# The Essential Guide to Greenhouse Foundations

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published by:

Wisconsin Greenhouse Company
211 S. Paterson Street Ste. 1
Madison, Wisconsin 53703
p. 608.515.3750

## CLAIMER:

The information contained in this book is intended to help readers make informed decisions about their greenhouse foundations. It should not be used as a substitute for advice by a professional contractor or engineer. It is based on experienced situations and experiences over several decades. Although the author and publisher have endeavored to ensure that the information provided herein is complete and accurate, this is not information certified by an engineer.

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# Introduction

One of our most frequently asked questions is this:

Do all greenhouses require a foundation? Yes, they do. It's important to think about greenhouses as typical buildings and plan for them as you would a home including plumbing, power and water. There are times when that is more than a gardener has bargained for and stops them in their tracks. There is no doubt that planning for a greenhouse takes time and consideration but the reward of a controlled growing environment is worth the sweat equity.

Over the years, we've been asked hundreds of greenhouse related questions and one of the greatest challenges for homeowners seems to be setting a plan for a foundation. This is the inspiration for this handy little guide. In most cases, if you are looking at a **Cross Country Greenhouse**, you either like the custom nature of the greenhouse, our unique style or want something more substantial and see the value in that. Your research has probably taken you to greenhouse

**GREENHOUSE TIP**

Running a passive greenhouse that incorporates solar gain, thermal heat syncs and rain barrels is a goal for many gardeners who want to stay off the grid.

companies that offer a built in foundation or claim not to need one. At this point, it's important to say that we think there is great value in doing it right the first time. There have been many times when we nod and shake our heads when we hear customers complain about their big box greenhouse falling over. The truth is, we're a little old school and we like it. We have been developing our system for over 68 years and although we are  not every greenhouse enthusiast's first stop, we are the last stop for our Cross Country Greenhouse owners and proud of it.

THIS FOUNDATION GUIDE WILL COVER:

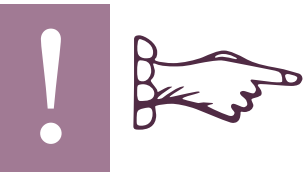
- *Types of Greenhouse Foundations*
- *Things to consider BEFORE you build*
- *Building a Wood Foundation*
- *Building a Concrete Foundation*
- *Details on Brick and Rock Façades*
- *Ideas on Plumbing, Electrical and Heating*
- *Some Handy Greenhouse Flooring Options*
- *A List of Questions to Ask Yourself Prior to Purchasing a Greenhouse*
- *Some Thoughts on the Costs of a Greenhouse Foundation*

# One: Types of Greenhouse Foundations

*A sunny spot for tea can be a great motivation.*

You've probably spent some time dreaming about the type of greenhouse you would like. You may have seen some of our customer's photos and pictured that in your yard and thought about a growing environment that you can control. No more blight! Veggies in the winter!

Or simply a sunny place to sit and have a tea on a cold, wet day. The truth is that we have some of the happiest customers around and reconnecting with nature, working the soil and reaping the rewards of your hard work is something to truly enjoy.



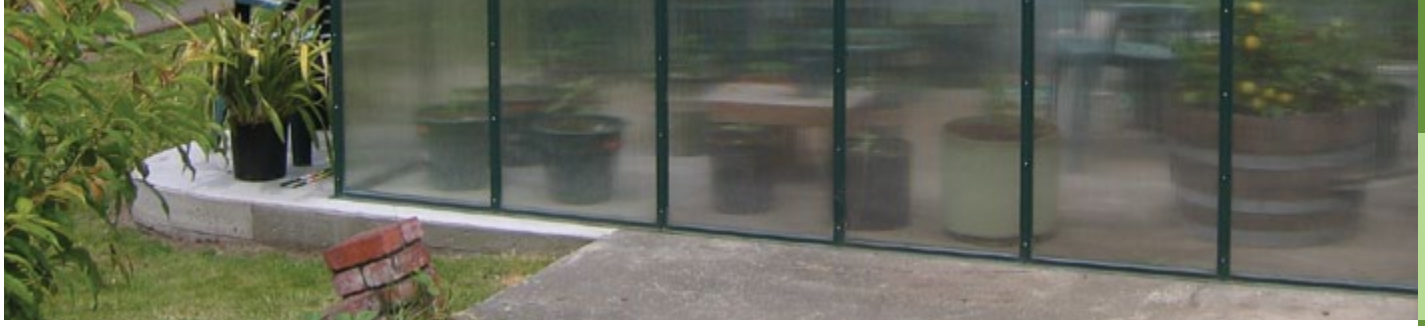
We might as well get this out of the way. Here is **the most important tip I can give you about greenhouse foundations:**

Your greenhouse foundation **MUST be level and square to properly anchor the greenhouse**. The greenhouse is manufactured true and square and must be installed this way. What if it is not level, you might be asking yourself? If your greenhouse foundation is not level, you might experience:

* the frame and panels will not align and you will think you have to cut into something and you don't, it's the foundation
* the framing for the door will be very tough to install and then the greenhouse door will not hang properly

Okay moving along to the types of foundations...

The most common foundations for hobby greenhouses are wood or concrete. Wood is the most popular choice because it is easy to work with and easy on the pocketbook. The other benefit is that wood can be easily adjusted down the line if you decide to move or extend your greenhouse.



*Pressure-treated wood foundation, and upper right, concrete foundation.*

A concrete foundation is more permanent, of course, and depending on the greenhouse you select, will become a part of your landscape for generations. Other common foundation materials include cinder blocks or bricks. Believe it or not, we have also seen a terracotta foundation that looked pretty great!

### PRESSURE TREATED WOOD FOUNDATION

A hobby greenhouse (under 120 sq. ft.) can be fastened to 4" x 4" or 4" x 6" pressure treated wood foundation. For a larger greenhouse, 6" x 6" beam or 8" x 8" wood timber is your best choice. Wood timbers can be stacked to increase height inside the greenhouse and create a more permanent look. Keep in mind the higher the greenhouse, the more air inside that you will need to heat. Another option is to use wood that is rot resistant and readily available in your area. Cedar is a great choice for a greenhouse foundation.

Above, cinderblock and below, brick foundations.

### CONCRETE FOUNDATION

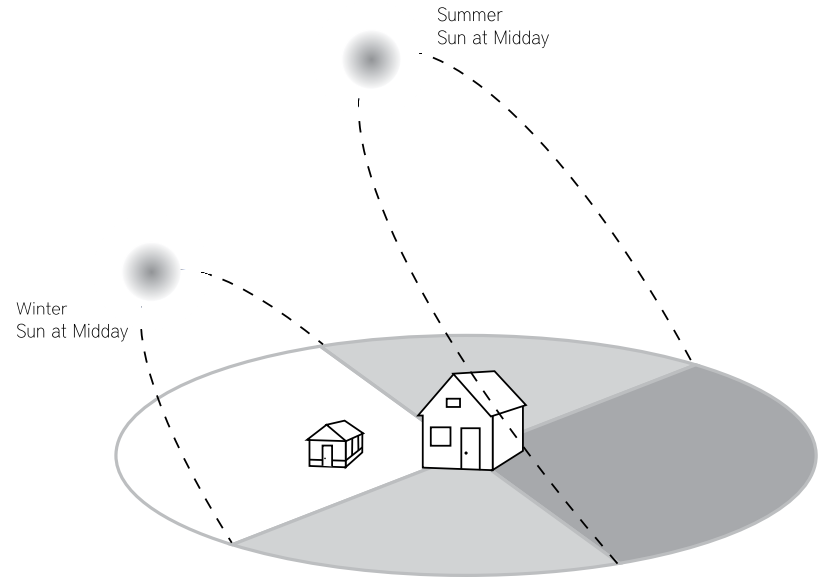
A concrete foundation is the most durable option and if properly sealed, will protect you from the elements for years. And as you can guess, the heavier the greenhouse, the more important it is to build a strong base to support it. Concrete is often necessary by your city planning office if job specific engineered drawings are required.

### BRICKS OR CINDER BLOCKS

Bricks or masonry blocks are also an option, but you must have a flat surface to fasten the greenhouse to. This means that the gaps and holes are closed off. Settling and cracking is common with bricks or cinder blocks so care must be taken to prevent holes or cracks as pests will find any way to get into the greenhouse. Often a treated timber top plate covered with a metal flashing is an easy way to provide a smooth, stable surface to anchor the greenhouse and you can buy regular sealant to fix any cracks or gaps.

## Select Your Site

Determine the best place in your yard based on sun exposure (six hours of winter sun), traffic, proximity to utilities and easy access. A flat, level surface is ideal but many customers deal with a sloped yard with a bit more digging. A slope in your yard



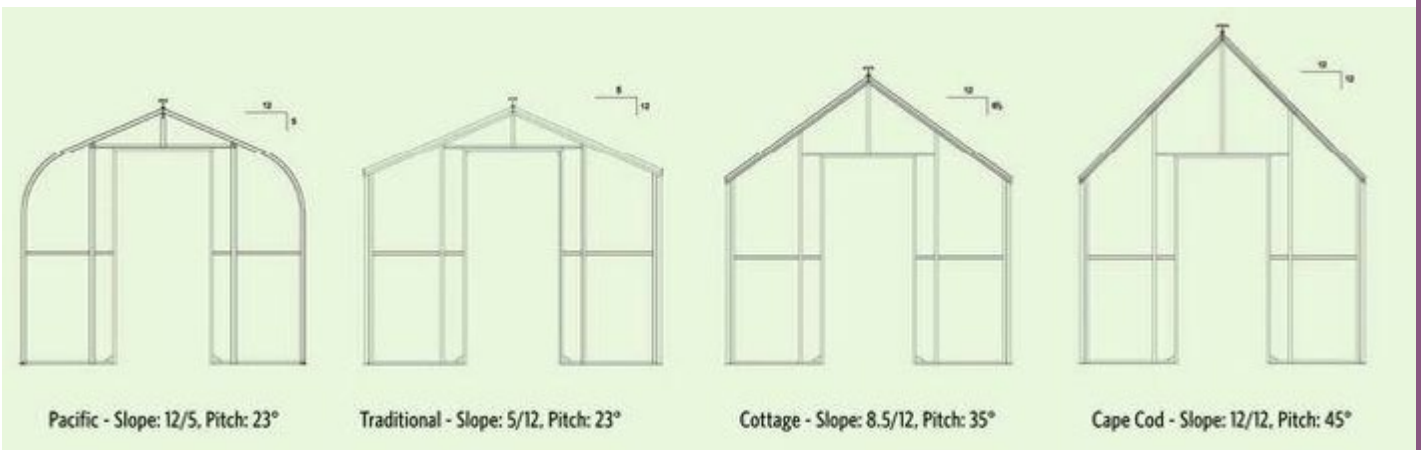
**CONSTRUCTION TIP**

Think about the aluminum sill as a trough to allow water to escape to the outside of the greenhouse.

requires building up the area to square off the greenhouse which will require more concrete or footing showing on parts of the foundation. In many cases, the concrete wall or wood foundation acts as a retaining wall depending on how steep the slope is. If it is a substantial slope, most people will drop their foundation with steps in their stem wall. The good news is that you do not need a perfect spot with our system to make it work as you can see above. This is a custom **Traditional 20 x 24 Double Glass** greenhouse with an offset ridge beam, extra sidewall height and two jogs in the foundation. Anything is possible = happy customer!

# Freestanding Greenhouse or Home Attached?

There are certainly benefits to each type of greenhouse and should you decide on a home-attached model, it's important to consider that a concrete foundation may be a better option due to settling or shifting. The next step is deciding what size of greenhouse you need based on available space, gardening needs and budget. What will your garden grow? If you are thinking citrus trees, a **Cape Cod** gives you the most height in the greenhouse but a **Traditional** is most common for gardeners who want to control the temperatures in the winter months – less air volume means less chance for cold air pockets. It is often a combination of function and aesthetics.



# Three: Building a Wood Foundation

## Prepping Your Site

### OPTION 1

Dig out the top three or four inches of topsoil for the perimeter of the greenhouse (at least 12 inches wide). Now dig out all four corners to inset concrete pier blocks to ensure that the greenhouse remains level and does not shift or settle due to soft ground or frost heaves. Place inset pier blocks every 6-8 feet.

### OPTION 2

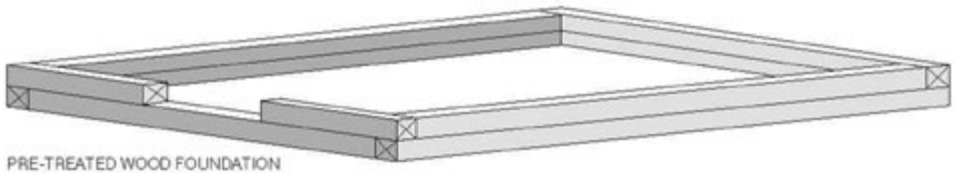
If you live in a colder climate where the frost level is deeper than 12 inches, you should consider using concrete sona tube supports below grade as you would do with typical building structures in your area. Again, it's critical that the pier blocks or sona tube

supports are level. Sorry to sound like a broken record, but you will be thrilled when you install your greenhouse that it goes up according to plan!

### SUGGESTED GUIDELINES FOR WOOD FOUNDATION

- **4 X 4 TIMBERS** Up to 100 square feet or any greenhouse no wider than 10 feet.
- **6 X 6 TIMBERS** Necessary with any greenhouse with a truss (a truss typically requires a 5 inch sill to attach); any greenhouse 12" x 16" and over.

For additional strength, we recommend that the 4 x 4's are connected with galvanized or deck screws or galvanized connectors with alternating stackable joints. For larger greenhouses, two rows of alternating stackable joints will be required. If you live in a high wind area, you should consider tying down your wood foundation. One option would be to incorporate a concrete pier block that has a galvanized bracket to anchor the wood. Others will simply drive a steel rebar into the ground and pin it to the wood.



PRE-TREATED WOOD FOUNDATION

**CONSTRUCTION TIP**

For larger greenhouses (20 feet or longer), place a pier block or sona tube at the 6 to 8 foot mark and/or at truss location mark on each of the sidewalls for the best support. Generally speaking, the more the merrier.

GREENHOUSE TIP

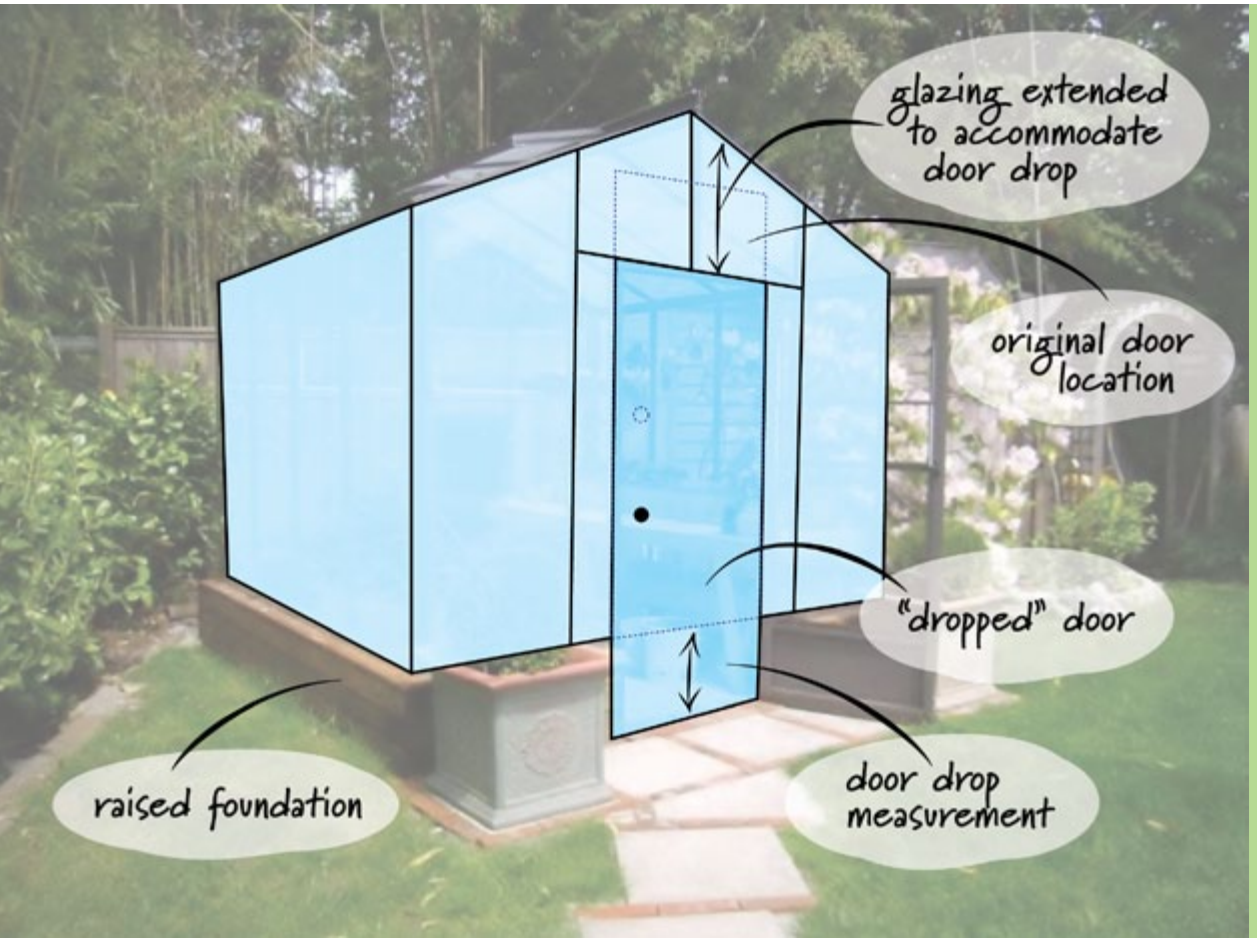
Many greenhouse gardeners prefer a full layer of gravel on the entire floor of the greenhouse because it's less expensive, looks clean and and leaves more room in the budget for odds and sods.

## Gravel Floor

As you can guess, when you create a perfect growing environment, you will have unwanted guests.  Stop them before they start by placing a weed screen or landscape fabric over the entire perimeter and floor of the greenhouse to prevent weeds from becoming those guests who just never leave.

Next step is to fill the area with gravel. We recommend 3/4" crush gravel for the ease of use, you can find it anywhere and it has the best drainage.

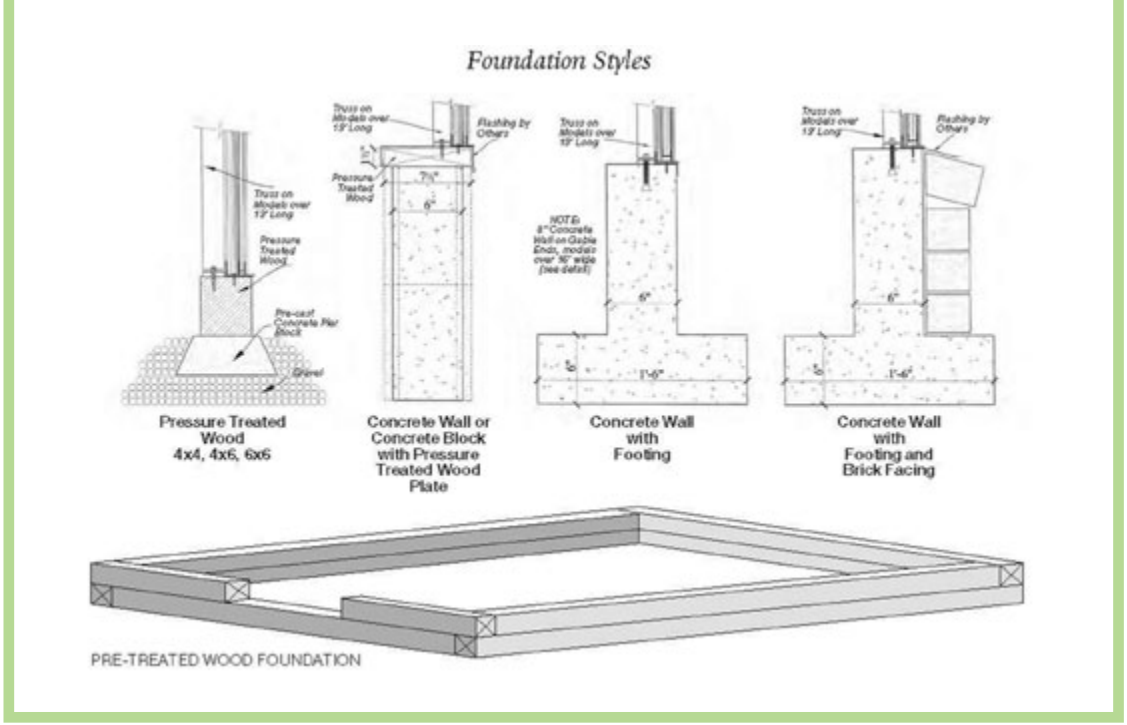
Another good idea is to place paving stones down the center of the greenhouse. It provides an even walking surface and prevents excessive dirt from tracking in and out of the greenhouse. One thing to think about is whether or not you want to step into your greenhouse. If you plan on using a wheelbarrow, decide how high your paving stones will be and match up to the timber threshold.




## WHAT'S A DOOR DROP?

A door drop is a custom modification that lowers the greenhouse door into the foundation (or allows the door to be flush with the ground). Prior to manufacturing the greenhouse, we will ask for the dimensions of the "drop" which is the total height of the foundation. We will place an order for a custom piece of glass or polycarbonate to install above the door for a perfect fit!

Staggering timber joints on a multi-layered timber foundation is essential for a solid wood foundation.




## A NOTE ABOUT THAT THRESHOLD

Given that **the greenhouse door is not typically built with a threshold**, it is suggested to place one continuous row of 4x4's or 6x6's all the way around the perimeter of the greenhouse. For those greenhouse gardeners wishing to add a raised wall or some height to the greenhouse foundation, the bottom row of timbers or concrete footing would remain lower. This allows the door to open and close easily, prevents gravel or dirt spilling out of the doorway and creates structural strength so that the door opening will not shift.

**Place your pressure treated wood beams and add a barrier** between the wood and the aluminum frame.

## WHAT ARE 'GREENHOUSE FRIENDLY' SOLUTIONS TO THE NEW RULES WITH PRESSURE TREATED WOOD?

- If you are using the new pressure treated wood, you will need to place a barrier between the wood and your aluminum frame. Popular barriers include 10 mm thick plastic sheeting, a rubber or foam weather membrane, or a row of weather resistant non treated wood such as cedar or hemlock.

- Other weather resistant non-treated woods are popular alternatives to pressure treated wood. These contain no harmful chemicals and can outlast pressure treated wood. Cedar timbers are popular choice for greenhouse foundations. If you want to keep foundation costs low, you could purchase a 1x4 or a 1x6 cedar (or other readily available wood) that will not rot and place it on top of the pressure treated wood.

If you have proper drainage, the foundation is not sitting in pooled water, and the greenhouse base is sitting on the very outside edge of the foundation, the greenhouse foundation should have a 15 to 20 year lifespan.

### INFORMATION ON PRESSURE TREATED WOOD

As of January 2005, the chemicals used in pressure treated wood have been changed. Previous wood was treated with arsenic; however, due to potential long term health hazards, this has been discontinued. New pressure treated wood is treated with copper. The copper in the 'new' wood will be corrosive to aluminum as well as other metals.

# Four: Building a Concrete Foundation

Our recommendation is that any double glass greenhouse or any greenhouse over 12x20 should rest on a concrete footing. Even so, many customers will choose a concrete foundation for a smaller greenhouse for longevity and easy cleaning. If you are currently building a new home, adding a concrete pad or footings for a greenhouse is a great idea. It's cheaper in the long run and hey, the builders are already there! Just a note to be sure that you have the exact outside dimensions of the greenhouse before you dig.

You have a few choices when it comes to concrete foundations and oftentimes this decision should be in conjunction with your local city planning department.

CONSTRUCTION TIP

Bevelled exterior edges or uneven surfaces can require major modification to the greenhouse or foundation itself. The foundation must be level and square for the entire area where the greenhouse frame and interior support channels rest.

# Types of Footings

The most common types of footings are:

### SPOT FOOTINGS

A spot or pad footing is used to support a single point of contact, such as under a pier or post. Spot footings are usually a 2' by 2' square pad, 10" to 12" thick, and made with reinforced concrete.

### CONTINUOUS SPREAD FOOTING

A continuous spread footing is mainly used to provide a stable base around the perimeter of a building. Spread footings are often augmented with interior spot footings. The spread footing supports the weight of the exterior or foundation walls. The thickness of the footing provides the necessary strength for that support. The wide width of the footing base provides a large area with which to transfer the weight from the walls to the ground. This is key to preventing settling.

### GRADE BEAM FOOTING

A grade beam footing is a continuous reinforced-concrete membrane used to support loads with minimal bending. Grade beams

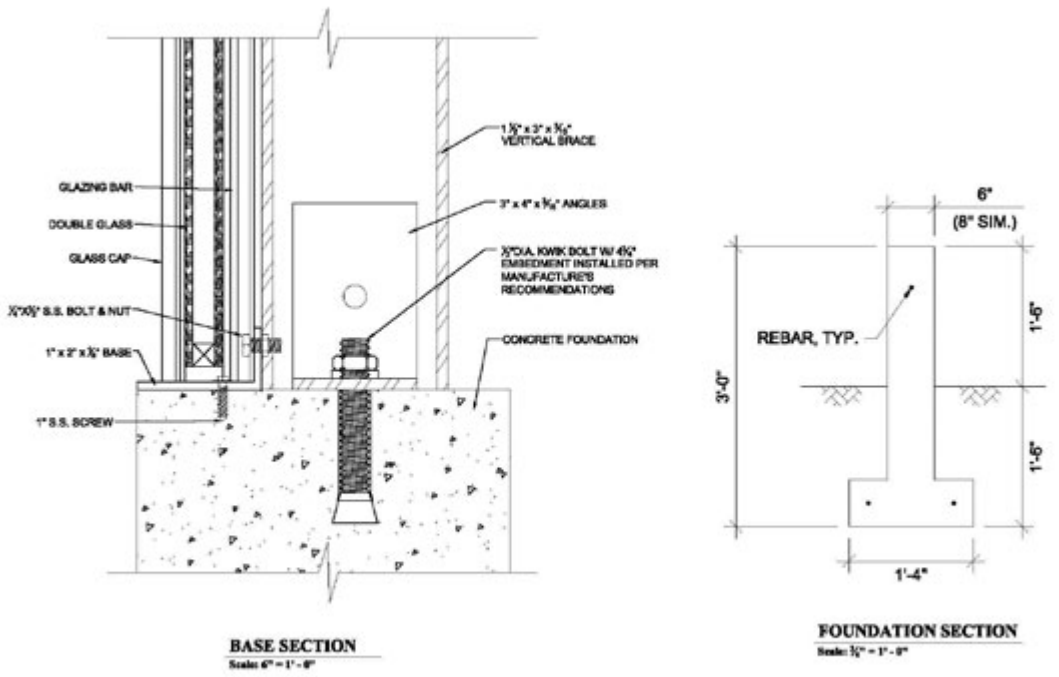
are capable of spanning across non-load bearing areas, and are commonly supported by soil or pilings. Grade beam footings differ from continuous spread footings in how they distribute loads. The depth of a grade beam footing is designed to distribute loads to bearing points, while the width of a continuous spread footing is designed to transfer loads to the ground. (Source: **all-about-foundation-repair.blogspot.ca**)

A SLAB is another common type of shallow foundation common with greenhouse structures. The slab will be about 4–6 inches in thickness, except at the perimeter where it will be thickened.

All concrete foundations should include the use of rebar to strengthen the concrete as well as steel mesh in the slab options.

In terms of overall depth, the foundation should be planned as you would design a typical outbuilding. It is critical to ensure the concrete foundation is built according to your local climate given that our typical 8x12 glass greenhouse is close to 1200 pounds.

The concrete must cure and be level and square for easy installation.




*Dimensions and rebar are for reference only. Actual dimensions to be determined by local building code.*

## ENGINEERED SHOP DRAWINGS FOR FOUNDATIONS

For larger greenhouses, engineered shop drawings that are available to customers can include the foundation and ensuring the foundation and greenhouse meets the specifications of the local building codes. The rules for the permit process depends on your municipality but generally speaking, a structure less than 100 or 120 square feet that is not considered permanent does not require a permit. Depending on the building department code, sometimes non-engineered foundation sketches suffice for a permit, so remember to ask about that when the time comes.

In terms of the footing, minimum thickness is really important when building a greenhouse. For a greenhouse with a regular support truss, a 6 inch concrete footing is fine. A more substantial greenhouse structure (16 foot wide **Cape Cod** or **Cottage** models or 18 feet and over for the **Traditional** and **Pacific** models), should have a footing that is at least 8 inches wide as the interior supports require a wider surface for attachment.

GREENHOUSE TIP

Many greenhouse gardeners like to experiment with passive heat sources and will paint the concrete dark colors to absorb the sun's energy particularly on the north wall.

If you require a permit for your greenhouse, then the foundation may also need to be engineered as well to ensure that it meets the local building codes in terms of thickness and depth. Occasionally some customers require a separate permit to engineer and design the foundation to suit the weight and substance of the greenhouse.

If the foundation is simple in design (width, depth and indicates the placement of steel), we can offer the engineered shop drawings for the foundation as an add-on (see image on previous page). We are able to design the concrete foundation detail and have our engineers design it per the applicable code for the home owner's region as we are licensed in all states and provinces.

### CONCRETE SLAB VS. FOOTING

When would you build a slab over a footing? A concrete slab is preferred by those that want a faster, easier foundation that does not go down as deep. Typically

A concrete foundation.

these types of foundations would be thicker around the perimeter and then steel mesh applied in the slab. This type of foundation should be reviewed by an engineer to ensure it can sustain the required loads and that is built to code.

### IMPORTANCE OF DRAINAGE WITH A CONCRETE FOUNDATION

As you can guess, you need proper drainage underneath the greenhouse. You will want to make sure that the water comes out and is sent away from the structure and doesn't pool underneath.

Many customers choose a simple center drain and add standard plumbing pipes to move water away from the greenhouse. Taper the concrete down and towards the grate for easy drainage.

### THRESHOLDS WITH CONCRETE FOUNDATIONS

If your greenhouse has our upgraded storefront door, we suggest extending the concrete foundation by two inches to provide more support for the threshold of the door. In addition to this, some customers choose to build a stoop or landing area in front of the greenhouse for container plants and easier access. Ensure that this landing has a slight slope away from the greenhouse to prevent water pooling into the greenhouse.

# Five: Brick and Rock Façades

Let's face it, a rock or brick façade is a gorgeous decorative feature for a greenhouse. This accompanying photo has a beautiful 36" rock façade which blends so nicely with the landscape.

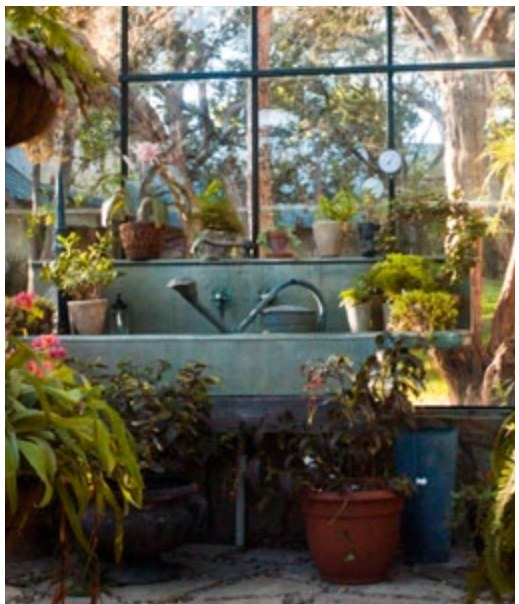
The most important detail to consider with façade is that the wall is built to the dimensions of the greenhouse and the façade is then attached to it. You will want to make sure that you purchase a flashing to ensure that water is not going to penetrate in between the footing and the façade. Alternatively, some customers like to add a decorative stone cap that is attached to the top of the concrete wall and sits past the edge of the façade as pictured here.

Should you wish to create a full brick foundation, we would recommend hiring an experienced bricklayer to ensure that the foundation is level and square and meets the minimum thickness to bear the structural loads. Our sales team can work on this detail with you.

# Six: Plumbing, Electrical and Heating

## Plumbing

When planning for your concrete foundation, the best idea is to rough in ahead of time and have the ability to come through the foundation if you plan on a permanent structure. Many customers choose to at least bring the PVC pipe through ahead of time so that you can plumb or wire it after the fact. Consult your plumber and electrician to double check before pouring your foundation. For wood foundations, it is fairly common to come through under the wood after it's constructed.



## Heating and Electrical

A 4KW heater requires a 220 Volt outlet which usually means a new electrical subpanel. If you are thinking about a gas heater, it's a good thing to bring in a gas fitter before the concrete gets poured. Many people ask where power should be brought into the greenhouse. We believe the best location is to put the electrical panel on either side of the door. The other benefit is that it's right inside the door with easy access to control and switches.

### THE CHALLENGE WITH STAYING OFF THE GRID

The trick is air circulation and finding the right passive fit for moving air around. It is one of the most overlooked necessities in a greenhouse because it prevents condensation, aids pollination, moves hot and cool air pockets, and helps to prevent infestation.

The challenge in any passive greenhouse is air circulation and finding the right way to move air around. It is one of the most overlooked necessities in a greenhouse because it prevents condensation, aids pollination, moves hot and cool air pockets, and helps to prevent infestation. We are frequently asked if we sell solar powered circulating fans and unfortunately, to date, we have not found a solar powered circulating fan that is worth the financial investment. The amount of power necessary to operate a fan is pretty substantial and you would need a fairly large solar field to run it.

# Seven: Greenhouse Flooring Options

Choosing between greenhouse flooring options includes considering many different factors. Drainage, decomposition, price, heat retention, comfort, and traction vary between flooring types and allow for a customization of your greenhouse that extends beyond visual appearance. Read on for some considerations when choosing your greenhouse flooring:

### DRAINAGE

As mentioned, drainage is crucial in a wet environment like a greenhouse. If you're leaning toward a solid flooring material, like concrete, keep in mind that you'll need to install drains to help keep your greenhouse flooring dry and your plants healthy and free from mold. You should consider the location of the drains carefully to ensure the drain is not in the middle of a proposed walkway or working area. Other materials, like gravel, concrete pavers, and flagstones also drain well and are most common.

Bark mulch flooring.

### DECOMPOSITION

Organic materials such as bark mulch, sawdust, and wood will need regular replacing. These tend to decompose and becoming a breeding ground for algae and pests and the cost savings will become prohibitive in the long term when you need to remove and replace the rotting floor.

### PRICE

The cost of flooring materials is by far one of the most important factors to consider when selecting between greenhouse flooring options. A full concrete slab is up to your discretion. You should plan to power wash the concrete with each annual cleaning to ensure that algae are not forming on the surface. For most areas, gravel is the most cost effective floor covering that has the most benefits in the greenhouse.

### HEAT RETENTION

Heat retention is an important factor in the greenhouse if you live in a colder climate. A concrete slab and most materials such as brick and flagstone will help trap and slowly release the day's heat during the cooler nighttime hours. This can help decrease your heating costs during colder weather.

### COMFORT

Standing for many hours while caring for your plants can be hard on your body if you choose an unforgiving flooring type like concrete. Adding rubber mats where you stand most often may help your back and are very easy to rinse clean.

### TRACTION

Landscape fabric.

Your greenhouse floor will often be wet or covered in spilled soil. This can lead to slips and falls if you're not careful. If you opt for a gravel floor which is the most common, we recommend to lay down a weed screen, and then fill with 3/4" crushed gravel for the best traction and drainage. You can then place concrete pavers in the aisle for walkways and work areas. For greenhouses over 14 feet wide, two aisles are common with a center bench.

### WEEDS

Remember that your greenhouse does a wonderful job at creating an environment that plants love – and that includes weeds! Before you lay down a floor base of

### LATEST TREND: BIOCHAR

Newest Trend:  Biochar has been used to manage weeds for many centuries and more recently, to improve soil conditions. Most commonly, the homeowner will use a sealed metal drum to burn organic matter such as grass, hay, leaves or wood. The matter is burned slowly and turned into a carbon rich soil additive that when combined with gravel or sand is very useful if you grow plants directly into the ground inside your greenhouse.

gravel, pavers, dirt, or mulch, be sure to put landscape fabric underneath. This will save you time and hassle of pulling unwanted weeds on your greenhouse floor. If you are plagued with pests and/or disease, removing and replacing the soil can be a back breaking job.

# Eight: 7 Questions You Should Ask

Here are some questions to consider when choosing a type of foundation.

### DO YOU REQUIRE A PERMIT IN YOUR MUNICIPALITY?

A permit is generally required if the structure is meant to be permanent or more than 100 square feet. The guidelines around permits vary according to municipality. Even if a permit is not required, it is still a good idea to follow local guidelines and call before you dig.

### WILL YOU REQUIRE ENGINEERED DRAWINGS?

We are one of the few greenhouse manufacturers that can provide job specific sealed  engineered drawings that will be required in most cases where a permit is necessary.

### WHERE IS YOUR WATER ACCESS AND DO YOU WANT TO INCORPORATE A SINK?

If it fits within your budget, a sink is very handy in the greenhouse. Clean up and sterilizing garden tools

is much easier! Some gardeners like to incorporate misting systems as well as thermal heat syncs which require easy access to water.

### WHAT ARE YOUR POWER REQUIREMENTS? CAN YOUR ELECTRICAL PANEL HANDLE THE EXTRA LOAD OF THE GREENHOUSE?

If you wish to heat your greenhouse with an electric heater, you may need to incorporate a sub panel with 220 volt. Depending on your climate, a 4KW heater would require more voltage than a typical 115 volt outlet, and with the addition of fan system, most large greenhouse gardeners will need additional power to the greenhouse.

### IS YOUR YARD LEVEL? HOW DO YOU ACCESS YOUR SITE?

Sloped yards require more planning and may take more time to build. Your yard access may be an important point should you require any specialty equipment.

### HOW DEEP DOES CONCRETE NEED TO GO?

If you require a permit, your city by-laws may state that you need to set the greenhouse foundation beneath the frost line depending on the properties of your soil. You may need a mini excavator to dig to the necessary depth. Foundations in some colder climates where extensive digging is required can incorporate concrete sona tubes to be the portion that extends down to the frost line.

### WHAT DO YOU NEED FOR DRAINAGE?

Most contractors will suggest installing a drain into your concrete floor with a bit of a slope to the drain for easy run off. This is a very simple way to clean your greenhouse when necessary.

# Nine: Price Considerations for a Foundation

The cost for a concrete foundation can vary widely based on labor and material costs in your area. Quotes should always be based on site inspection as certain conditions can greatly affect cost such as:

### SLOPE

A significant slope in your yard could mean the difference between 2 yards of concrete and 5 yards and a few hours of labour for digging out a retaining wall.

### GROUND QUALITY

Is there a presence of moisture or large rocks that will need to be fixed prior to laying the foundation? Will you need a mini excavator to clear the area?

### ACCESSIBILITY

Another factor to consider is how easily accessible is your yard? How will the contractor bring materials

into the space? There have been instances where the customer's yard is difficult to access even by wheel-barrow and gravel needed to be brought in by hand, bucket by bucket full. Not a fun day but great exercise!

### MATERIAL COSTS

This is where the prices change depending on your location. For example, if you are really set on having a cedar built foundation and you live in New Mexico, it is going to cost you significantly more than your friends in the Pacific Northwest. However, if you go with what is readily available you can often save money. For example, a customer from Texas used beautiful limestone for her greenhouse floor because it can be found anywhere in Texas.

### LABOR COSTS

If you are able to lay the foundation yourself, you can save cash but not everyone has the means or the back strength for the job.

# Approximate Costs for a Foundation

The suggested costs for concrete foundations are ballpark prices only given the range of labor and material costs. These really can vary quite widely. You should always ask for a comprehensive quote based on site inspection as certain conditions can greatly affect cost such as slope, ground quality, presence of moisture, rocks, etc.

### APPROXIMATE FOUNDATION COSTS

- 8 x 12 Pressure Treated Wood (1 row on grass or concrete pad, gravel and pavers) ..... $600–$800
- 8 x 12 Slab (2 yards of concrete) ..... $1,500–$2,500
- 8 x 12 Perimeter Foundation (2-4 yards of concrete) ..... $2,000–$3,000
- 16 x 20 Pressure Treated Wood (1 row on grass or concrete pad, gravel and pavers) ..... $800–$1,000
- 16 x 20 Foundation (4-5 yards of concrete based on frost level) ..... $2,500–$3,000
- 16 x 20 Slab (6 yards of concrete) ..... $3,000–$4,500

Many greenhouse gardeners enjoy the do-it-yourself nature of greenhouse gardening and bring friends and a "can do" attitude to build the foundation and greenhouse. The fruits of your labor will be enjoyed year after year!

# Ten: Resources and Staying Connected

## Resources

- **Planning and Building a Greenhouse** – West Virginia University, ES
- **Garden and Greenhouse Ideas** – Paula Greenfield
- **Greenhouse Flooring, Heating and Staging** – HGTV
- **Greenhouse Flooring** – eHow.com
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