



An Extended Guide · No. 1547

Foundations and Footings, Explained Simply

What holds a ground
array to the earth

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! Read this first — two honest truths about ground-mount solar

Two honest truths before we start, because they surprise a lot of good folks. First, a ground-mounted solar array is a professional job. It takes a licensed installer, real foundation work in your yard, building and electrical permits, and your utility's approval to connect (that approval is called interconnection). This guide is here to help you understand, plan for, and evaluate a ground mount; it is not a do-it-yourself project, and I never want you digging footings, wiring an array, or opening an electrical panel. Second, a plain grid-tied solar system — roof or ground, without a battery — shuts itself off during a power outage, even in bright sunshine. That is a required safety feature, so the system cannot put electricity onto the lines while the crews are repairing them. If keeping the lights on during an outage matters to you, you will need a battery, and we will talk about that plainly. In this guide we will meet the handful of ways an array can be anchored to your ground — driven posts, concrete piers, ground screws, and ballast — so a proposal makes plain sense to you.

What holds an array to the earth

A ground-mounted array has to stand against wind, gravity, and our Ohio freeze-and-thaw for decades. What keeps it planted is its foundation — and there are a few honest ways to do it. Let's meet them in plain words, with nothing to sell you.

I'm Bill, and I run Bill's Home Tech here in Portage County. Over 30-plus years I've learned that the word 'foundation' scares folks off, and it shouldn't. You don't have to pour anything or drive anything. You just want to understand the choices well enough to follow a proposal and ask a good question or two.

So that's all this guide does. It walks you through the four common ways an installer anchors an array, what each is good at, and what decides which one lands in your yard. I'll keep it plain, and I'll keep every number where it belongs — with the licensed installer and the engineer.

★ Staring at a proposal you don't quite follow?

Bring it to me and I'll translate it into plain English, line by line, with nothing to sell you. Call or text me at (330) 200-8042.

Foundations, on one page

If you read nothing else, read this. Here's the heart of it in a handful of plain points.

- ❑ A foundation is what holds your array down against wind, weight, and frost.
- ❑ There are four common families: driven posts, concrete piers, screws, and ballast.
- ❑ Driven posts and screws go into the earth; concrete piers anchor in it.
- ❑ Ballast sits on top and weighs the frame down — no digging needed.
- ❑ Your soil, frost, water table, rock, and slope decide which one fits.
- ❑ A soil test or an engineer's look often guides the final choice.
- ❑ It's the installer's and engineer's call — and always a permitted, pro job.

✓ You're the evaluator, not the builder

Your job isn't to pick the footing — it's to understand enough to judge a proposal and choose a good installer. That's exactly what this guide is here to help you do.

What a foundation actually does

Before we meet the four types, it helps to know what any of them is fighting against out there in your yard.

A row of tilted panels is really a big, smooth surface — and to the wind, that surface acts a little like a sail. So the foundation's first job is to keep the whole array from being pushed over or lifted in a strong blow. It also carries the plain weight of the frame and panels, and here in Ohio it has to hold steady as the ground freezes and thaws through the seasons.

That freeze-and-thaw is the sneaky one. When wet ground freezes it swells and can shove a shallow footing upward a little each winter, year after year, until a frame starts to lean. A proper foundation reaches down past where that freezing happens, so the array stays square and true. We cover that in depth in our frost-and-soil guide.

✓ Think 'planted,' not just 'set down'

A good foundation doesn't merely hold the array in place today — it keeps it standing straight and safe for decades of Ohio weather. That's why the installer and engineer take it seriously, and why you can relax about it.

Meet the four families

Nearly every ground array you'll ever see rests on one of four kinds of foundation. Here they are at a glance, and we'll take them one at a time.

Don't worry about memorizing these. Just get a feel for the idea behind each, and which words you might hear an installer use. Two of them go into the ground, one anchors in it with concrete, and one simply sits on top.

- Driven steel posts — posts pushed straight into the soil by a machine.
- Concrete piers or footings — posts set in augered or poured concrete.
- Ground screws or helical piles — big screws turned into the earth.
- Ballasted mounts — a frame weighed down on top of the ground, no digging.

✓ Different tools for different ground

None of these is 'best' in the abstract. Each shines in certain ground and struggles in others — which is the whole reason the choice is made by someone who has looked at your particular soil.

Driven steel posts

The workhorse of ground-mount solar: steel posts driven straight down into the soil, much like a big fence post, only by machine.

A special machine pushes each steel post into the ground to the depth the engineer calls for, and the racking bolts right onto them. Because there's often little or no concrete to pour and cure, this is usually one of the faster, tidier ways to build — which is a big part of why it's so common on open ground.

The catch is that the soil has to cooperate. Driving posts works beautifully in ground that's firm but drivable, and not so well where there's shallow rock, loose fill, or a very high water table. That's exactly the kind of thing a soil check sorts out before anyone commits.

✓ Common for a reason

On typical open Ohio ground, driven posts are often the simplest, cleanest choice — fast to set, little concrete, and proven. If your ground suits them, don't be surprised when an installer leans this way.

Concrete piers and footings

The classic, rock-solid approach: posts set into concrete that's either poured into augered holes or formed as footings in the ground.

Here the crew bores or digs holes, sets the posts, and anchors them with concrete that then has to cure. It's a heavier, more involved process than driving posts, but it produces a very firm, very trusted anchor — and it can work in soils where driving a post simply won't do.

Because concrete needs to cure and the holes take real digging, this route usually takes a bit more time and material. But when the ground calls for it, or when an engineer wants the extra certainty, it's a dependable old friend that's held up structures for generations.

✓ When certainty matters most

Concrete piers come into their own where an engineer wants a stout, no-doubt anchor — larger arrays, trickier soils, or a tall pole mount. Our pole-mount guide leans on this same idea of a deep, poured foundation.

Ground screws and helical piles

A newer, clever middle path: big steel screws that are turned down into the earth by machine, with little or no concrete at all.

Picture a giant screw threaded into the soil until it grips firmly. The racking mounts on top, and because there's usually no concrete to cure, the array can often go up quickly and leave the ground less disturbed. Some can even be turned back out if a post ever needs adjusting.

They shine where you want minimal concrete or a lighter touch on the land, and where the soil is right for them to bite and hold. Like driven posts, they're not the answer for every ground — shallow rock or very loose soil can rule them out. Again, the soil check tells the tale.

✓ Fast and low-disturbance

If leaving the ground as undisturbed as possible appeals to you, ask your installer whether screws suit your soil. When they fit, they're a neat, quick way to anchor an array.

Ballasted mounts

The no-dig option: instead of going into the ground, the frame sits on top of it and is held down by heavy ballast, like concrete blocks or trays.

Sometimes you can't — or shouldn't — put anything into the ground. There may be shallow rock, a high water table, a utility easement, or capped ground that mustn't be disturbed. A ballasted mount answers that by weighing the array down on the surface, so nothing has to be driven or poured below.

The trade-off is that all that holding-down takes real weight and room. A ballasted array generally needs a bigger, flatter footprint and a good deal more material than an anchored one. It's a specific tool for specific sites — and our driven-post versus ballasted guide compares the two head to head.

✓ For ground you can't dig into

Ballast is the honest answer when penetrating the ground is off the table. It costs more room and material, but it lets you put an array where digging or driving simply isn't allowed or isn't wise.

Two kinds of homes, two sets of needs

The foundation that fits often depends on how much land you have and what's under it — and town lots and country acreage tend to differ on both counts.

If you live in town or the suburbs

In town or the suburbs, a ground array is usually smaller and tucked into a back corner, sometimes near a patio, a fence line, or buried utilities. That can steer the choice in specific ways.

- Tight spots near buried lines may favor a no-dig ballast approach.
- A smaller array can still use driven posts if the soil allows — ask.
- Setbacks and where you can dig are set by your township, so defer to it.
- A good local installer already knows the rules for your neighborhood.

If you are out in the country on a well

Out in the country you usually have room and open ground, but the soil varies more — firm pasture in one spot, wet low ground or clay in another. That variety is exactly why the ground gets checked.

- Open, drivable pasture often suits fast driven posts.
- Wet, low ground or a high water table may point to screws or ballast.
- Heavy clay that holds water is a reason a soil test earns its keep.
- Bigger arrays can mix approaches across different patches of ground.

★ Not sure what's under your yard?

You don't have to guess — that's what the soil check and the engineer are for. Tell me about your property and I'll help you know what to ask. Call (330) 200-8042.

The four, side by side

The whole family lined up on one page, to keep or photograph. Keep in mind these are general leanings, not rules.

Foundation	How it's set	Often handy where
Driven posts	Driven into soil	Firm, drivable ground
Concrete piers	Set in concrete	Many soils; big loads
Ground screws	Screwed in	Low-disturbance sites
Ballast	Weighed on top	Can't dig: rock, wet

No single row is the winner. The right choice falls out of your soil, your frost, your water table, and your site — which is why the next few pages are about what actually decides it.

What actually decides the choice

So how does an installer land on one of the four? A handful of plain facts about your particular piece of ground do most of the deciding.

None of these are things you have to judge yourself. But knowing what's on the list helps you follow the reasoning when an installer explains why they're recommending what they are.

- Soil type — firm, sandy, loose, or heavy clay that holds water.
- Frost — how deep the ground freezes here, which sets how deep to go.
- Water table — how high the groundwater sits, especially on low ground.
- Rock — shallow bedrock can rule out driving or screwing posts.
- Slope and drainage — how level the spot is and where water runs.
- Access and permits — what machines can reach, and what the township allows.

✓ It all comes back to the ground

Notice how much of this is about what's under your feet. That's the theme of ground-mount foundations: the earth itself, more than anything, picks the footing.

Why a soil test or engineer may step in

For some sites the installer already knows the ground well. For others, it's worth having someone actually check what's down there.

A soil test — sometimes called a geotechnical look — is simply a way of finding out what the ground is made of and how it behaves before anything is built on it. It can reveal a high water table, a layer of rock, or clay that swells when wet, any of which changes the right foundation.

On top of that, a structural engineer often designs and stamps the foundation so it's sized correctly for your soil and our local wind and snow. That's not red tape — it's the very thing that lets you stop worrying about whether the array will stand. Let the pros carry that weight.

✓ A test now beats a lean later

Paying for a soil check when the ground is uncertain is cheap insurance against a foundation that heaves or settles years down the road. When an installer suggests one, it's usually looking out for you.

Going into the ground, or sitting on top

One useful way to sort the four families is by a single question: does the foundation go into the earth, or rest on top of it?

Driven posts, concrete piers, and ground screws all anchor into the ground. They tend to use a smaller footprint and less bulk material, but they need ground you can dig, drive, or screw into. Ballast, by contrast, sits on the surface — no penetration at all — but asks for more room and a lot more weight to do its job.

Which side of that line you land on is usually decided by what your ground will allow. If you'd like the full head-to-head on the two philosophies — anchored in versus weighed down — that's exactly what our driven-post versus ballasted guide is for.

✓ Let the ground draw the line

You don't have to prefer digging or no-digging. In practice the ground decides: where you can anchor, you usually do; where you can't, ballast steps in.

A word about frost and depth

You'll hear that footings must go 'below the frost line.' It's an important idea, and it's simpler than it sounds.

When wet ground freezes it swells, and it can slowly push a shallow footing upward over the winters. So the fix is to set the footing down past the depth where the ground freezes, where the earth stays put. That keeps the array from being heaved out of square as the years pass.

How deep is that here? I'm not going to put a number on it, because the honest answer is set by your local building department and confirmed by your installer and engineer for your exact spot. Our frost-and-soil guide digs into why Ohio ground behaves the way it does — without guessing an inch either.

! Beware anyone who quotes a depth off the cuff

The correct footing depth comes from your building department and your engineer, not from a rule of thumb shouted across a driveway. If someone promises a depth before they know your ground, be cautious.

How the footing plan gets made

Here's the calm, orderly way a good installer arrives at your foundation, so the process feels familiar when it happens.

First they look the site over — the soil, the slope, where water drains, and what machines can reach. Where the ground is uncertain, they arrange a soil check so nobody is guessing. Then they match a foundation type to what they've learned, and an engineer sizes and stamps it for our local wind and snow.

Only after all that comes the permit, the drawings, and the actual build. It may sound like a lot, but each step is there to protect you and your investment — and none of it lands on your shoulders. Your part is simply to understand it and choose a careful installer.

✓ Orderly is a good sign

An installer who looks at the ground, tests where needed, and brings in an engineer is doing it right. If someone wants to skip straight to building without any of that, slow down and ask why.

This is a licensed pro's job — start to finish

I'll say this plainly, because it matters: a ground-array foundation is not a weekend project, and I never want you attempting one.

Foundations for solar involve engineered loads, code requirements, heavy machinery, and often electrical work close behind. Get a foundation wrong and you don't just lose money — you risk an array that leans, heaves, or comes loose in a storm. This is precisely the sort of work that licensing, permits, and inspections exist to keep safe.

So let the licensed installer pull the permits, let the engineer size the footings, and let the inspector sign off. Your role — understanding the choices and picking good people — is the valuable one, and it's the one this whole set of guides is built to help you play well.

! Please don't dig or pour footings yourself

Beyond the code and engineering, there are buried utilities, heavy loads, and real hazards involved. Leave the foundation to the licensed crew. Your safety is worth far more than any savings.

Before anyone digs: call 811

Whatever foundation is chosen, if it goes into the ground there's one step nobody skips — finding out what's already buried down there.

Under your yard may run gas, electric, water, or communication lines, and hitting one is dangerous and costly. That's why there's a free service called 811, or 'call before you dig.' A call gets the buried utilities located and marked before any digging or driving starts.

Your installer handles this as a matter of course — it's part of doing the job right. But it's a good thing for you to know about, so if you ever see work about to start without those colored marks in the yard, you can ask the simple question: has 811 been called?

! No marks, no digging

Calling 811 before digging is the law and plain common sense. If digging is about to begin and you don't see the utility-locate marks, speak up. It takes one phone call to keep everyone safe.

What you'll actually see in your yard

Once it's done, the foundation mostly disappears from your mind — which is exactly how it should be. Here's what remains visible.

With posts, piers, or screws, you'll see the array standing on a row of supports, with most of the anchoring hidden below ground. With ballast, you'll see the weights holding the frame down on the surface. Either way, day to day, there's nothing for you to tend on the foundation itself.

Over the years it's worth a casual glance now and then for anything that looks like leaning, a post sitting higher than its neighbors, or pooling water at the base — signs the ground may be shifting. You don't fix those; you just note them and call the installer. Our common-problems guide covers what to watch for.

✓ Quiet is the goal

A good foundation asks nothing of you and simply keeps the array standing straight. If it ever stops being quiet — a lean, a heave, a wobble — that's your cue to call a pro, not to grab a shovel.

Questions to ask your installer

Bring these to an installer and you'll quickly get a feel for how carefully they're approaching your ground.

Q: What foundation are you recommending for my soil, and why?

You want a clear, reasoned answer tied to your actual ground — not just 'this is what we always do.' A thoughtful why is a very good sign.

Q: Will you test the soil, or do you already know this ground?

Either can be fine. What matters is that the choice rests on real knowledge of your site, whether from a test or genuine local experience.

Q: Who engineers and stamps the foundation design?

For most ground arrays a structural engineer sizes the footings for local loads. Knowing who does that, and that it's happening, should reassure you.

✓ Listen for 'it depends on your ground'

The best answers to these questions usually start with 'it depends on your soil.' That's not a dodge — it's the truth, and it's the mark of someone who takes the ground seriously.

What a solid foundation buys you

It's easy to see the foundation as just the boring part under the panels. It's actually the part that lets you forget about the array for decades.

A foundation matched to your ground and sized by an engineer is what keeps your array standing square through every storm, every winter heave, and every hot summer for the long life of the system. Get it right once, up front, and it quietly does its job for as long as the panels last.

That's why it's worth understanding, worth doing properly, and worth paying a good installer to get right. Everything else about your solar — the aiming, the production, the easy access — rests on this being sound. It really is the part you build once and trust for a very long time.

✓ Pay for the boring part

Of all the places to want a careful, by-the-book job, the foundation is at the top. It's not glamorous, but a sound one is the difference between an array you forget about and one that gives you grief.

Common Questions

The questions I hear most about ground-array foundations.

Q: Which foundation is the cheapest?

It depends entirely on your ground. Driven posts are often quick and economical where the soil suits them, but on rock or wet ground the cheaper-looking option won't work at all. The right foundation for your soil is the one that saves you money over time.

Q: Do I need concrete for a ground mount?

Not always. Driven posts and ground screws often use little or no concrete, while piers rely on it. Ballasted mounts use concrete as weight on top rather than as an anchor below. Your soil and engineer decide.

Q: How deep do the footings go?

Deep enough to get below where the ground freezes and to hold the loads — but the actual depth is set by your local building department and your engineer for your exact site. I won't guess a number, and you should be wary of anyone who does.

Q: Can I install the foundation myself to save money?

No, and I'd never want you to. It involves engineered loads, permits, buried utilities, and heavy equipment. It's a licensed professional's job from start to finish — your job is to understand and evaluate it.

★ Want a hand reading your quote?

Foundations are where a lot of the cost and the confusion live. If a proposal has you puzzled, call or text me at (330) 200-8042 and we'll go through it together, plainly and with nothing to sell you.

You don't have to do this alone

You just have to remember that a friendly, patient person is one call away.

I hope this guide made the foundation under a ground-mounted array feel a little less daunting and a lot more doable. Keep it in a drawer with your other home papers, come back to a page whenever you need it, and don't worry about memorizing anything.

When you'd rather have a hand, that's exactly what I do. I come to your home, work at your pace, and never make you feel rushed or silly for asking. A first visit is a flat \$99, and for the parts that don't need me on-site I can often help right on your screen for \$49. Every visit comes with a 30-day, come-back-free guarantee. I don't sell solar and I don't do the licensed electrical work or the install itself — I help you understand it all, ask the right questions, and line up a trustworthy local solar installer, so you never feel talked into anything.

★ Bill's Home Tech — real help, close to home

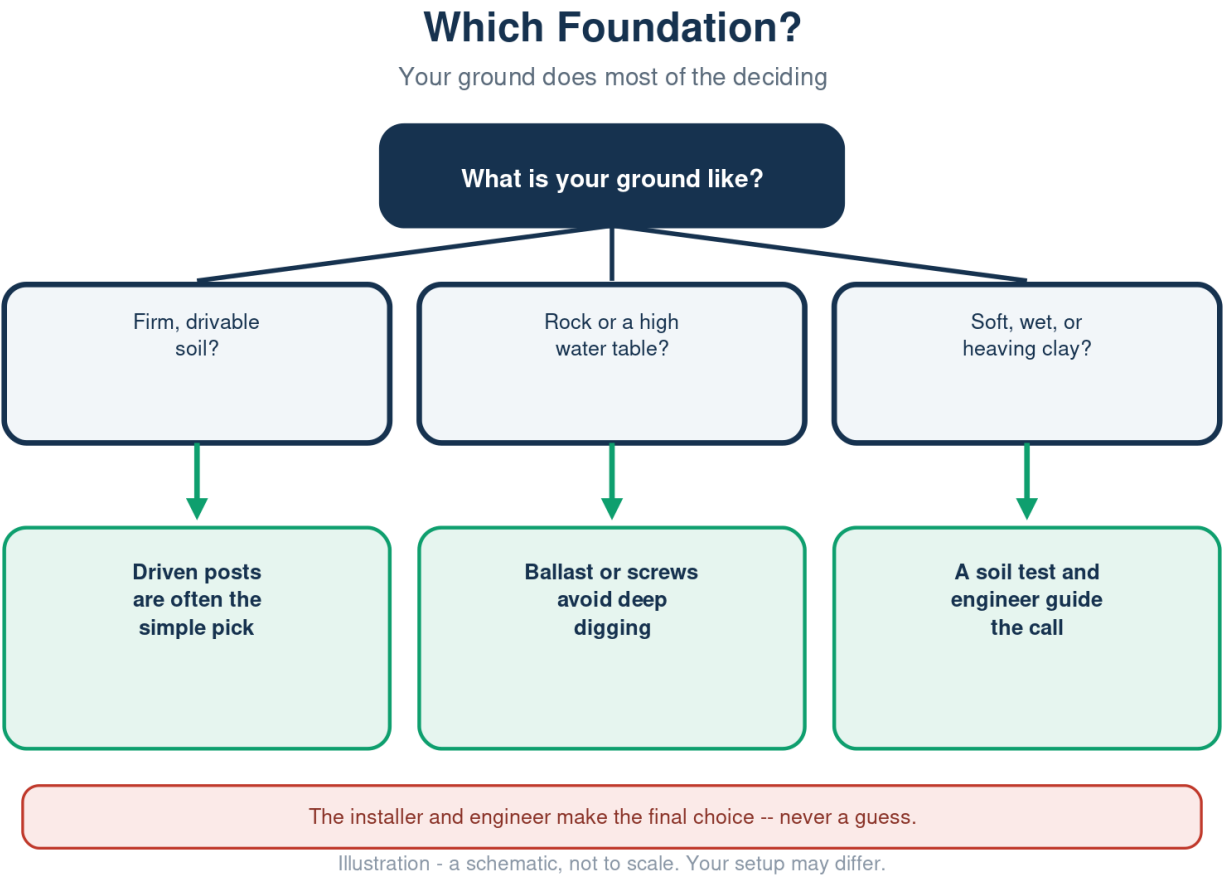
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The Four Foundation Families

How each is set, and where it tends to fit

	How it's set	Handy for
Driven posts	Driven in	Firm soil
Concrete piers	Set in concrete	Many soils
Ground screws	Screwed in	Low disturbance
Ballast	Weighed down	No-dig sites

These are general leanings -- your soil and engineer make the call.



Into the Ground vs On Top of It

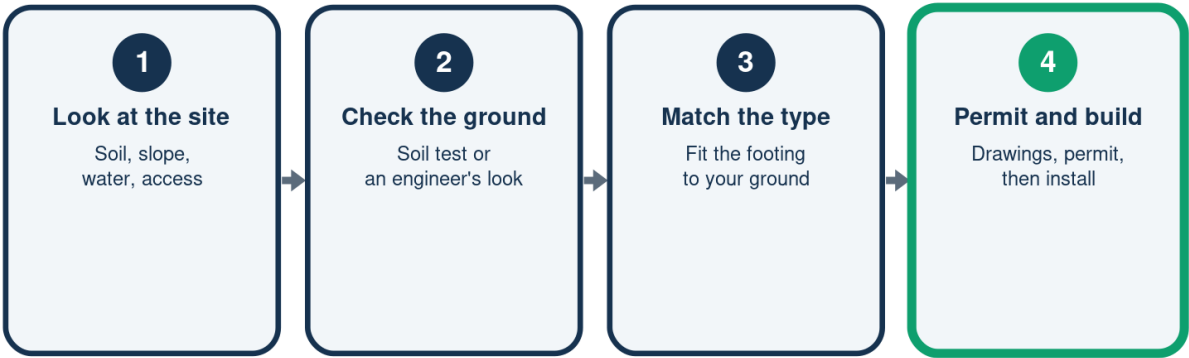
Anchored in the earth, or weighed down on the surface

	Anchored in	Ballast on top
Anchoring	Into the soil	Weight on top
Best ground	Drivable	Rock or wet
Footprint	Smaller	Larger
Digging	Yes	None

Where you can anchor, you usually do; where you can't, ballast steps in.

How a Footing Plan Is Made

The calm, orderly path to your foundation



Every step protects you -- and none of it lands on your shoulders.



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A Note From Bill

A quick note from Bill.

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