



An Extended Guide · No. 1549

Frost Line, Soil, and Ohio Ground

Why what's under your array
matters as much as what's on it

Tech Made Simple — Service Made Personal

BillsHomeTech.com · (330) 200-8042 · Atwater, Ohio

Free & printable — share it with someone who needs it



Book a visit —
billshometech.com/book

! 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. This guide is about what's under your array — the frost that comes and goes each winter, and the Ohio soil it sits in — and why the pros pay such close attention to both.

Why what's under the array matters

We spend a lot of time thinking about the panels up top. But what holds them steady for decades is the ground underneath — and here in Ohio, that ground freezes, thaws, and shifts with the seasons. Let's talk about it plainly, so none of it feels mysterious.

I'm Bill, and I run Bill's Home Tech here in Portage County. In 30-plus years I've learned that the ground is the part folks think about least and the part that quietly matters most. Get it right and you never think about it again; get it wrong and it nags at you for years.

I'll tell you up front what I won't do: I won't quote you a frost depth or any other number. The honest, correct answer to 'how deep' comes from your local building department and your engineer, for your exact spot — not from a guide or a rule of thumb. What I can do is help you understand why it all matters.

★ Worried about your ground?

If you're not sure whether your soil is friendly or fussy, that's normal — and it's exactly what the pros check. Tell me about your place and I'll help you know what to ask. Call or text me at (330) 200-8042.

Frost and soil, on one page

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

- ❑ When wet ground freezes it swells, and it can lift a shallow footing.
- ❑ So footings must reach below the depth where the ground freezes.
- ❑ That required depth is set by your local building department — not by me.
- ❑ Ohio soils vary a lot: firm loam, heavy clay, sand, rock, and wet ground.
- ❑ Your soil helps steer which foundation an installer chooses.
- ❑ Where the ground is uncertain, a soil test is cheap, wise insurance.
- ❑ The engineer and building department own the numbers — you just understand.

✓ Why no depth here?

You'll notice I never give a frost-line number. That's on purpose. The right depth depends on your local code and your exact site, so quoting one would do you a disservice. Defer that number, always.

What 'the frost line' means

You'll hear the phrase a lot in ground-mount solar. It's simpler than it sounds, so let's pin it down.

In winter, the cold reaches down into the earth and freezes the ground to a certain depth. Below that depth, the ground stays unfrozen all winter. That boundary — the deepest the freeze reaches in a typical winter — is what people mean by the frost line.

How deep it sits depends on where you live and how hard your winters run, which is exactly why it's set locally rather than by any national figure. The important thing isn't the number — it's what happens above that line each winter, which we'll get to next.

✓ A local line, not a national one

The frost line is a local matter, and your building department knows it for your area. That's the right and only place to get the actual depth for your footings.

Frost heave, explained plainly

Here's the bit of nature that drives the whole design. It's the reason footings go deep at all.

Water expands when it freezes — you've seen it push the lid off a jar in the freezer. The same thing happens in the ground. When wet soil freezes, it swells, and that swelling has to push somewhere. If there's a shallow footing sitting in that zone, the freezing ground can shove it upward. Folks call that frost heave.

It doesn't happen all at once. A shallow footing might get nudged up a touch each winter and settle back only partway when it thaws. Repeat that over many seasons and a footing can slowly work its way out of place — which is trouble for anything standing on it.

✓ Think of the jar in the freezer

That homely picture — water swelling as it freezes — is the whole idea. The ground does the same, and a foundation has to be built so that swelling can't lift it.

Why heave matters for your array

A little seasonal nudging might sound harmless. For a precise structure like a solar array, it isn't.

An array is meant to stand square and aim its panels just so. If one footing heaves up while its neighbors stay put, the frame can slowly rack out of true — panels tilt off their intended angle, hardware strains, and over the years you get a system that looks and works a little crooked.

That's the whole reason nobody sets solar footings shallow and hopes for the best. The array is a decades-long investment sitting out in the weather, and it has to hold its shape through every freeze and thaw. Frost heave is the quiet enemy the foundation is designed to beat.

! Shallow footings invite trouble

A foundation set too shallow to dodge frost may seem fine at first and then slowly go crooked over the winters. It's the sort of corner-cutting you can't see on install day — another reason to choose a careful, by-the-book installer.

The fix: reaching below the frost line

The cure for frost heave is refreshingly simple in concept, even if the exact depth is a job for the pros.

If you set a footing down past the depth where the ground freezes, the freezing above it can swell all it likes — the footing sits in ground that never freezes, so nothing lifts it. That's the entire idea behind 'below the frost line.' Deep enough, and heave simply can't get a grip.

Different foundations reach that depth in different ways — a driven post goes down far enough, a concrete pier is set deep enough, and so on. Our foundations guide covers those types, and our driven-post versus ballasted guide compares the two you'll hear about most. The common thread is getting the anchor below where the freeze reaches.

✓ Deep enough to sit out the freeze

The whole trick is putting the footing where winter can't reach it. Once it's below the frost line, the seasonal freeze-and-thaw happening above just doesn't concern it.

So how deep is that around here?

This is the question everyone asks, and I'm going to give you the most useful answer I can — which is not a number.

The required depth for footings is set by your local building department, written into the code for your area, and confirmed by your engineer for your particular ground. It's not a figure I can responsibly put in a guide, because getting it wrong — even by guessing on the safe side — helps no one and could mislead you.

So here's the useful part: you don't need to carry that number in your head. Your installer pulls a permit, and the depth is part of doing that properly. Your job is just to make sure the work is permitted and engineered — and then to trust the people whose job the number is.

! Be wary of a depth quoted off the cuff

If someone rattles off a footing depth before they've checked your ground or your local code, take it as a caution sign. The real answer comes from the building department and the engineer, every time.

Ohio's mixed-up ground

The other half of this story is soil — and Ohio serves up quite a variety, sometimes within a single property.

Drive around the county and you'll cross firm, friendly loam, sticky clay that holds water like a sponge, sandy stretches, rocky rises, and low wet ground where the water table sits high. Your yard might even mix several of these. Each behaves differently when it freezes, and each holds a footing differently.

That's why an installer doesn't assume. What worked on a neighbor's place might not suit yours a quarter-mile away. Over the next few pages we'll walk through the main soil characters you might meet, in plain terms.

✓ Your dirt is its own story

Don't take a neighbor's foundation as gospel for yours. Soil can change over a short distance, so your ground deserves its own honest look.

Two kinds of homes, two sets of needs

Frost is frost wherever you are, but the soil under your feet — and how much of it you're dealing with — often differs between a town lot and country acreage.

If you live in town or the suburbs

In town or the suburbs, your array is small and the ground may be old fill or graded lot soil rather than native dirt. It's a smaller patch to check, but it still deserves a look.

- Graded or filled lots can behave differently than untouched ground.
- A small array still needs footings below the local frost line.
- Your building department sets the depth and the permit either way.
- A good local installer knows how your neighborhood's ground tends to act.

If you are out in the country on a well

Out in the country you've got more ground and more variety — firm pasture in one spot, a wet low corner in another, maybe rock along a rise. That range is exactly why a soil check earns its keep on acreage.

- Open pasture may be firm, while a low corner sits wet much of the year.
- Heavy clay that holds water is common and worth testing for.
- A high water table near creeks or bottoms can steer the foundation.
- Bigger arrays may cross more than one kind of soil at once.

★ Not sure what your soil is up to?

That's the soil test's whole job, and it's money well spent when the ground is uncertain. Tell me about your property and I'll help you weigh it. Call (330) 200-8042.

Clay: it holds water and heaves

If there's one Ohio soil to know by name, it's clay. It's common here, and it has a couple of habits worth understanding.

Clay is fine-grained and tends to hold onto water rather than letting it drain away. That matters for frost, because wet ground is exactly what heaves the most when it freezes. Clay can also swell when it's wet and shrink when it dries, moving a bit with the seasons even apart from frost.

None of that makes clay a deal-breaker — plenty of solid foundations sit in clay. It just means the ground has to be understood and the footing designed for it, which is a big reason a soil test is so often worth it on clay-heavy ground.

✓ Clay is workable, not scary

Heavy clay simply asks for respect and a proper design. It's one of the clearest cases where having the soil checked pays for itself in peace of mind.

Sandy and loose soils

At the other end from clay you'll find sandier, looser ground. It has its own personality.

Sandy soil generally drains well, which is friendly where frost is concerned — less trapped water means less to heave. The flip side is that loose, sandy ground may not grip a post as firmly as denser soil, so a foundation might need to go deeper or use a different anchoring approach to get a solid hold.

As always, it's a matter of matching the foundation to what the ground offers. Good drainage is a plus; a looser grip is something the design accounts for. Your installer and engineer weigh both.

✓ Drains well, grips less

Sandy ground trades easy drainage for a softer grip. Neither is a problem on its own — it's just information the foundation design takes into account.

Rocky ground and shallow bedrock

Rock is the soil character that most changes the plan, because it can stop some foundations cold.

Where bedrock sits close to the surface, or the ground is thick with large stone, a machine may simply be unable to drive a post or turn a screw down to depth. That's not a failure — it's just rock being rock. It often points toward ballast, which sits on top and needs no digging at all.

Rock can be sneaky, too: the surface might look ordinary while stone lurks just below. That's one more reason a look at the ground before committing to a method saves headaches. Our driven-post versus ballasted guide covers how rock tips the scales toward ballast.

✓ Rock often means ballast

If your ground is rocky or hides shallow bedrock, don't be surprised if the answer turns out to be a no-dig ballasted mount. It's the natural fit when you can't get down into the earth.

High water table and low, wet ground

Low spots and high groundwater bring their own considerations, and they're common enough in Ohio bottoms to know about.

A high water table means groundwater sits close to the surface, so the ground stays soft and wet much of the year. That softness can make it harder for a driven post to get a firm grip, and all that water is prime material for frost heave when winter comes. Low, poorly draining ground raises the same flags.

Depending on how wet it is, the answer might be a deeper or different anchor, careful attention to drainage, or a ballasted mount that doesn't rely on the soggy ground for its hold. It's exactly the kind of site where guessing is unwise and a proper check pays off.

✓ Wet ground wants extra thought

If your spot sits low or stays soggy, flag it early. It doesn't rule out solar — it just means the foundation deserves careful design rather than a standard assumption.

How your soil steers the foundation

Pull it all together and you can see how the ground quietly points toward one foundation or another.

Firm, drivable ground often welcomes driven posts. Rocky ground tends to send you toward ballast. Soft or wet ground might call for a deeper anchor, ground screws, or ballast. Heavy clay says 'test me first.' None of this is a rigid rule — it's the kind of reasoning a good installer walks through for your site.

You don't have to run that logic yourself. But now, when an installer explains why your soil points a certain way, you'll follow the thinking and recognize a sound answer. Our foundations guide lays out all four types in full.

✓ Soil first, foundation second

The order matters: understand the ground, then choose the footing to suit it. Any installer who works the other way round — footing first, ground later — has it backwards.

Why a soil test earns its keep

I keep mentioning a soil test, so let's give it a proper page. It's one of the smartest small steps on an uncertain site.

A soil test — sometimes called a geotechnical investigation — is simply a way of finding out what's really down there before anything is built. It can reveal a high water table, a hidden layer of rock, or the kind of clay that swells, any of which changes the right foundation. It trades a little cost now for confidence later.

Not every site needs one — an installer with real local experience may already know the ground well. But where there's any doubt, a soil check is cheap insurance against the far bigger cost of a foundation that heaves or settles down the road.

✓ A small step that prevents big regrets

When an installer suggests testing the soil, hear it as care, not up-selling. Knowing the ground before you build is one of the best bargains in the whole project.

What a soil check actually turns up

So what does someone learn from looking at your ground? A handful of plain, useful facts that shape the design.

- What the soil is made of — clay, sand, loam, rock, or a mix.
- How wet it is, and how high the water table sits through the year.
- Whether hidden rock lurks below an ordinary-looking surface.
- How well the ground drains, which ties straight back to frost heave.
- How firm and load-bearing it is for holding a foundation.

With those facts in hand, the engineer can size and choose a foundation that truly fits your ground — and the building department's required depth gets applied correctly for your site. It turns guesswork into a designed, confident plan.

✓ Facts beat assumptions

Everything good about a foundation flows from actually knowing the ground. A soil check is how assumptions become facts, and how surprises get caught before they cost you.

Drainage, grading, and keeping water away

Since water is the troublemaker behind frost heave, how water moves around your array is worth a moment.

Ground that drains well has less trapped water to freeze and heave, so part of a good site plan is making sure water runs away from the array rather than pooling under it. Sensible grading — the gentle shaping of the ground so water sheds off — helps keep the soil around the footings from staying soggy.

This is the installer's department, not a chore for you. But it's handy to understand, because if you ever notice water standing under your array after the job is done, that's worth a mention to the pro. Our common-problems guide covers pooling water as a sign to watch.

✓ Move the water, ease the heave

Good drainage is quiet insurance against frost heave. Keeping water from collecting under the array is one of the simplest ways the ground is kept on your side.

Whose job the numbers are

Let me be clear about who owns the figures in all of this, because it takes the pressure off you entirely.

The frost-line depth belongs to your local building department, written into the code for your area. The foundation's size and design belong to a structural engineer, working from your soil and our local loads. Pulling the permit and building it to those figures belongs to your licensed installer. Not one of those numbers is yours to know or guess.

That's genuinely good news. You get to focus on understanding the ideas — which this guide is for — and on choosing trustworthy people, while the folks whose job the numbers are handle the numbers. That division of labor is exactly how it should work.

! Never let anyone skip the permit

The permit is how the building department's required depth actually reaches your footings. If an installer suggests skipping it to save time or money, that's a serious red flag — walk away.

Questions to ask your installer

A few plain questions will tell you whether an installer is taking your ground as seriously as they should.

Q: Do you know my soil, or will you test it?

Either answer can be fine. What you're listening for is that the foundation will rest on real knowledge of your ground, not on a convenient assumption.

Q: How will you make sure the footings clear the frost line?

A good installer talks about the permit and the local code, and about an engineer sizing the design — not about a depth they invented on the spot.

Q: My ground stays wet in spots — how does that change things?

A thoughtful answer weighs drainage, a possibly different anchor, or ballast. A shrug means they haven't reckoned with your site's real conditions.

✓ Listen for the building department

When an installer naturally mentions the local building department and the engineer, that's the sound of someone who respects where the numbers come from. It's a very good sign.

You don't have to know your own dirt

If this guide left you feeling you should have your soil memorized, let me set that worry down for you.

You truly don't need to know whether you're sitting on clay or loam, how high your water table runs, or how deep the frost reaches. That's what the soil test, the engineer, and the building department are for. Their whole purpose is to carry that knowledge so you don't have to.

What this guide gives you is something better than the numbers: the understanding to follow along, ask a good question, and know a careful installer from a careless one. That's the part that actually protects your investment — and it's well within reach for anyone.

✓ Understanding beats memorizing

Nobody expects you to be a soil expert. Understanding why the ground matters, and trusting the right people with the figures, is exactly enough.

Common Questions

The questions I hear most about frost, soil, and Ohio ground.

Q: How deep does the frost line go here?

That's set by your local building department for your area, and confirmed by your engineer for your exact site. I won't put a number on it, and I'd gently warn you off anyone who quotes one before checking your ground and your local code.

Q: Is Ohio clay a problem for a ground mount?

Not a deal-breaker at all — plenty of solid arrays sit in clay. Clay just holds water and can swell, so it wants a proper design, which is why a soil test is so often worth it on clay-heavy ground.

Q: Do I always need a soil test?

Not always. An installer with real local experience may already know your ground. But where there's any doubt — wet spots, suspected rock, heavy clay — a test is cheap insurance against a costly foundation problem later.

Q: What happens if footings are set too shallow?

Over the winters, frost can heave a too-shallow footing upward, and the frame can slowly rack out of true. That's the very thing going below the frost line prevents — and why permits and engineering aren't optional.

★ Ground got you second-guessing?

Soil and frost are the parts folks worry about most and understand least. If yours has you unsure, call or text me at (330) 200-8042 and we'll talk it through in plain English.

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 frost and soil 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

Call or text me at (330) 200-8042, or visit BillsHomeTech.com. Serving Atwater and all of Portage County. 30+ years of patient, plain-English tech help — and if you're ever not 100% happy with a visit, I'll make it right or refund it. That's a promise. — Bill

How Frost Heave Works

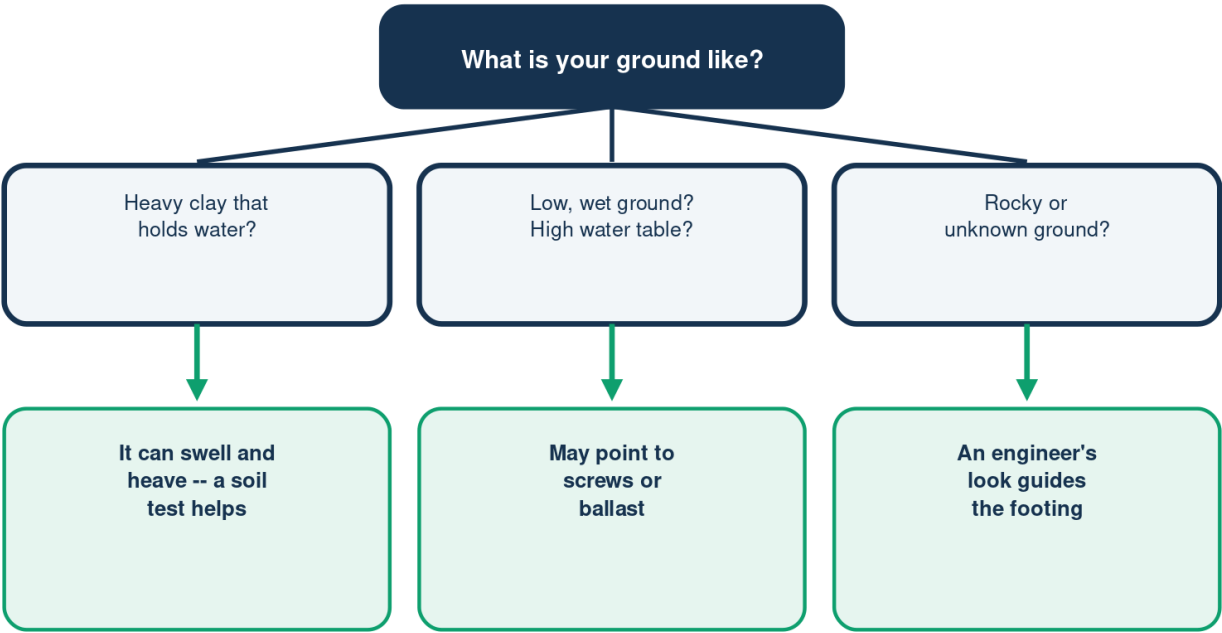
And why a deep footing sits it out



The exact depth is set by your local building department -- not here.

What Is My Ground Like?

Different soils lead to different foundations



The required depth is set by your building department -- never guessed.

Illustration - a schematic, not to scale. Your setup may differ.

Soil Type and the Foundation

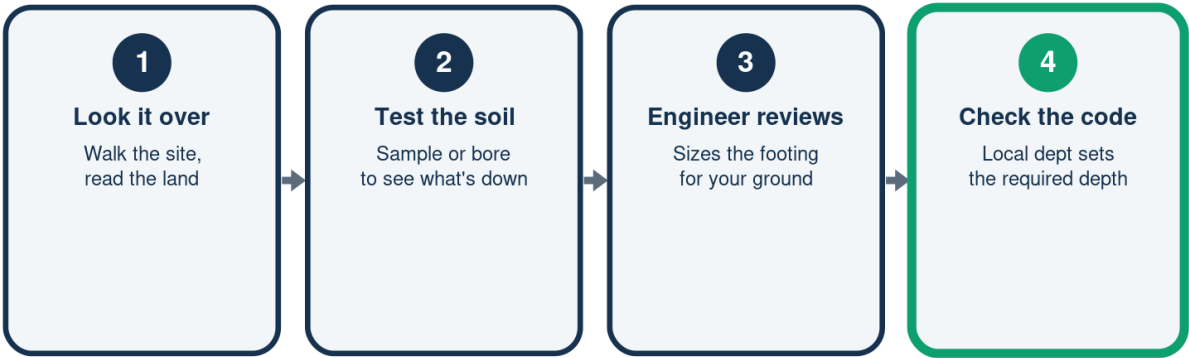
How the ground leans the choice -- general, not a rule

	What it's like	Often leans to
Firm loam	Drives well	Driven posts
Sandy/loose	Drains, less grip	Deeper or screws
Rocky	Can't drive	Ballast
Wet/high water	Soft, holds water	Screws or ballast

Your installer and engineer confirm the fit for your exact ground.

How Soil Gets Checked

Turning guesswork into a designed plan



You focus on the ideas; the pros carry the numbers.



Need a Real Person?

You do not have to remember all of it.
You just have to remember you can call.
Friendly, in-home tech help -- I come to you.

BILL'S PROMISE

If you are not 100% happy with a visit, I will
make it right -- or refund it. No awkwardness,
no fine print. That is how I would want to be treated.

(330) 200-8042 · BillsHomeTech.com

Bill@BillsHomeTech.com · Mon–Sat 9:00 AM – 7:30 PM

— Bill

Prefer help without a visit?

Bill can screen-share and fix many things remotely — a flat \$49, free for Support Plan members.



A Note From Bill

A quick note from Bill.

I write these guides to make home tech a little less frustrating, and I do my best to keep every step accurate and up to date. Still, every home, device, and setup is a bit different, so I can't promise a guide will match yours exactly or fix your particular problem. These guides are for general information only — they're not professional, legal, or financial advice, and they don't replace your device's own manual or the manufacturer's instructions. Please go slow, use your own good judgment, and use everything here at your own risk. If a step involves electrical wiring, a gas appliance, a water heater, plumbing, or climbing a ladder — or if anything just doesn't feel safe — please stop and call a licensed professional (or give me a call at 330-200-8042). Bill's Home Tech and Bill Davis can't be responsible for any damage, data loss, or injury that comes from using these guides. Thanks for reading, and stay safe out there.

— *Bill*



Book a visit —
billshometech.com/book

Use of these guides is subject to our Terms of Use (billshometech.com/terms-of-use).

(330) 200-8042 · BillsHomeTech.com

Bill@BillsHomeTech.com · Mon–Sat 9:00 AM – 7:30 PM

For general information only — not professional advice. Use at your own risk. For electrical, gas, water, or ladder work, please call a licensed professional. — Bill's Home Tech