BURNS McDONNELL

SERVICE FEATURE / **HELICAL PILES PREFABRICATION AND CONSTRUCTION**

IMPROVING COST AND SCHEDULE OF SUBSTANTIAL INDUSTRIAL PROJECTS

Helical piles have secured their spot as one of the most resilient, cost-effective foundation choices. When incorporated into an integrated delivery approach, in-house prefabrication and installation of these structural foundations provide even more value, adding to their wide-ranging benefits.

HELICAL PILES: PROVIDING A STRONG FOUNDATION

The critical nature of our aging infrastructure has been at the forefront of industry conversations and concerns, increasing the awareness of durability, longevity and efficient project delivery. Improved construction execution and appropriate material choice are proven solutions that provide substantial relief to ongoing challenges, including schedule and budget constraints.

One thing that has stood the test of time — for many reasons — is the reputation and application of helical piles. Renowned for securing deep foundations, they have carried the weight of buildings and bridges for almost 200 years.

Invented to shore up lighthouses, helical piles are composed of helical bearing plates welded to a central steel shaft or extension. Transferring the load from the shaft to the ground, the helix-shaped plates efficiently screw into the soil with minimal disturbance. Installed via a hydraulic drive head, helical piles provide secure foundations with minimum embedment and calculated torque.

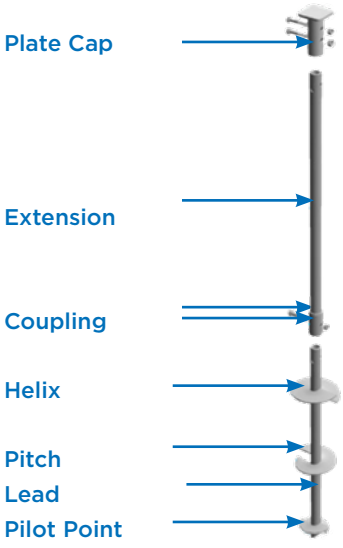

FIGURE 1: *Helical pile components.*

MEETING EVOLVING MARKET DEMANDS

Helical piles typically are a faster, more cost-effective construction option than traditional concrete foundations. But instead of trusting the prefabrication and installation to separate entities, an integrated design-prefabricate-construct approach offers a more streamlined option, where all is handled in-house and absorbed into the comprehensive project package.

Partnering with AZCO, a Burns & McDonnell prefabrication and construction subsidiary, our integrated team has the capability to safely and effectively execute design-build projects as well as fabricate and install helical piles as part of the overall project delivery. Offering this service in-house accelerates foundation installation at industrial and manufacturing locations and at power delivery facilities, reducing project cost, schedule and footprint.

An integrated team approach improves the overall quality of the final installed product because the chain of control stays with one company.

Through collaboration and testing, an inclusive engineering, prefabrication and construction team identifies solutions and standardizes offerings to meet speed-to-market demands. The Burns & McDonnell family of companies engages skilled craft, the right equipment and innovative technology to engineer, design, prefabricate and install helical piles for a variety of applications.

WHAT'S IN A NAME?

Helical piles also are called:

- **Auger screw piles**
- **Ground-anchoring system**
- **Helical anchors**
- **Helical piers**
- **Helix piers**
- **Screw anchors**
- **Screw foundations**
- **Screw piles**
- **Screw piers**
- **Steel screw-in piling**
- **Torque anchors**

Folding prefabrication and installation of helical piles into the mix swiftly advances new construction as well as the development of replacement parts for aging concrete foundations.

DIGGING DEEP INTO THE BENEFITS

Prefabrication of helical piles delivers predictable costs and enables expedited schedules, with immediate, direct delivery anywhere in the world. This customized, prefabricated process provides individual design assurance and improved quality control.

Made of carbon steel with optional galvanizing, helical piles can be installed in any weather and within most environments. They also offer a mostly spoils-free installation process, resulting in less excavation, concrete and expensive off-site trucking.

Helical piles are prefabricated and inspected for accuracy, weld quality, and conformance to the design and specifications of each customer or per requirements. The finished product then undergoes performance testing. Utilizing an integrated design process also involves effective sourcing of equipment, drive heads and torque monitors for efficient installation.

As part of an intelligent, streamlined construction approach, helical piles allow for low-clearance installations of multiple piles per day. Designed and prefabricated to stand strong for a long time, helical piles are not only a preferred option for poor soil conditions within challenging landscapes but also a competitive option for good soil.

Bringing the prefabrication and installation of helical piles under one integrated construction entity, packaged as part of the project delivery approach, is smart integration. Beyond increased project efficiency, it's a lasting combination that significantly reduces project cost and footprints and enhances speed to market.

SECURING SUBSTATIONS WITH HELICAL PILES

Embedded deep underground, helical piles create a durable platform and solid foundation that can withstand the loads of industrial power plants, substations and transmission line structures.

CARRYING THE LOADS

Suitable for varying subgrade profiles, helical piles are scalable for light to heavily loaded structures, including:

- 3-pole potential transformer (PT) structures
- A-frame structures
- Backbone structures
- Bus support structures
- Chemical tanks
- Commercial buildings
- Control enclosures
- Circuit breakers
- Distribution structures
- Electrical switch structures
- Guyed tower PT structures
- H-frame structures
- Industrial power plants
- Instrument transformer structures
- Pipelines
- Lattice tower replacements
- Refinery pipe racks
- Solar panel structures
- Tangent pole structures
- Transformers
- Transmission line structures
- University facilities
- Upstream and midstream oil and gas equipment
- Water crossing structures

Burns & McDonnell was selected in a joint venture as the engineer-procure-construct (EPC) contractor for two new substations and the expansion of a third in the Rocky Mountain region. New and updated power infrastructure would support the addition of more than 1,000 megawatt of new wind generation capacity throughout the region.

Due to power purchase agreements for new renewable generation facilities, this project had a stringent schedule and firm completion deadlines. With remote substation sites, the availability of labor and concrete supply resources also was limited. Fortunately, helical piles addressed many of the project and site challenges. For a 10-acre substation expansion and two new facilities covering 120 acres and 140 acres, helical piles delivered durability and longevity in support of substation structures up to 500-kV.

With limited excavation, off-site prefabrication and fewer installation team members, helical piles allowed the bulk of the work to be done in a shop, then put in place with minimal disruption to the surrounding environment.

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