CASE STUDY

Helical Pier Foundation for Industrial-Scale Battery Energy Storage System

INTRODUCTION

Rosendin Electric, a leading U.S. energy contractor, was planning to increase grid stability with the addition of a central BESS facility located in Rosamond, California.

The Battery Energy Storage System is an increasingly important component of the American energy grid, due in no small part to the rapid growth of renewable energy generation in this country.

As part of their overall project to enhance grid capacity in Rosamond, California, Rosendin Electric planned to include large-scale energy storage for reliability and stability.

Because they're comprised of dense battery banks and large inverters, along with other command and control equipment, single BESS units are enormously heavy structures to support.

The geotechnical report for the site indicated that helical piers would be an efficient and economical foundation solution compared to other foundation solutions for the facility.

S&B Helical would ultimately be engaged to work with Rosendin's chosen engineering firm to deliver and install 2,076 piers to their specification in less than 7 weeks.

AT A GLANCE

Client	Rosendin Electric
Project	Rosamond Central BESS
Structures	Energy Storage Systems, Containers, Inverters
Location	Rosamond, CA

FOUNDATION SPECS

Material	Galvanized Piers, Steel Caps
Site & Soil Conditions	Some tight access, stiff and challenging soils
Pier Diameters	3-1/2" 5-1/2"
Embedment Depth	13'

The Challenge

Rosamond, California, located in a western valley of the Mojave Desert, is a land of extremes.

Soaring summer temperatures give way to freezing winds in winter, creating a tough and difficult landscape to live and build in. The soil itself is classified as an "Aridisol", which means it delivers very dry and dense conditions (particularly for installing a deep foundation).

It was here that Rosendin Electric was planning to build a large battery energy storage facility to support existing renewable energy power generation and increase grid reliability. The site was set to span several acres and would house several industrial-size BESS units and their related infrastructure.

Pre-construction geotechnical reports indicated the soils were dense and stiff. Additionally, SIMOPS created an environment where several contractors would be working in close proximity. These challenging soil and site characteristics made foundation solutions like cast-in-place or driven piles an undesirable prospect.

Rosendin decided to explore a helical pier foundation solution that would meet their needs and satisfy project budgets.

The Solution

After realizing a helical pier solution would be more efficient and economical, Rosendin Electric hired SOA Engineering to design the foundation. Our team at S&B Helical was then contracted to supply and install the helical foundation.

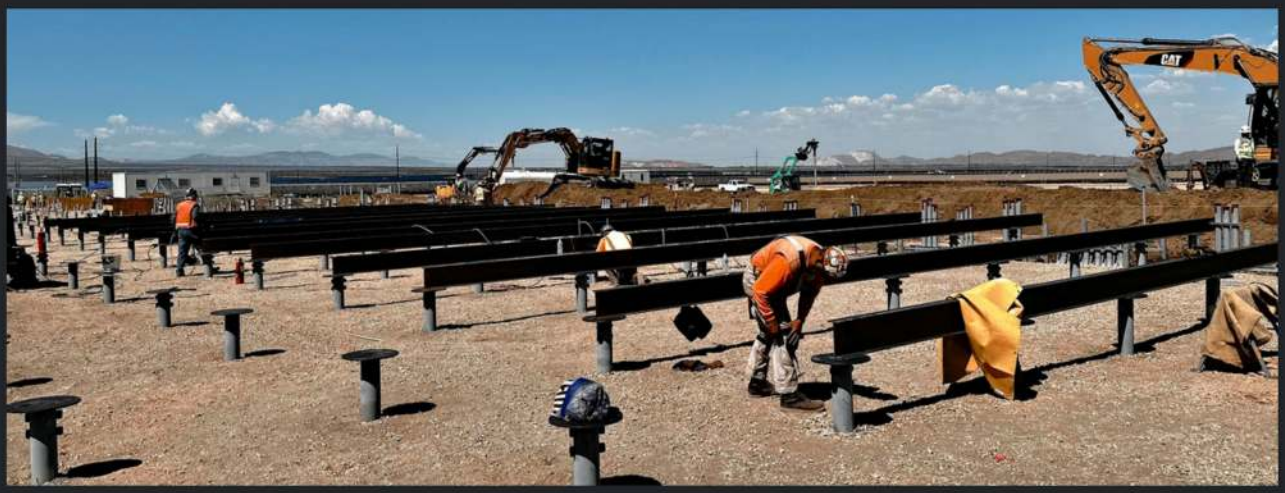
The engineering team came up with an efficient helical pier design that would provide outstanding support to the BESS units in the tough desert soil.

Based on the engineering team's designs our procurement crew acquired the helical piers, caps, beams, and hardware, needed for the foundation. Because we've built extensive relationships with vendors and suppliers across the U.S., we could source high-quality materials and hardware.

To maximize installation efficiency, S&B Helical planned to utilize four excavators and around 25 crew members to allow for multiple piers to be installed simultaneously.

Each installation team would consist of a trained equipment operator, a grade checker, and ground crew. A dedicated quality control inspector would also be present to check the battery packs and inverters before our installers would continue working.

S&B Helical would also send additional employees to train the required California union labour force in the installation of helical pier foundations to ensure maximum on-site efficiency, safety, and performance.



Implementation

Because this project took place in California, the S&B Helical team was obliged to adhere to some of the strictest labor laws in the entire United States.

This meant that S&B Helical was required to use union labor to remain compliant, which our team was happy to do.

The union workers had to be trained how to safely, accurately, and efficiently, install helical pier foundations. To achieve this, several highly-experienced S&B employees traveled to the site to deliver hands-on training.

Once the union crews were prepared to install piers to S&B Helical's exacting standards, progress was rapid. At peak our crews were installing 95 - 100 helical piers per day.

Skidsteers were used to maneuver the helical piers on-site and attach them to excavator-mounted drives that would turn them into the ground.

Once attached, the piers were precisely positioned according to the plans and smoothly rotated into the ground with the excavator. After confirming the pier height to be accurate, S&B's contracted union ironworkers installed the caps and beams to finish the foundation.

Over the course of the project, very few of the helical piers installed required remediation. In fact, in one single day our crews installed **100** helical piers with **none** of them requiring remediation.

Rosendin Electric was able to utilize the foundation immediately, erecting battery packs and inverters while our crews were installing piers for the next one.

Problems & Our Solutions

No project is ever completed without unexpected challenges to overcome. During the course of the Rosamond Central BESS project, our S&B Helical team cleared several hurdles and implemented rapid solutions to difficult problems.

Problem	Our Solution
Soil conditions were significantly more dense than geotechnical analysis had indicated during design and engineering. The equipment we chose based on geotech turned out to be undersized for the actual soil conditions	Delivered an entirely new complement of properly-sized installation equipment and machines best suited to the actual soil conditions within one work week. Increased installation productivity to overcome time lost
Installation priority was changed two weeks before mobilization. Our team had been producing, preparing, and delivering, 3-1/2" piles for several weeks. Close to mobilization, we learned the 5-1/2" piles had to be installed first	With very little time to recover, the S&B team was able to coordinate with our outstanding vendors to produce and deliver the 5-1/2" material in time for mobilization.
Upon arrival at the job site, our team had no IFC's and were not allowed to install helical piers until we received IFC's. This caused a delay of 7 calendar days (4 working days)	With the loss of working days, our crews focused on efficiency and productivity to recover the time lost once IFC's became available and work could begin
Scope of the project changed after mobilization, several hundred 5-1/2" helical piers were added to the design while S&B was on-site	Coordinated with our excellent vendors and engaged our team to source and produce the additional 5-1/2" helical piers required by client
S&B Helical was obliged to use California union labour for the first time and had to train the union workers while abiding by some of the strictest labor standards in the nation	Rapidly familiarized the S&B team with the standards and expectations of California's union labor. Safely trained those union workers to install quality helical piers

Success

By the time our crews had finished, over 2,076 helical piers were safely and successfully installed. There were no change orders caused by S&B Helical at any point during the project.

While the challenges on this project slightly increased our days on-site from 38 to 44, our team never stopped devising solutions and coordinating with vendors to ensure delays were kept to a minimum and progress could continue.

The new Rosamond Central BESS is now ready to assist in grid reliability for years to come, supported by a strong and durable helical foundation installed by a dedicated team of hardworking professionals.

S&B Helical thanks Rosendin Electric and all other partners who worked together to make this project a success.

Results

2,076 helical piers were installed in just **44** working days

Efficient processes meant up to **100 helical piers per-day** were being installed

Trained local union crews to install quality high-capacity helical piers

Piers required virtually no remediation, most days averaged **0 - 2 piers** for remediation

Battery packs and inverters were being installed **daily** concurrent to new foundations being laid

Compared to cast-in-place or driven solutions, a helical foundation was **faster and more economical**

Zero change orders caused by S&B Helical

Absolutely **no safety incidents** among S&B's crew

Questions or comments about this case study?

Let our team of foundation experts answer your questions about **faster**, **easier**, more **efficient**, and more **environmentally-friendly** foundations.

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