer at a critical substation, the utility selected a progressive EPC approach to get the job done safely, quickly and efficiently.

This paper uses the Beaches Energy Services case study to explore why the EPC delivery method was chosen for this project, the steps of the process, and the benefits for the substation project and the utility.

THE NEED

The Beaches Energy Services electrical system includes six substations in a chain. In 2018, two of the three transformers at its Sampson Substation locked out about a month apart. Both instances were due to catastrophic failure of load tap changers. Because of the Sampson Substation's position at one end of the chain, this put the system on precarious footing. If anything happened to the third transformer, it would lead to a devastating result downstream from the substation.



One of the failed transformers was 30 years old, and the other was 40 years old. The remaining one, which would only load halfway, was also 40 years old. It was beginning to exhibit erratic behavior as well, so the utility knew that substation needed inspection.

With limited internal resources — based on tight staffing and a small engineering team — and the recognition of a complex upgrade project looming to replace the 40-year-old Autotransformer No. 2, the utility needed an emergency game plan. A project of this scale and complexity would be extremely challenging to manage alongside day-to-day duties.

WHY EPC WAS SELECTED

Going back to 2000, it appeared no Florida municipal utility had utilized the EPC project delivery method. That made it hard to find go-by documentation and an execution framework. Furthermore, municipal utilities are bound by state statutes and municipal ordinances. These regulations can be limiting to consultants, and they can complicate project management when different elements are constrained by differing legal criteria.

For the Sampson Substation project, time was of the essence. The utility was determined to utilize the project delivery method that would be the most efficient and likely to hit targeted in-service dates. Using EPC gave the utility access to dedicated project management and construction management personnel beyond its internal resources. The EPC method's ability to coordinate steps in parallel and start some aspects earlier would help condense the project timeline.

Among the advantages of EPC project delivery were greater efficiency, cost and schedule certainty, and risk mitigation. Having a single entity managing all aspects would streamline multiple aspects of the project life cycle. Comparing the additional cost of allocating internal resources to the project with having one vendor handling matters seamlessly from beginning to end, the benefits of EPC clearly extended beyond the expense of individual subcontractors.

It was challenging to convince the governing body of the merits of EPC, given what appeared to be higher upfront costs. But the utility made a persuasive case for benefits that extended beyond cost certainty to include schedule efficiency and dedicated external resources. It pointed out another project at a similar cost point that began in 2017 and took three years through the traditional DBB approach. The vital Sampson Substation project would be energized in a matter of months, not years.

HOW IT UNFOLDED

Beaches Energy Services had a strong sense of what needed to be done at the substation and how it wanted the work performed, so it elected to put out a request for qualifications rather than a request for proposals.

Under the circumstances and given the commitment to using EPC project delivery, the utility placed emphasis on qualifications over pricing. Its primary objective was to select a highly qualified firm that would be capable of providing the necessary services on a complicated project.

The RFQ evaluation criteria were intended to gauge applicants' abilities to successfully support the substation project across many variables:

- **Execution plan:** How would the contractor manage the execution of the project (i.e., engineering, procurement, construction, testing)?
- **Key personnel:** Does the contractor have sufficient breadth and depth of resources?
- **Material management:** How does the contractor plan to manage lead times for equipment and materials?
- **Proximity:** Does the contractor have resources close at hand for the project?
- **Quality:** Does the contractor have specific, relevant EPC experience on similar projects?
- **Safety:** What is the contractor's plan to protect personnel and property?
- **Subcontractor utilization:** How would the contractor utilize subcontractors, and what would the local and minority business representation look like?

Beaches Energy Services conducted interviews with applicants about expectations and ability to meet or improve on the schedule.

The contract ultimately was awarded to Burns & McDonnell, in part based on its plan to utilize progressive, or "open-book," EPC. Under that structure, the prime contractor performed the engineering, developed a price, put together an estimate and shared it with the utility. The package was then put out for bid, and the utility and prime contractor worked together to decide which firms to select for purposes of cost certainty.

By discussing and assigning risk in advance, and evaluating all bids collaboratively and transparently, the utility gained a lot of insight into EPC best practices while also achieving the efficiencies and relative cost certainty of that project delivery approach.

REAPING THE BENEFITS

Utilities with perfect drawings of their facilities are few and far between; there are almost always some discrepancies. Using the open-book approach gave Beaches Energy Services additional clarity on any changes of scope based on differences from drawings. A contingency amount was built into the prime contract to compensate for any additional scope arising outside of the contractor's fault.

The project similarly benefited from having a Burns & McDonnell construction superintendent with more than 30 years of experience on-site to monitor construction and mitigate any potential shortcuts, since quality was a critical factor for the utility and Burns & McDonnell.

As part of efforts to lower risk and plan project sequencing effectively, the prime contractor brought in contractors prior to setting prices and shared the 30% design and what was to be built. In those meetings, the engineering team and subcontractors brainstormed how to achieve the objectives with minimal outages, and how to design and sequence the construction for a combination of safety and efficiency. These open discussions helped deliver schedule

certainty, which was reinforced by having the construction superintendent monitoring safety and quality and seeing that the project schedule was being met.

The EPC prime contractor met with subcontractors weekly to provide a three-week look-ahead and discuss any issues or upcoming outages. Any plan discrepancies or changes, such as potentially rerouting a conduit, would be discussed. The prime contractor also met biweekly with the utility to provide ongoing status updates and discuss any significant issues without forcing the utility to delve into the fine details of the work.

In addition to installation and energization of Autotransformer No. 2 at the substation, the project included addition of a 138-kV station service voltage transformer (SSVT) connected to the 138-kV ring bus, providing a measure of redundancy. Five motor-operated disconnect switches were replaced as well, among the many pieces of equipment being changed out. The switches had been previously ordered and were awaiting installation, but the project team discovered that a few accessory parts were missing. The probability is high that such a detail could have been overlooked by strained internal resources, but the EPC team was able to get the parts expedited as soon as the issue was identified. If not for this project, the problem likely would have come up in the middle of an outage, forcing the utility to place an order through regular procurement and costing precious

time. Instead, the project delivery structure helped obtain the necessary parts a day before the outage, resulting in no negative impact to the project schedule.

CONCLUSION

The substation upgrade project was substantially accomplished over the course of about eight months by utilizing progressive EPC to deliver the vital project efficiently and cost effectively, including everything from engineering and procurement to construction and testing/commissioning.

In contrast, under a conventional approach, once an engineering firm had been selected, that firm would have had to procure materials based on the specifications, bid that out, respond to the bids and then repeat the process with construction specifications. Furthermore, the utility and its partners would have needed to schedule outages with state authorities. For a project of this magnitude, those outages would have needed to be requested months in advance in order to accommodate the potential impact to the bulk electric system in the region and the state.

Once all of those pieces would have been in place and construction had begun, discrepancies in materials and/or designs likely would have arisen. When different entities are supporting engineering and construction, this can quickly devolve into a back-and-forth, finger-pointing exercise.



The EPC contract instead placed all responsibility with a single point of contact — the prime contractor — that then had responsibility to iron out any problems and deliver any cost and schedule savings within the terms of the lump-sum contract. The efficiencies in terms of project sequencing, spared work hours and cost savings from utilizing best practices meant the utility could trust that it would get a successful project completed on schedule, enhancing capacity and reliability on its grid.

BIOGRAPHIES

ESTEBAN MARTINEZ, PE, is a project manager in the substation department at Burns & McDonnell. He is an electrical engineer specializing in the design and construction of electric power substations. His responsibilities include management of EPC projects, from concept to final design and construction; design of electrical layout; and protection and control schemes. He is a registered professional engineer in several states.

JAMISON PARKER, PE, is an electrical engineer at Beaches Energy Services. He is an electrical power systems engineer responsible for transmission, substation and system protection and control. His responsibilities include engineering, project management, planning, operations, maintenance and NERC regulatory compliance. He is also a lieutenant in the U.S. Navy Reserve and a registered professional engineer in Florida.

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