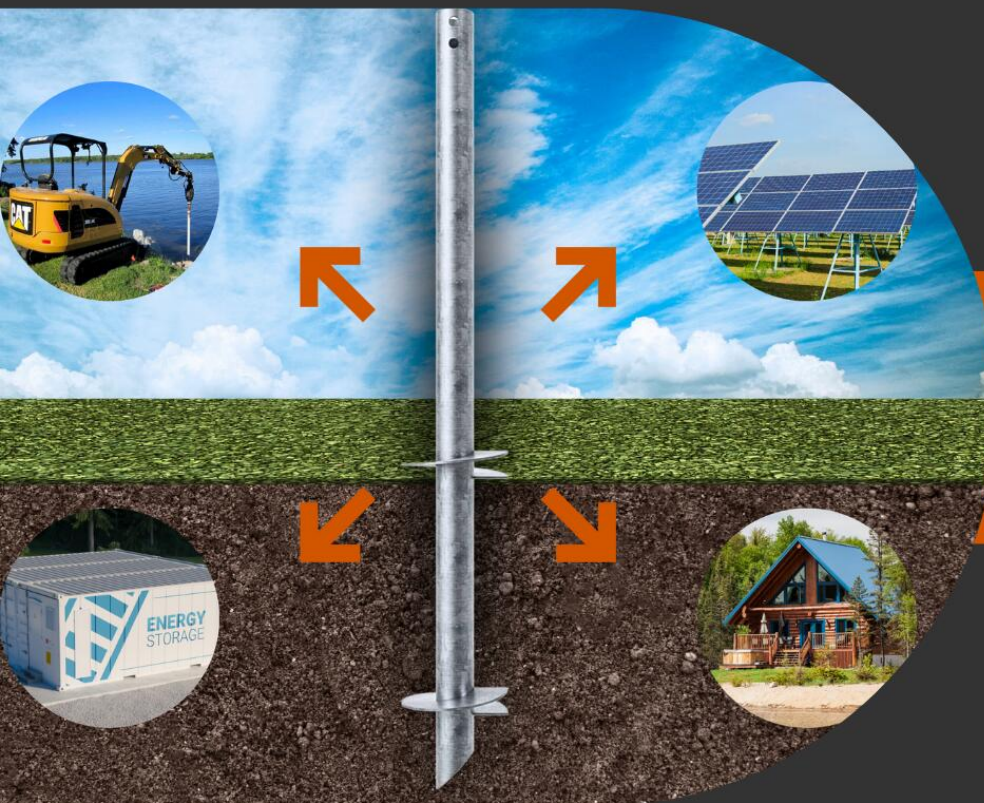




Your Complete Introduction to Helical Pile Foundations



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There's a foundation technology that's allowing large and small projects to be built **faster**, **easier**, with **minimal environmental impact**. Meet the **helical pile foundation**, an alternative to solutions like poured concrete or driven piles. This foundation has been completely revolutionizing construction across America, and now it's gaining popularity in Central New York.

But, what is this impressive foundation really all about? Find out in this complete introduction that will teach you **everything important to know** about helical piles.

Introduction

Humankind has been building for thousands of years, and one of our constant challenges has been finding the right foundations to support our civilizations. Take an ancient settlement like Çatalhöyük in Turkey, for example. It's over **9,000 years** old and uses foundations that are, essentially, nothing more than humble packed mud.

Fast-forward to the modern era and the evolution of foundation technology has been staggering. Far from packed mud, these days you have a wide range of materials and solutions to choose from when it comes to foundations.

You may already be familiar with common options such as concrete, but have you heard of **helical piles**?

This unique foundation was invented nearly 200 years ago, supports everything from luxury homes to industrial construction, and completely transforms how you can build in Central New York.



Unfortunately, many people are still unaware of **what** helical piles are, **how** they work, or their countless **benefits** compared to other options. Time to fix that!

Join us as we explore the ins-and-outs of helical pile foundations in Central New York, covering topics like:

What are helical piles?

1



2

How do they work?

How do they compare to other foundations?

3



4

What's the cost of a helical pile foundation?

And more...

5

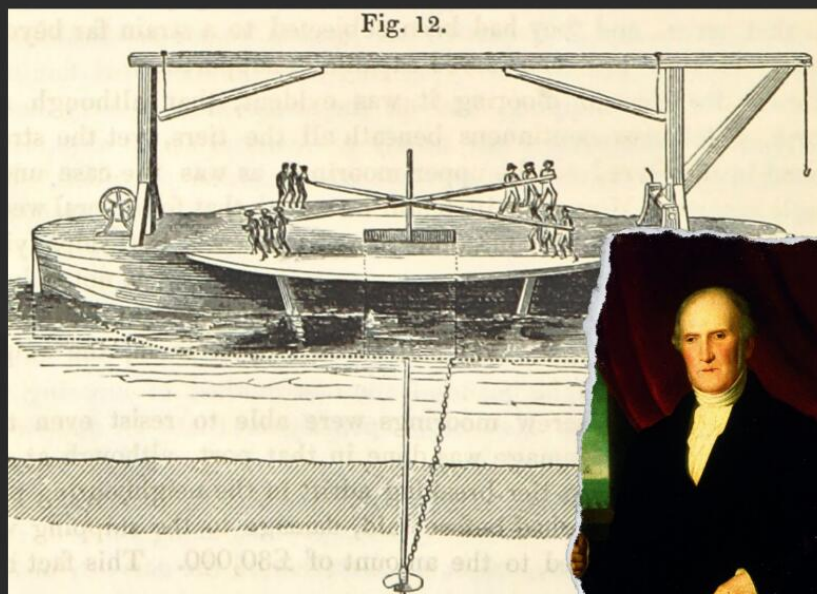


The (Fascinating) History of Helical Piles

Okay, we admit, structural foundations might not *seem* like the most fascinating topic at first glance. If anything they can feel like an afterthought, something that goes into the ground and is quickly forgotten.

But the history of helical pile foundations is, honestly, quite fascinating and gives some insights into why they're such an effective support nearly 200 years after their invention.

Rewind to the early 1830's, where an interesting man named Alexander Mitchell is hard at work on an idea that could change the world. Mitchell himself is quite the character, from going completely blind at age 21 to starting a successful brick-making business and eventually taking an interest in engineering.



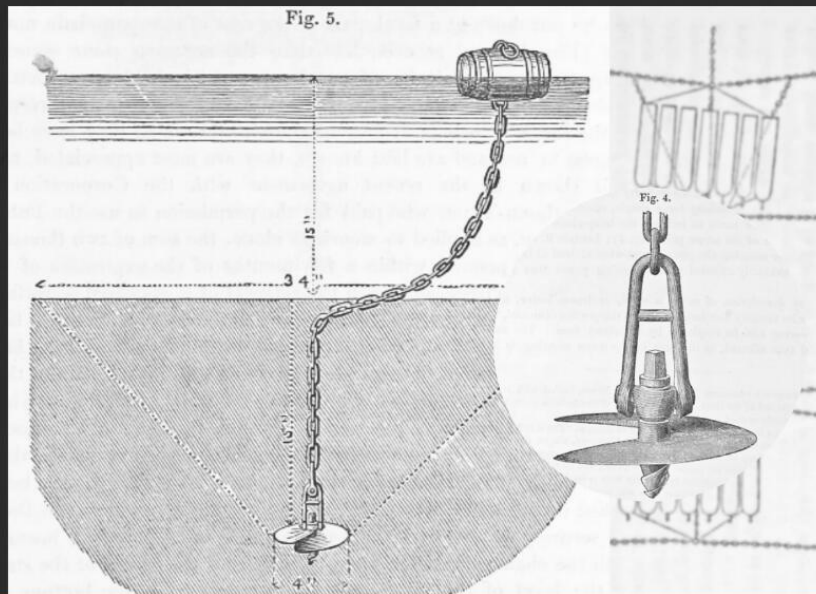
Alexander Mitchell, inventor of "screw piles", possessed a remarkable understanding of soil conditions for the day. Also shown is the manual method of turning helical piles in by hand.

One of the areas that caught his attention was the (at the time) poor coverage of lighthouses along the waterways. Many ships were lost because they couldn't navigate through inclement weather or at night.

But, it was a challenge to build lighthouses on the poor soils found along the coast. And putting them offshore could typically only be done in areas where solid rock was close to the surface.

Greatly concerned over the loss of life, Mitchell wanted to figure out how to support lighthouses in sandy and soft soils. If only they had a foundation that could handle harsh building conditions and withstand the savage forces of nature.

Then, like a flash, he found inspiration from the very ships he was hoping to protect. Some harbors of the day used a particular type of anchoring device that would screw into the soft mud on the bottom and provide a secure point to hold a ship.



The helical-style anchor system that inspired Alexander Mitchell to create the "screw pile" (helical pile)

Amazed that such a simple device could hold massive ships in place even during violent storms, Mitchell would take the idea and add one critical component - the pile shaft.

By attaching the helix-shaped plate used to anchor ships to a long shaft, they could be "screwed" deeper into the ground and deliver structural support for buildings. Like a lighthouse, for example.

He would patent the "screw pile" (what we call a **helical pile** today) in 1833 and would use it under the Maplin Sands Lighthouse a few years later. Over the following decades an uncountable number of lighthouses, bridges, piers, and other structures were built on Mitchell's revolutionary foundation.

191 years after their invention, the core design of a helical pile has not changed that much. Modern materials and manufacturing are more precise, plus the installation equipment has improved dramatically. Yet the engineering principles established by Alexander Mitchell hold true to this day, and continue to live-on in the modern helical foundation.

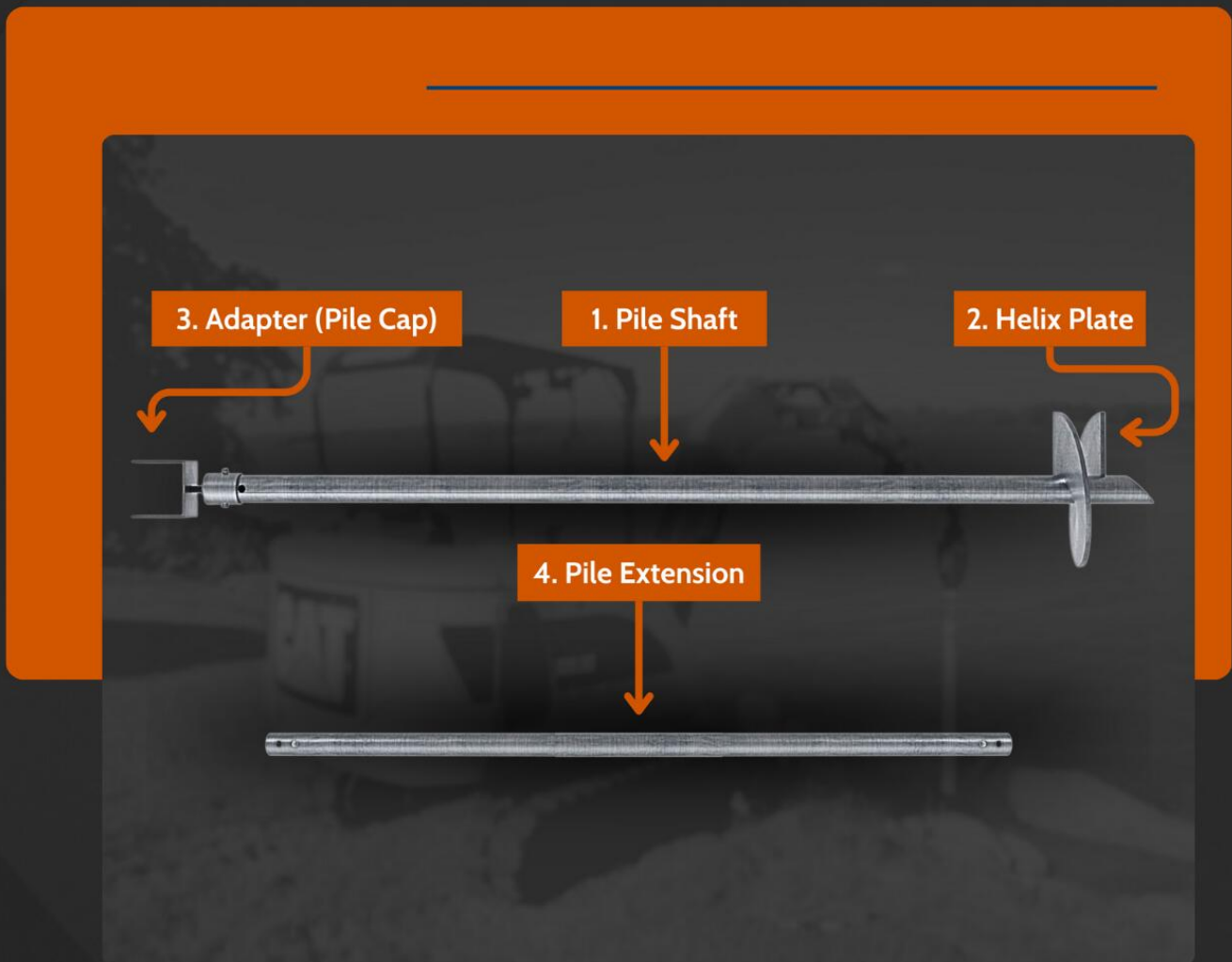
Speaking of those principles, how does a helical pile work to deliver unrivalled foundation support even in the toughest conditions?

How Does a Helical Pile Foundation Work?

When you look at a helical pile for the first time, it can seem a little strange for a foundation. How can something that looks so, shall we say "humble", support enormous amounts of weight?

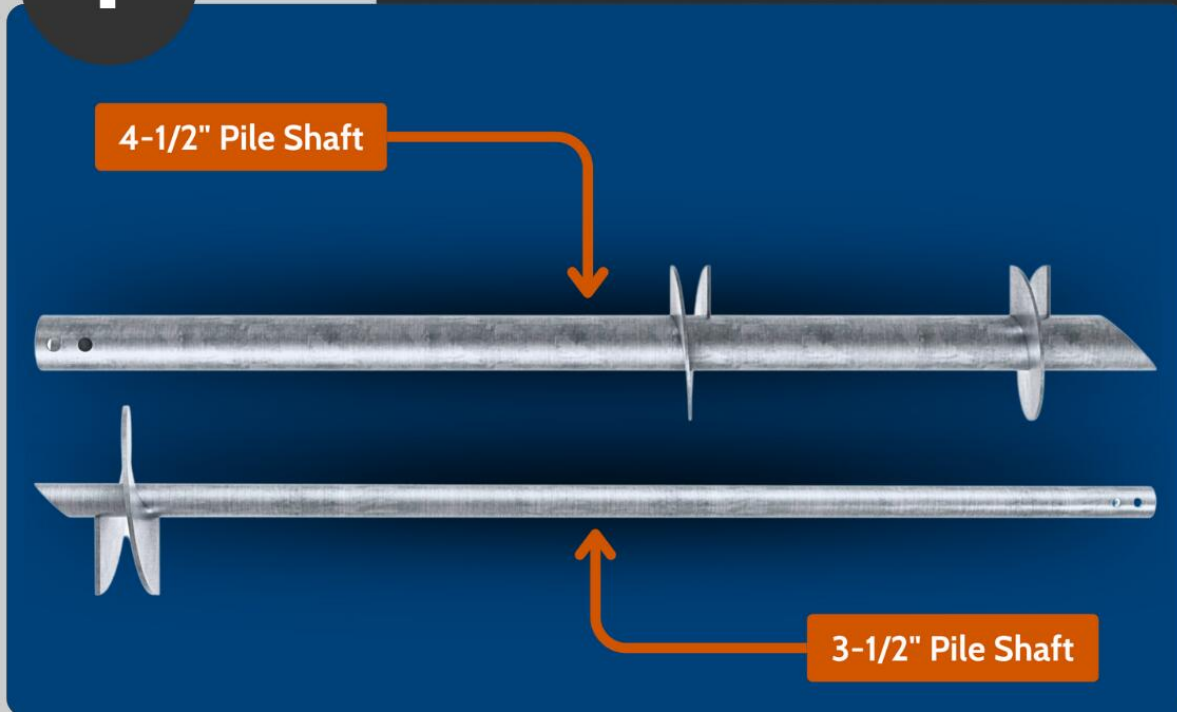
Especially when many of us are used to the word "foundation" meaning bulky columns or blocks of concrete.

It all comes down to the specific (and special) way that a helical pile interacts with the soil. Let's walk through the **key components** of a pile and see how they work together.



1

The pile shaft comes in various diameters to suit different load requirements and soil conditions



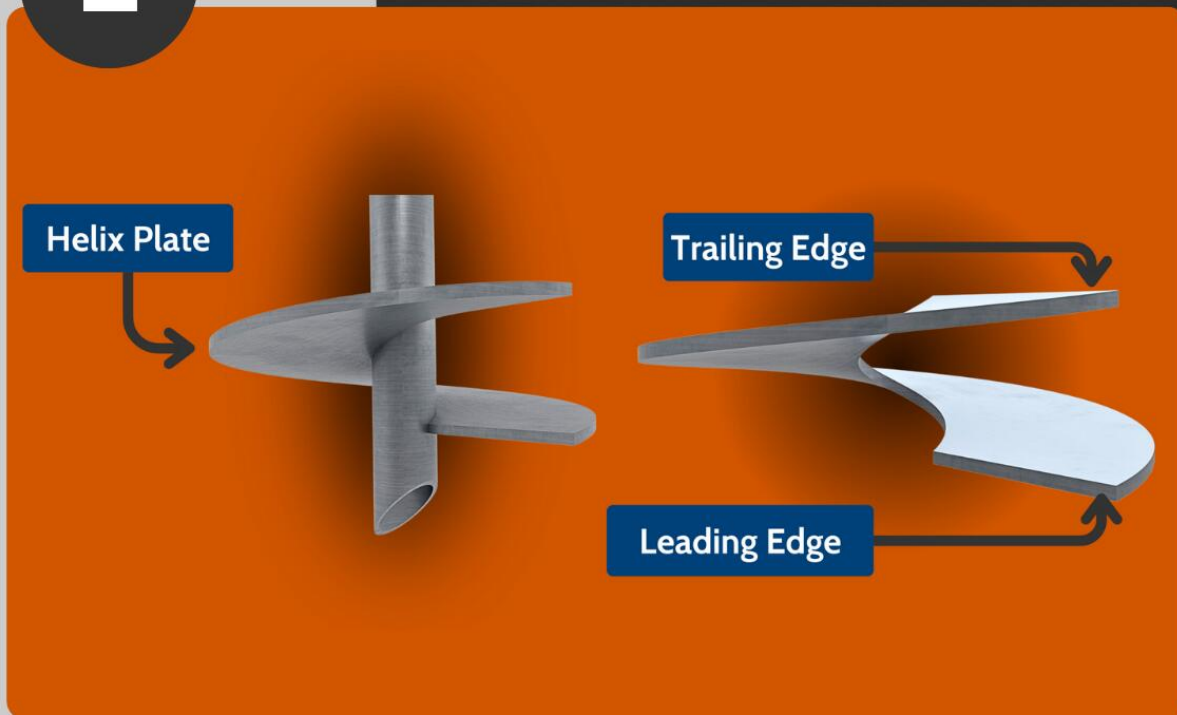
Pile Shaft

Forming the "core" of a helical pile, the pile shaft can be made from round pipe or solid square bar depending on the application. They come in a variety of diameters, from 1-7/8" all the way up to over 30". However the most common diameters typically fall between 2-3/8" to 5".

The length of the pile shaft can also vary, although 7', 10', and 15' are popular sizes. Finally, the pile shaft can also be coated in galvanizing for increased corrosion protection or left as bare steel.

Oh, and a fun fact - the first section of a helical pile to go into the ground is called the "**lead section**".

2



Helix Plate

A helix plate is the true magic that delivers such outstanding structural performance, and is also why we call them "helical piles". This specially-formed plate is designed to allow the helical pile to turn down into the ground without displacing material. Once secured, the soil exerts pressure on the top and bottom of the helix plate.

It's this pressure from the soil that holds the helical pile in place and prevents it from **sinking** down or **heaving** upwards.

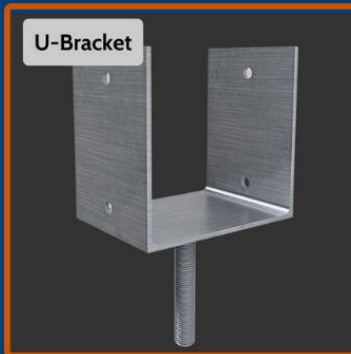
Depending on the structural loads and soil conditions, there may be more than one helix plate attached to the pile shaft. Those considerations also influence the **diameter** of the helix plate, which can be increased or decreased to meet your specific needs.

3

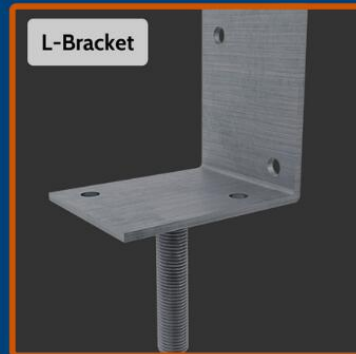
Pile adapters, or pile caps, come in a virtually-limitless range of designs to suit your project



Flat Cap



U-Bracket



L-Bracket

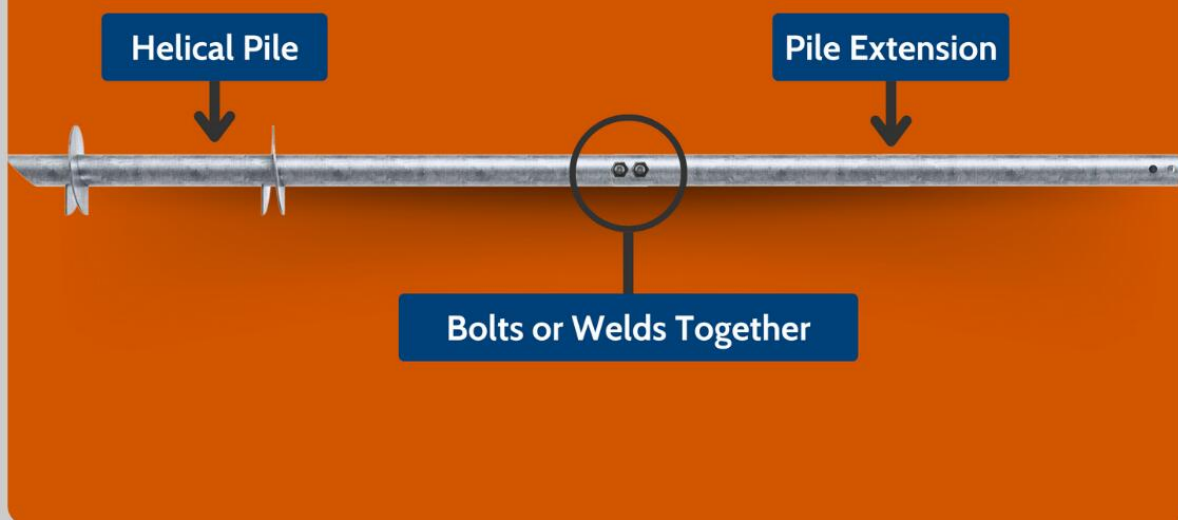
Examples of Pile Adapters

Adapter (Pile Cap)

A foundation in the ground is great, but ultimately you need to transition from the piles to your structure. This is achieved with caps that attach to the tops of your piles and provide a streamlined connection for practically any structure.

These may be straightforward L or U brackets, connectors for solar panels, or even rebar caps to hold concrete beams. For some projects, special caps or grillages may be used to tie several helical piles together into one cohesive support. Custom pile caps can even be manufactured for highly specialized or specific situations.

4



Pile Extension

Sometimes, soil conditions may be so poor that the helical piles need to be installed deeper in order to deliver firm support. Thankfully this isn't a problem, as extensions can be added to easily increase the depth of your piles.

They're usually connected with bolts or welding and make it a quick process to sink piles deeper for overcoming loose, wet, or swampy ground.

How is a Helical Pile Foundation Installed?

Compared to other foundation solutions common to Central New York, installing a helical pile foundation might almost seem too easy. Here's what we mean...

With typical foundations like dug concrete piers or driven piles, you need to do a fair amount of prep work and follow quite a few steps to install them. Not to mention the disruption they can create through excavation, pouring concrete, vibrations, noise, and mess.

Helical piles, conversely, cause very little in the way of preparation or disturbance to install. While each project will, naturally, look slightly different here's the usual process for the installation of a quality helical pile foundation:



1

Create a Foundation Plan

Success starts with precision planning, and that's especially true when talking about your foundation. You don't want to end up with less, or more, than you need. Like Goldilocks, you're looking for the "just right" support that blends economy and long-term safety. The design process can involve reviewing your building plans, assessing soil reports, collaborating with structural engineers, and securing permits from governing bodies.

2



Transport Materials & Equipment

Thanks to the lightweight nature of helical piles and the minimal equipment required to install, transporting everything to your site is much easier than other foundations. Many projects will only require a single truck and trailer, minimizing disturbance and keeping neighbors happy. If piles need to be stored on-site, their compact nature makes it easy to keep them out of the way until installation.

3



Install Helical Piles

After confirming the pile locations are correct, the helical foundation can be installed. This is shockingly quiet and smooth, as we use special hydraulic drives to turn the piles into the ground at a constant rate. A gentle install ensures minimal disruption to the soil or environment and protects any nearby structures.

During installation, we measure the **torque** that's exerted on the helical pile as it advances downwards. What's amazing about torque is it can actually indicate the **quality** and **accuracy** of the foundation installation in *real-time*. There's a correlation between how much torque we exert on a pile and its ultimate load capacity.

Using that correlation, we can monitor each pile as it's installed and ensure there's no problems later on. It's one of the huge benefits of a helical foundation and a big reason that more people are looking to make the switch.

4



Finish The Foundation

Once the piles are installed and checked for quality, the finishing work can take place immediately. Pile caps, grillages, or other foundation components can be attached to the helical piles for easy transition to your structure. This might be done through bolts or welding, depending on your needs and requirements.

5



Build On It

Because there's no cure time needed for a helical foundation, you can start building immediately after installation. Not only does that provide an enormous boost to your productivity and timelines, it helps you better coordinate other aspects of your project as you're not stuck waiting on a foundation.

Why Are Helical Piles Ideal for Central New York?

You might be thinking at this point, *"All this sounds great, but are helical piles really meant for Central New York? Why haven't I heard more about them?"*

That's a completely fair question! Despite the wide popularity of helical foundations in places like Europe and Canada, here in America we still lag behind somewhat in terms of adopting this technology. That's caused a bit of a "knowledge gap" regarding helical piles, their applications, and what benefits they can offer.

Because of this knowledge gap, they're not often the first foundation solution that comes to the mind of engineers - unless they have specific experience with them.

This lack of awareness **isn't anyone's fault**, it's the consequence of engineering text books in the U.S. not paying enough attention to helical foundations (although thankfully that's starting to change). That's the big reason we wrote this article - to help people understand this unique foundation option.

So, let's take a closer look at a few of the reasons that helical piles are a perfect foundation for construction projects in Central New York...



Able to overcome our saturated, loose, difficult soil conditions

Since the helical pile was originally invented as a foundation solution for lighthouses, bridges, and piers, it's no surprise they offer outstanding performance in difficult soils. And we have plenty of that in our region.

The geography of Central New York is varied and beautiful, but there's a couple things that are common to many locations across the region:

- > Numerous **bodies of water** like lakes, rivers, streams, and ponds
- > Soil that tends to be loose and offers poor **bearing capacity** (*ability to hold weight*)

Those two factors can be lethal for a foundation. A high water table combined with loose soil is extremely challenging to overcome, and traditional solutions like poured concrete can struggle to provide proper performance.

Because a helical pile anchors into the ground using a (comparatively) wide helix plate and narrow pile shaft, it creates a large surface area underground. However, the "screw in" method of installation means the pile displaces virtually zero material as it goes into the ground.

The result? You get great support even in loose or saturated soil, as the large surface area of a helical pile overcomes the weak bearing capacity.



Significantly faster (and easier) than other foundations

Speed may not be *everything* in life, but it sure does make a difference on a construction project. Every day you can shave off the timeline equals **money saved**, and that's a big deal in an age where budgets are tighter than ever.

As you've already seen, a typical helical pile installation is straightforward and simple. There's no holes to dig, rebar to tie together, or endless concrete trucks tearing around your site. Plus, you can load a helical foundation **immediately** after installation instead of having to wait for it to cure.

How fast can a helical foundation install be, exactly? That, of course, depends on your project. But when compared to concrete, helical piles often beat them by **weeks** in the time department. There's simply far less equipment, work, and hassle, required to install them.



More environmentally friendly

Every action we take as humans has some kind of impact on the environment. When we're talking about construction, that impact can be incredibly significant and damaging.

Think about what it takes to install an average concrete foundation pier. You have to...

- > Excavate the ground
- > Deal with the spoils
- > Set concrete forms
- > Insert rebar
- > Pour concrete

Each of those steps leaves a mark on the physical environment. Whether it's in the form of extensive ground disturbance or carbon emissions from all the materials and equipment, there's an "eco-cost" to concrete.

Now, we're not going to stretch the truth and tell you helical piles have **zero** environmental impact. They're made from steel, which does still need to be mined from the earth, smelted, and manufactured. All that activity emits greenhouse gases, too.

That said, there's an important distinction between something like concrete and helical piles, and it has to do with **volume**...

The **overall volume** of material you need for a concrete foundation compared to helical piles is shocking. For example, we know of a project where **448 tons of concrete** foundation material was replaced with a mere **12 tons of helical piles**. That's more than a **97% decrease** in raw materials while delivering even better support.

Less raw material = fewer greenhouse gas emissions associated with your construction activity.

Reduced carbon emissions aren't the only eco-friendly aspect, either. Remember the extensive **ground disturbance** it takes to install a concrete foundation? Helical piles have that beat as well.

Because a helical smoothly turns down into the ground without displacing the dirt, it means there's minimal impact on the environment beneath the surface. We're not auguring big holes and removing truckloads of material from the site. Your foundation could even be removed someday simply by turning the piles out of the ground, making remediation dramatically easier and more economical.

There's a lot more we could say about the environmental friendliness of helical piles, but you get the idea. You can enjoy **big support** for your project without having to **sacrifice** the environment.

Compared: Helical Piles, Concrete, and Driven Piles

Alright, now we're getting into the real question. How do helical foundations compare to solutions like concrete or driven piles?



Before we get into that comparison, we need to get something out of the way first.

We're **not out** to discredit or denigrate these foundation options. There's no "issue" we have with those solutions, but we also can't ignore the reality that helical piles offer **substantial benefits** when compared.

If you're a particular fan of those foundation options, that's okay! We aren't here to say you're wrong.

What we *do* want is to highlight the **differences** between these three common technologies and see how a helical foundation stacks-up against its peers.

Comparison Chart: Helical Piles, Concrete, Driven Piles

	Helical Piles	Concrete Foundations	Driven Piles
<u>Installation Time</u>	Fast - Can be installed in hours or days	Slow - Usually requires several days to weeks	Moderate - Depends on site conditions, ease of access, and weather)
<u>Cost-Effectiveness</u>	High - Efficiency and performance reduces long-term costs	Moderate to High - Labor and material costs can be higher for concrete	Moderate - Varies based on material, installation, and depth of piles
<u>Environmental Impact</u>	Low - Minimal disturbance to surrounding area	High - Requires significant excavation, raw material, and land disruption	Moderate to High - Ground vibrations can affect environment, future removal can be difficult
<u>Adaptability to Soil Conditions</u>	Excellent - Design can be adjusted to suit a huge variety of soil conditions	Low to Moderate - Can be challenging to use in unstable, loose, or saturated soil	Moderate - Performance will vary depending on the soil type, with some being unsuitable for driven piles

The quick installation, cost-effectiveness, low environmental footprint, and adaptability of helical piles is making them a **go-to choice** for construction projects who want efficiency without compromising on quality.

Of course, there will continue to be instances where another foundation solution fits the project better than helical piles. That's why it's absolutely **critical** you connect with a quality helical contractor who can help you determine if it's the **right foundation** for your project.

Not only will they work with you to uncover the benefits a helical solution can offer, they'll also be honest if they aren't a good fit. Because no foundation technology, not even helical piles, are perfect for every situation.

What's The Cost of a Helical Pile Foundation?

Understanding the cost of a helical pile installation is, naturally, an incredibly important aspect. No-one would want to buy *anything* without knowing what it costs.

Unfortunately, unlike an oil change or pair of new boots, we can't quite give you a "one size fits all" price.



The big reason for this? Each project is **unique**. From the structural loads to the soil conditions, there's a huge range of factors that affect your helical foundation cost beyond the price of the piles themselves.

So, instead of giving you a vague notion of the cost that isn't based in reality, let's take a look at what factors affect the price of a helical pile foundation. If you understand those aspects, you'll have a clearer idea of where your project might be at in terms of foundation needs (and ultimately, costs).

What Affects the Cost of Your Helical Foundation in Central New York?

We could probably write an entire article about the factors that influence a helical foundation's price, and maybe we will in the future.

For now though, we're going to focus on the three which tend to have the biggest effect overall...



Soil Type

Soil conditions dictate many of the choices a helical engineer will make when designing a foundation, from pile diameter to how deep it's installed.

If you were dealing with loose and sandy soil, for instance, your foundation may have to go deeper into the ground to reach supportive strata. More helix plates may be added to the shaft, or we may use larger-diameter helical piles to overcome the weak conditions.

Conversely, if you had dense and compacted soils, your piles may not be installed as deep or need to be as large.

That's a simplified example, but we don't quite have the space to dive into the fine points of soil science today. Our point is that your soil conditions will have an important effect on the final cost of your helical foundation.



Structural Loads

What kinds of loads your foundation needs to support also play a key role in determining costs. Structures with complex or extreme loads will, unsurprisingly, demand a more intensive approach compared to a straightforward project.

This can affect not just the cost of the piles themselves, but also the time invested in coming up with an accurate design. However, if you are facing a complex project, helical piles can overcome complex structural loads and end up **more economical** than other solutions overall.

One of the (many) things we like about helical foundations is their ability to adapt to a huge range of structural loads and conditions.



Site Access

While helical piles are much more efficient to install and require minimal equipment, site access is still a crucial consideration that can alter your price. At the end of the day, it's much easier (and quicker) for your helical contractor to install piles in an open area compared to a tight-access site.

Think about a **solar farm**, for example. They're typically built in wide spaces with plenty of room to catch the sun - which typically also makes it easier to install the foundation. There's nothing to get in the way and no "excavator gymnastics" we'd have to do in order to access pile locations. This could reduce the overall cost.

Take the **same number** of helical piles and install them in an urban area with various obstacles to work around. You may find costs are higher due to the increased complexity and time required.

Frequently Asked Questions About Helical Pile Foundations

Understanding the cost of a helical pile installation is, naturally, an incredibly important aspect. No-one would want to buy anything without knowing what it costs.

Unfortunately, unlike an oil change or pair of new boots, we can't quite give you a "one size fits all" price.



What is the typical lifespan of a helical pile?

Helical piles deliver a long and impressive lifespan, potentially even outliving the very structures they support. Made from durable steel and designed to resist corrosion, a properly installed helical pile could last over 150 years. This incredible longevity makes them an excellent investment for enduring support.



Can helical piles be used in commercial or industrial projects?

Absolutely. Helical piles are versatile and able to support a wide range of structures, from residential homes to large commercial buildings. Their adaptability to different soil types and conditions, along with their minimal environmental impact, makes them a great choice for commercial projects in Central New York.



How does the cost of helical piles compare to other foundations?

Initially, the cost of a helical foundation may appear higher than methods like poured concrete or driven piles. However, you have to consider the faster installation times, reduced environmental impact, and lower long-term maintenance costs, that helical piles offer. In this context, helical piles often prove to be more cost-effective. An easier installation process and fewer complications ultimately saves your money and avoids costly delays.



What makes helical piles more environmentally friendly?

Helical piles are being increasingly recognized for their low environmental footprint compared to other foundations. Installation is minimally invasive, less raw material is required, and carbon emissions are lower overall. This preserves the natural habitat, reduces embodied carbon, and significantly cuts down on the amount of waste generated.



How fast can a helical pile foundation be installed?

One of the fantastic advantages of helical piles is their rapid speed of installation. While exact timelines depend on the scale and complexity of the project, most helical foundations can be installed in a matter of days. This quick pace accelerates construction timelines while minimizing labor costs and site disruption. An excellent solution for tight schedules.

Conclusion

At the end of the day, there's no single foundation solution that's going to be the right fit for every project in every location. As you saw, there's a huge range of variables that go into determining which foundation option is the best for your situation.

However, we are confident in saying that helical piles are a **revolutionary and high-performing foundation** that's extremely well-suited to the tough conditions we have in Central New York. Their speed, adaptability, environmental-friendliness, and overall economy, make them a strong alternative to concrete or driven piles.

In the process of planning a construction project in the Central New York region? Now that you know about helical piles, **don't ignore them**. They might just save you time, headaches, and even money.

Get in touch with our team and let's work together to find out if a helical pile foundation is the right fit for your needs. Our honest and friendly people can help you assess your foundation requirements, devise an engineered design, and ensure your installation goes off without a hitch.





Time to put your project on an unshakable foundation! Helical piles are ready to support residential and commercial projects across the region.

Get in touch with a seasoned contractor who will give you honest advice and make your project easy. Our friendly team at **CDP Excavating** has served Central New York for **more than 17 years**. We approach each project with careful engineering, precision installation, open communication, and a friendly attitude.

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