

Deck, Porch and Gazebo Planning and Construction Guide

3rd Edition

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The Ambassador



14' Victorian Bandstand



Stevens Sunroom

Table of Contents

Notes, caveats, & tips to buyer 2-3
How to Plan a Deck 3-9
How to Build a Deck..... 9-15
“Hints & Tips: A Guide to Avoiding Common Deck Building Problems”.. 15-19

Appendix of Drawings

Stair Detail Drawing20
Tread & Riser Detail Drawing20
Railing Designs & Detail Drawings21
Piggyback Beam to Post Configurations22
Footing to Post to Beam to Joist to Ledger Detail.....22
Bay Window or Chimney Framing Detail23
Typical F8 (min) Footing Detail23
Bench Detail.....24
Coffee Table Detail24
Spa Support Detail25
Gate Detail25
*4x4 Skid Support for Octagon & Victorian Bandstand Gazebos26
Alternative Substructure for Gazebo Floors27

***Important and necessary to use 4x4 skid support with octagon and Victorian Bandstand gazebo floor plans for proper substructure support.**

NOTE: PLEASE CAREFULLY STUDY ALL OF THE INFORMATION BELOW BOTH BEFORE AND DURING CONSTRUCTION OF YOUR PROJECT. THE INFORMATION CONTAINED BELOW, IF FOLLOWED, WILL SAVE YOU MANY, MANY HEADACHES.

Notes, Caveats, & Tips to Buyer

Thank you very much for placing your order with my firm for the deck, porch or gazebo plan. It is my sincere hope that you will find our Building Plans adequate to help you with your project. Not everything you read in the following pages will apply directly to your project. However, I would

advise you to read it all anyway because a great deal will be applicable. Please understand that, as mentioned on our home page, these projects are of complexity that expertise of a carpenter is normally necessary to read and execute these plans. That is why I always explain to folks that you should be a carpenter, or be working alongside a carpenter, or at minimum have access to a carpenter for consultation and advice. Should you have any questions, you may find your local Building Plan Review helpful. If you need our assistance, we are pleased to offer our help at our standard consulting rates of \$60/hr on the telephone/fax/email/mail billed in 15 minute increments. We only require your VISA or MC information in order to accomplish this.

Unfortunately due to the "sue happy" environment in which we live, prudence dictates that I make the following disclaimer which applies to all plans, material lists, written and verbal information transmitted to you either now or in the future:

"There exists no warrant or guarantee for the plans, materials list, or written or verbal information transmitted to you in any way. It is solely the responsibility of the buyer to follow his locally accepted building practices and code, obtain prior plan review approval, and insure the project is constructed properly."

That said, I would none-the-less be delighted to help you in any way should the need arise. Call, fax or email me. Best times to reach me are 10am-4pm ET Monday, Wednesday, Friday (office closed Tuesday for my Family Day and Thursday for On Site work).

Incidentally, any suggestions and feedback you can give us will be greatly appreciated. We are constantly striving to update, upgrade and improve this service.

ALWAYS SUBMIT ALL BUILDING PLANS TO YOUR LOCAL BUILDING AND PLAN REVIEW FOR THEIR APPROVAL.

How to Plan a Deck

(Portions are applicable to porches & gazebos)

Most folks use a deck as the central gathering and entertainment focus for their entire back yard. Therefore how the deck is designed becomes critical. If planned correctly, your deck will custom fit your house, your terrain, your lifestyle, and your budget. Plan your deck carefully now and years down the road you will be glad you did!

Considerations, Problems & Pitfalls

Question: *"What kinds of things should I be aware of as I plan my new deck?"*

Answer: How will you use your deck? For example, do you need lots of room for entertaining large numbers of people? Will there be sunbathing? Cooking on the deck? Small children? Will the deck lead to a pool? Will a spa be added to the deck? Will a screen porch be added in the future? Will you want permanent seating? Flower boxes? If so, will you want flower boxes on casters to make them moveable? Need privacy from neighbors? A special place for your grill? How much do you

hate maintenance (periodic deck sealing)? Is the view from the house critical? If so, from which room(s)? Will you want stairs? If so, what are the traffic patterns from the house to the yard to consider? Is your deck going to be high enough that you will need an intermediate landing in the stairs? Will you need additional lighting to illuminate stairs at night? Will a self-latching gate be needed?

Location-Location-Location

Question: *"Where should I locate my deck?"*

Answer: In most cases, that will be answered by where your door is located at the rear of your house. In some cases, folks will want to consider adding a door (installing a door the same size and at the same location of an existing window makes the job easier and less costly). Most decks follow along the back of the house, working around such things as hose bibbs, dryer vents, chimneys (never attach a deck to a chimney or to a cantilevered bay) and downspouts. Check with your local utility company or heating and air conditioning company (or heat pump manufacturer) to determine how much clearance you will need above your heat pump or AC unit if you plan on decking above it. Some say a prudent clearance is 5'. You do not want to lower it's efficiency. You can deck around them, but be sure to leave a foot or two to allow room for access. In locating a deck, you will also want to consider what is buried in the yard. Do not cover a well, propane tank, or septic tank with a low level deck without designing in proper access panels into the deck. Also, where the sun comes up and sets and when and where shade is available should be considered when choosing location. Also, certain trees can produce very annoying sap drippings and leaves that stain a deck. Minimizing noise (and nosiness) from neighbors and passing road traffic may also help you decide to locate the deck in a more protected and private area. Similarly, your view should be taken into consideration. A high deck allows you to see, but not be seen as well.

Legal Stuff

Question: *"What kind of legal considerations are important?"*

Answer: Check with your local Zoning Department to determine how close you can come to your side and rear lot lines with your deck. Sometimes they will allow stairs to come closer than the deck. Sometimes a so-called "free standing" deck can come closer to a lot line than a deck attached to the house. Ask if they have anything they can give you in writing. If you are blessed with an HOA (Homeowners Association), ask them for up-to-date covenants that spell out any restrictions on size, location, and appearance. Trust me... it's better to know now rather than plead ignorance later and wind up re-doing your deck. Ask your local Building Department if they require a building permit and a set of Building Plans. Call your local utility companies (gas, electric, phone, cable) and ask them to mark buried lines or pipes in the yard and to notify you is they have a utility right-of-way on your property that prohibits constructing a permanent deck.

Size Matters

Question: *"How large a deck should I build?"*

Answer: That will depend upon many factors including how large your house is, how small your yard is, how much you want to spend, and what you will want to do on the deck. Don't plan a deck

too big for your house. And if your yard is small, you may want to keep some yard available for landscaping. To get a feel for how large the deck should be, try using string to line the perimeter of the deck. Then place some deck or lawn furniture in the designated area to see how useful this space will actually be. Will there be enough room for a table and chairs? A grill? A separate sitting area needed? You will likely only build this deck once. Do it right the first time... and don't make the common mistake of building it too small. Five years from now you won't remember what you paid for it... but you'll darn sure know if you made it too small. Another good point to remember in planning size is this: Plan the distance out from the house in even 2' increments. Normally your floor joists will be perpendicular to the house wall and wood lengths come in even numbers. Don't waste materials if you do not need to.

Design Enhancements

Question: *"Are angles and level changes and different decking patterns good to use? Or will it run the cost up a lot?"*

Answer: A deck can be built in just about any shape and with multiple levels and deck boards run on a 45 degree angle (or even alternating in a herringbone design) really adds aesthetics and strength to a deck. But, yes, any of these design enhancements also add materials cost and normally also labor cost as well. Don't even ask me to estimate how much more. Maybe 5%-25% more depending on what design enhancements you want.

Height Matters

Question: *"How high should I build my deck?"*

Answer: Typically build a deck no higher than about 4" below the door threshold. You don't want water to gain entrance to your house. Sometimes to gain more view from the house, or to attach a deck to a solid concrete foundation wall (as opposed to attaching it to a thin house floor joist plywood band), it is preferable to build a step in front of the door and lower the deck 14" to 16" below the door threshold. Check with your local Plan Review to determine if a deck over a certain height will require cross bracing to increase stability. If your land slopes down, you may want to build in level changes to follow the terrain. It looks very cool... but it runs the cost up.

Spas & Hot Tubs

Question: *"What special considerations should I make for a hot tub or spa?"*

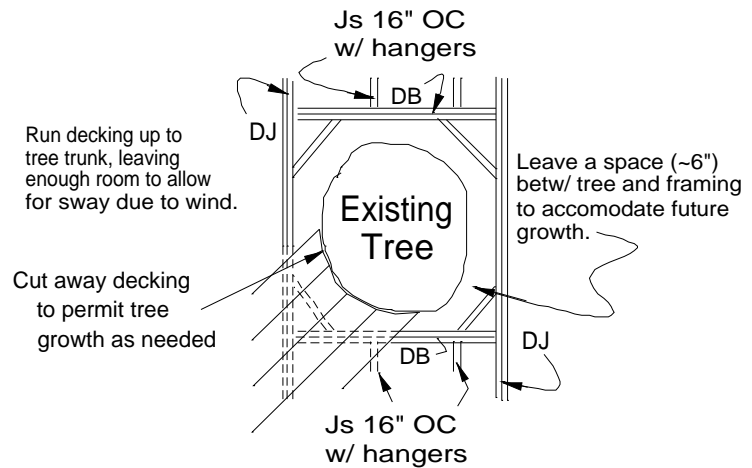
Answer: Water weighs 62 lbs per cubic foot, so if you plan on setting your spa on top of your deck, when it's full of water and people, it's the equivalent of an elephant on your deck. It needs proper support. You will definitely want to hire the services of an architect, engineer, or deck design firm to help you with the additional support requirements for a spa. (See **Spa Support Detail Drawing** in Appendix, page 25) Your local Plan Review should also be able to help. (Your taxes pay their salaries remember. They can help you by working out some calculations to properly support your spa.) On the other hand, you may want to rest your hot tub on a concrete pad and build the deck around it. Here's where things also get tricky because you must insure that the deck is properly supported. And don't make the mistake of sinking the spa flush with the top of the deck. That first step into the spa may be so much lower than the deck surface that folks fall into the spa! (Which may be funny until it's your wife.)

Cut Outs

Question: "How about cutting out the deck to go around things like trees?"

Answer: It looks great. Just make sure that you take into account such things as how much the tree will grow and how much it will sway in a typical high wind. Don't frame and deck too closely. Leave about 6" on all sides. You will want to run your decking boards up to the side of the tree but allowing enough room for sway in the wind. Cut the decking with a saber saw as the tree grows and needs room. Also a bench around the tree (planter box?) is a possibility. Check with a local Building Inspector or your Plan Review to determine if there are safety issues they will want addressed.

Detail Drawing for Framing Around a Tree



Railings

Question: "What special considerations should I be aware of for my deck's railings?"

Answer: Check with your local Plan Review to determine at what elevation from the ground your deck actually is required to have a railing. Typically it's 30", but localities may differ. But even if you are not required to have a railing, if you choose to install one, it must meet code requirements. That means the openings must be only so large (code changes periodically, but as of this writing most localities typically require that a 4" diameter sphere cannot pass through it) and the main support posts (usually 4x4s) cannot be too far apart (5' is typically the max). The railing must be of sufficient strength to sustain both lateral and vertical forces specified by code. Here again you will need an architect, engineer, deck designer, or local Plan Reviewer to help you with what railing designs meet or exceed code requirements. See Appendix page 21.

Stairs

Question: "What do I need to know about designing stairs?"

Answer: If your deck will be high (say 6' or higher), you will want to consider installing an intermediate landing for safety and aesthetic reasons. Step and stair construction is very carefully regulated by code requirements, so you will want to work closely with your local Plan Review in order to build to their specifications. As of this writing, code typically calls for stairs to be no less than 36" wide (from inside of railing to inside of railing), have a banister (grab rail) down at least one side, have riser and treads limited in dimensions, a 1/2" to 1" stair nosing, risers enclosed, 2x12 stair carriages appropriately spaced (18" in some localities). Again, work with an architect, engineer, deck designer or your local Plan Review to obtain a detail drawing of a typical set of stairs. (See **Stair Detail Drawing** in Appendix, page 20) As with all of your deck, you will want to build stairs to meet or exceed code requirements.

Basic Components

Question: *"What are the basic components of a typical deck?"*

Answer: A deck is normally composed of vertical support posts that rest on buried concrete footings. Code typically limits how far apart these support posts can be spaced. Each post supports beams (girders) that normally run parallel to the house. Again, code dictates how far apart beams can be from each other otherwise you will over span your floor joists. The beams support floor joists that normally run perpendicular to the beams. Normally floor joists are spaced 16" OC (on center meaning center to center) but may need to be spaced closer under certain circumstances (ex- if using certain composite decking diagonally). Sometimes floor joists can be spaced further apart. Joists distribute the weight of the deck boards above which are run either perpendicular to the floor joists or on a 45 degree angle. The last deck component is the railing which is normally 36" to 42" high. Code will dictate the materials, design and spacing for railings and for all components of a deck. Always submit all Building Plans to your local Plan Review before building.

Building Materials

Question: *"What kinds of deck building materials are commonly acceptable?"*

Answer: There are more and more materials being used today, but take into consideration whether or not the materials are resistant to decay and insects (CCA pressure treated wood is as also is cedar and redwood... but not as much). What are the effects of water, sun, heat and cold? Some composites and plastics do better than wood in this area... but some composites "creep" with heat (meaning the deck boards actually sag between the joists). Some plastics are very user unfriendly to install whereas many composites cut, nail, and screw like wood. Wood (any kind of wood) left exposed to the elements will turn gray unless you apply an excellent sealer. But sealers are expensive and must be periodically re-applied. There are no easy answers... but there is a simple answer: Do your homework. Read, study and talk to the experts.

Costs to Contract

Question: *"If I contract a deck out, how much should I expect to pay?"*

Answer: Naturally the prices will vary, but a fair price range currently is from \$18-\$25 per square foot for a turnkey standard pressure treated deck. Turnkey means they provide labor, materials, building permit and you don't lift a finger. You can find deck companies that will charge less currently, but be careful. Sometimes a home improvement company falls into the trap of thinking that they can lower their prices so they get a lot of business... but wind up so busy and making so little on each deck that they become frustrated and go out of business... leaving you to deal with any future problems.

Costs for Materials

Question: *"Suppose I want to build a pressure treated deck myself. How much can I expect to pay for materials?"*

Answer: Again, prices vary. But a fair price range right now is from \$5.00 to \$7.00 per square foot for pressure treated deck materials (including fasteners and concrete).

Costs (Labor Only) to Contract

Question: *"And if I want buy the materials and have a good deck builder build it for me... how much should I pay?"*

Answer: If you have the deck design (so no salesman needs to be paid a commission), are willing to obtain your building permit and buy your own materials, you are saving the deck builder a lot of overhead expenses. So it is natural to expect a sizeable discount. The amount of that discount is naturally a very negotiable quantity... but my firm offers a 25% discount off our current turnkey prices of \$20.00 per square foot. As I said, companies will vary, but we will build a typical pressure treated or composite deck for \$9.00 per square foot labor only. But then you must add the cost of materials and your building permit. Most folks find a savings of about \$2000 on the typical deck by using this interesting homeowner interactive program.

Fitting the Deck to the Budget

Question: *"If I am on a budget, how can I design a deck and know I'll come pretty close to how much I can afford?"*

Answer: Simple actually. Take the total cost per square foot and divide it into your budgeted amount. *Example:* Suppose you are building the deck yourself and you are using pressure treated materials. Let's say you have a \$6000 materials budget. Divide \$6000 by \$6.00/SF (approximate cost of materials) and you get 1000SF of deck. That's a lot of deck, by the way. 500SF is more typical. If you are hiring out all or part of the labor, you must add into the materials cost of \$6/SF the cost of the labor. But this will help you determine how large you can design your deck for a given budget.

Getting Started

Question: *"OK, but how do I get started?"*

Answer: You will want to make a sketch on 1/4" graph paper. Splurge and buy a pad of the 11x17 paper. Draw your house wall to scale (overhead view... like a blueprint). Draw in the windows and doors to scale (accurately placed on the drawing). Include such things as a heat pump, chimney, bay window, hose bibb, dryer vent... anything that may impact the deck (including trees or even a septic system). Include an elevation measurement from the ground to 4" below the door threshold. If you know where you will want your stairs to go, make an effort to determine how high it will be from the ground at that point to 4" below the door threshold. A line level and length of string works great for this measurement and costs very little. (That information will be needed to calculate the number of stairs) If your lot lines are close, include them on this drawing so you can prevent the deck from encroaching into your local zoning setbacks. Now that you have your critical house and terrain information drawn to scale, go for it! Based upon the information you provided in the above, start drawing your dream deck! I'll bet your next question will be *"what materials do I need to get started?"*

Things You'll Need

Question: "What things do I need to get started?"

Answer: How did I know that? You will need a 100' measuring tape, a pencil, eraser (most important tool), 1/4" graph paper (11x17 works best), ruler (triangular engineer's ruler with 40 scale is best), string (to help layout the deck on the ground), and optional line level and optional Polaroid camera (you'd be surprised how many trips out to the yard I've saved by having a photo of the back of the house).

Anything Else You Forgot to Tell Me?

Question: "Anything else I should know?"

Answer: Actually, lots of things. No way we can cover everything here. But there is one very critical item. After you have designed your dream deck and before you start building... please turn these preliminary plans over to someone who knows what he's doing and can generate a detailed, accurate, complete set of **Building Plans** that will meet or exceed code. Remember, what you are about to draw up is preliminary only. It does not tell you where to locate the footings, or how large to make them, or how far to span your floor joists, or how large the floor joists should be, or a hundred other things... all of which are critically important to the structural integrity of your new deck... and to the safety of it's occupants. Don't skimp here. Hire someone you trust like an architect, engineer or good deck designer. Carpenters are normally not good choices for this kind of work. We have found that good carpenters can read a set of plans easily and can build a good deck from a good set of plans... but most carpenters do not know the formulas or spans or critical information necessary to keep a deck code compliant and safe... not unless that is what they do for a living.

How to Build a Deck

(Portions are applicable to porches & gazebos)

Submit Building Plans to Plan Review

Question: "Can I just build from this Preliminary Plan I drew up? I mean, do I really need anything else? I like flying by the seat of my pants."

Answer: Didn't I see you barnstorming my nephew's birthday party last Saturday? Was that you? You should be ashamed. Once you have determined the basic design of your deck, you will need to work with an expert who knows code requirements, has access to span charts and can calculate loading requirements in order to generate a detailed and complete set of code compliant Building Plans. Most folks use an architect, engineer or professional deck design and build firm. Once you have these working drawings, submit them to your local Plan Review for their study and comments. Even if your locality does not require a building permit for a deck, this is still a smart move. Your taxes pay their salaries. Use your Building Department's Plan Review as a double check for your set of Building Plans. And listen to what they tell you. Most of them are quite good at what they do.

Selecting and Ordering Materials

Question: *"I am not a carpenter. How will I get a materials list drawn up so I can order all this stuff?"*

Answer: You can pay a carpenter or deck builder to work up a materials list for you. It'll take 'em maybe a couple of hours depending upon the size and charge you... oh, I don't know... maybe \$50 or \$100. Or you can work it up yourself (get ready to make some return trips to the local materials supplier). But here's a little known secret that will save you some time and trouble: If you have good, clear Building Plans drawn up (which is very important to have if you are going to build this yourself), just take a copy down to any reputable materials supplier and ask him for an *itemized* quote. He will happily provide you with a materials list complete with prices... *free*. Why? He wants to sell you the materials! Now you've got a materials list and you can comparative shop. Some won't do it. Good ones will.

Preparing the Ground

Question: *"I've heard conflicting reports. Some say I should remove the sod where my deck will go, others say to kill the grass with a vegetation killer, others say do nothing. Still others tell me to put down black polyethylene to prevent weeds and grass from growing through the deck. I'm really confused. What's right?"*

Answer: Well, think about it. If you remove the sod, what will prevent the water that comes from the deck from eroding the ground under your deck? Sod is good. Grass is good, even if it's dead grass. If there is not enough sunlight to sustain the grass, it will die. But that's ok. The sod that remains will prevent erosion. If the deck will be fairly low to the ground (4' or so), you may want to skirt it with something like lattice for aesthetic reasons. But if it's higher, sometimes lattice skirting becomes over bearing. In that case, there should be enough light to sustain some kind of vegetation. Try it. If not, you can always concrete it or put stone under the deck. Or make it into a pet graveyard.

Laying It Out

Question: *"What must I do to lay this deck out?"*

Answer: You must establish the exact location of each footing. This is extremely important, so take time and care here. Your plans should have the distance from the house and the lateral distance for each footing so you can determine the exact location for each one. Carefully measure and mark each one with a can of spray paint. In most cases, the ground slopes away from your house, so you cannot simply measure along the ground from the house. You will need the exact location of each footing which can be determined by use of a measuring tape held horizontally (you may need a line level here) and a plumb bob held on the end of a string. Remember that most of the main support footings will lie on a straight line parallel to the house wall. Before you dig, use a string to determine that the main support footings are in fact all on a straight line and equidistant from the house wall. Another excellent double check to insure the line of main footings is properly spaced from your house is to lay out a rectangle with string on the ground in which the house wall forms one side, the line of main footings form the opposite side, and the two exterior footings form the two exterior corners. Two diagonals must be equidistant for this to be a perfect rectangle. If the diagonals are not equal in length, shift the line of footings right or left (keeping it parallel to the house wall) until the diagonals are exactly equal. Then you know you have a perfect rectangle. If your ground slopes, you will need stakes

and a line level to make this work.

Attaching the Ledger

Question: *"What is the significance of a ledger board?"*

Answer: If your deck will not be free standing (attached to the house, but not supported by the house), you will need to attach the deck to the house wall in such a way that the house supports the deck. The board that is attached to the house is called a ledger or band. It must be level and attached with 1/2" lag or carriage bolts staggered high and low and spaced according to code. If you are attaching the ledger to a house band board (board that faces off the ends of the house floor joists and rests on the foundation wall), the house band board must be a minimum of 1.25" thick. Anything thinner cannot support your deck and must have solid 2x blocking inserted behind the house band, resting on the foundation wall, and toe nailed to each house floor joist. The ledger is then attached with 1/2" lags or carriage bolts through the thin plywood house band into these 2x blocks which will support the deck. If blocking behind the house band is not possible, you may need to drop the elevation of the deck so that the ledger may be attached to the house concrete foundation wall (use concrete expansion bolts approved by your local Building Official) or a beam will be needed to support the deck at the house wall. In either event, be sure to run 10" or so of aluminum flashing on top of the ledger and up behind the house siding in order to prevent water from gaining entrance to your house. Also be sure to run silicone caulking into every hole you make in your house wall as you attach the ledger so you seal your house against water.

Footings

Question: *"Anything I should know about footings?"*

Answer: That's a joke, right? If you mess up your footings, you might as well not finish your deck because it won't be worth much when you do! First of all dig your footings to the depth recommended by your local Plan Review. They know the correct footing depth for your geographic area. Don't guess. And be sure your footing depth is deep enough that each footing will rest on **solid, undisturbed (virgin) soil**. This is critical or your deck will sink. Do not build on fill dirt. On the other hand, if your house has been built on fill dirt, or if you have not reached solid, hard dirt in 4' or so... do not continue digging without taking proper measures to shore up the holes and prevent a dangerous cave in. It's happened where folks have lost their lives in digging too deep a footing and it caved in on them and they suffocated. One man I heard of was lying on his belly on the surface while using a post hole digger. (You'd think that was safe, wouldn't you?) But he accidentally fell head first into the hole and could not work himself out for 30 long minutes. Had there been water in the hole, he would have drowned. His partner had left to run an errand and no one could hear his cries for help. He backed himself out agonizing inch by agonizing inch with his toes and his finger tips. (Gives me the willies just to think about it.) Please don't do something dumb. It's only a deck. An alternative to digging past 4' feet is to call a local soil engineer and have them test each footing. They might charge you \$30 or so for each footing. But they will be able to tell you exactly how large to make each footing in order to sustain the weight of the deck given your soil analysis... and your local Building Official should accept their report. Once your holes are dug and you've obtained a good footing inspection from your local Building Inspector, mix concrete in each hole (follow the directions on the bag) so that the concrete is a minimum of 8" thick and very level. You do not want it uneven. See Appendix page 23.

Posts

Question: *"What kind of posts do I use and how do I attach them to the concrete?"*

Answer: You can use 4x4s if your deck is low (2' or less) and if your local code permits it... but I would still recommend using 6x6s for the main support posts. They look better and they are much easier to attach the beams to that will rest on them. After the concrete has set, stand each 6x6 on top of the concrete footing. Repeat the procedure under Laying It Out above for insuring a perfect rectangle. Use a level to plumb each post in both directions and use temporary braces to hold each post in place. Insure the 6x6s are on a line if they are to support the same beam. Once each of the 6x6 posts are in place and supported, run a string and a line level from the top of the ledger board to the post. Mark each post. This represents the top of the floor joists. But the joists rest on a beam which rests on the 6x6. So then measure down the width of your floor joists plus the width of your beam and scribe a line on each post for cutting a pocket out to hold the beam. You should leave enough wood on the 6x6 so that you can use 1/2" carriage bolts to bolt through the 6x6 and through the beam thereby holding the beam on top of the 6x6. The length of your post from the concrete to the horizontal cut should be such that the beam resting on the horizontal cut with joists resting on the beam brings the top of the joists level with the top of the ledger... or perhaps a 1/2" lower than the ledger to allow for water to roll away from the house... though normally footings will sink 1/2" or so anyway. Some localities want you to attach the posts to the concrete which you can easily do with "L" brackets. But don't do it yet. (See **Footing to Post to Beam to Joist to Ledger Detail** drawing in Appendix page 22).

Beams

Question: *"Let me get this straight. I've got concrete in my holes, 6x6 posts standing tall on top of the concrete all marked and ready to cut, and the ledger attached to the house. What am I supposed to do now?"*

Answer: Cut the 6x6s with a Saw Zaw. Make a horizontal cut (no further than needed for the beam to sit totally on the 6x6) and a vertical cut so that the 6x6 can be attached to the beam. Nail your beam together according to code and insert it on and into the pockets cut into the 6x6s. Drill holes through the 6x6 and beam and attach the beam to the 6x6 with two (2) 1/2" x 7" carriage bolts with nuts and washers. Insure the beam is level and the 6x6 posts are plumb. Insure the beam is parallel to the house and the proper distance from the house. Once you know the beam is right, use more temporary braces and make it very secure so a man could sit on it safely. Important tip: If you cannot make a beam of continuous 2xs, then insure the break in the beam is over an interior 6x6 (NOT ON AN EXTERIOR 6x6). Always insure a break occurs directly over a post. And attach the broken beam by running four (4) carriage bolts through the beam and 6x6 post. Attach with nuts and washers.

Joists

Question: *"OK. I'm with you. I'll bet you want me to lay floor joists next...?"*

Answer: Say, you're a quick learner. And the way you do that is by starting from the left side of the ledger and marking off where each of the joists will go, either 12" OC or 16" OC or 24" OC depending upon your Building Plans and code requirements. Then do the same thing on the top of the beam. Set the joists in place (crown up). Most carpenters will toe nail all the joists to the ledger first, then go back and install the joist hangers (putting a nail in every single hole and being sure to use joist hanger nails only). If your deck is so far out from the house that two sets of floor joists are re-

quired, be sure to overlap the joists by about a foot on the beam, nailing them together at the overlap. Install blocking between the floor joists around the perimeter to stiffen the outside joist for railing attachment. Install any additional blocking necessary to fulfill local code. Nail the rim joist to the ends of the floor joists.

Deck Boards

Question: *"If I don't miss my guess, decking is next. Anything important I should know here?"*

Answer: Everybody's a comedian. Of *course* this is important. Lay the deck boards so that the best side is up. Ignore whether the cup is up or down (end grain looks like a cup). This is one of those deck building myths that well meaning carpenters have perpetrated for years. See my *"Hints & Tips: A Guide to Common Deck Building Problems"* for the reasons. I don't recommend you install decking parallel to the house for two reasons: 1) Decking parallel to the house and perpendicular to the joists does nothing to keep the deck in rack (square) so it will shake on you unless it's cross braced below. 2) A deck board parallel to the house and up against the house wall tends to hold water against the house. Never a good idea. Running the decking on a diagonal keeps the deck in rack, runs water away from the house, and looks better to boot. Just insure that you stick to a 45 degree angle, no more. Running 5/4x6 pressure treated pine decking on a 45 degree diagonal between floor joists 16" OC means you will be spanning over 20" with the deck boards. That's within code, but it's close. Don't go over a 45 degree, and feel free to cheat it back to a 40 degree. You'll never see it and the decking will have very little spring in it. Tip: Don't want to splice the decking? Running the decking one direction may result in splices, but the opposite direction may not. If that doesn't work, break it up with a deck "break" board right down the middle (needs extra joist and blocking below), and run a herringbone pattern. That way you can avoid splicing deck boards. If you do need to splice, for heaven's sake, end the deck board in the middle of a joist so you can have something to nail to. Tip: If you will cut the ends of the spliced deck boards on opposite angles (under cutting the one and over cutting the other), they will overlap and when they shrink, the resulting gap will not be as noticeable. It's tricky but cool. And, and if you are splicing, be sure to stagger the joints so that the splices don't line up. Totally ugly.

Question: *"I've heard from my buddy at work that I should gap the deck boards. That true?"*

Answer: False. You're buddy's living about 25 years in the past. Never gap 5/4x6 or 2x6 pressure treated decking unless it's kiln dried. If you do, they will shrink as they dry and you've got 1/2" to 3/4" gaps. A real eye sore and high heel catcher... and it won't be funny when Mom walks right out of her shoes. If the boards are kiln dried, you should gap them 1/8" because they won't dry and shrink anymore and you want water to run out. Otherwise, butt those boards as tightly together as you can. Jam 'em!

Question: *"Should I use 2 or 3 nails at each joist?"*

Answer: Two nails is fine, one about 3/4" from each edge and on an angle (helps to hold better). Use hot dipped galvanized (resists rusting) or stainless steel spiral or ridge shank nails (for superior holding). And if you will run a thin (I said *"thin"*) bead of exterior pressure treated wood adhesive down the top of each joist before fastening the deck board, it will prevent nail pops. See *"Hints & Tips..."* for reasons. Deck screws work fine also. I like the ceramic coated screws instead of galvanized. Heads don't strip out and they won't rust ever. Just know what you're buying. You might want to pre-drill the ends of the decking before nailing so you don't split the ends. Some folks use a galvanized siding nail just for the ends and use three at the end. The siding nails are a tad thinner

than regular deck nails and so they don't split the ends as easily.

Question: *"What, do I measure and cut each board... suppose it's too short?"*

Answer: If it's too short, cut it again! Just kidding. Actually, the best way is to lay the decking with one end of the rim joist (band) or last joist. Then just strike a chalk line and saw the ends off at one time. Neat, huh.

Railings

Question: *"Is it done yet? Tell me it's time for an ice tea in the shade with a pretty girl feeding me grapes..."*

Answer: No such luck, my friend. Not yet. You've got to get up and build your railings! First you will want to secure each post (normally 4x4s) at each corner of the deck (attaching to joists perpendicular or horizontal to the house wall if possible). Typically you will use two 1/2" carriage bolts with nuts and washers per post. Stagger the bolts slightly off center of the post. Then equally space the interior posts such that you do not exceed your local code requirements (typically 5' max between railing posts). Insure posts are plumb in both directions. Run the top and bottom sub-railings (normally 2x4s on edge) around the top and bottom of the posts. We like to run them continuously where possible along the inside face of each 4x4 which adds strength to the railing. Be sure to put a couple of 2x4 spacer blocks under each of the bottom 2x4s pieces before you nail them. Connect the tops of the posts with a 2x6 cap laid flat, continuous where possible. Don't forget, when cutting for a 45 degree angle, you cut a 22.5 degree on each side. But you may find it quicker and easier and more accurate to overlap the 2x6 cap pieces and simply scribe from corner to corner each board. Then cut. Then screw your 2x2 vertical pickets to the outside of each 2x4. Bring the top of each picket flush under the 2x6 cap, and cut the bottom off on an angle. Tip: Want proper spacing of the pickets and minimize waste? Layout each railing section for pickets as follows: Mark the center of the top 2x4. Measure slightly less than 2" to the right and mark and slightly less than 2" to the left and mark. Install pickets on those marks such that the distance between them is slightly less than 4" (current code requirements in most places as of this writing). Scribe and cut a block to this gap. Plumb only one picket and screw it to the bottom. Use the block to gap the other picket and attach it. From this point on just use the block to gap each picket. If you've spaced your 4x4s equally, the resulting gaps between 4x4 and 2x2 on each side should be equal. And by starting in the exact center with two (not one) pickets, you will save one or two pickets on each section.

Tools Checklist

Question: *"OK. I'm ready to start. I feel like I've aged just reading this thing. What kind of tools do I need to get going?"*

Answer: My friend... you need the following: String (mason's line), line level, wheel barrow, pencil, level, carpenter's framing square, tri-square, hammer, skill saw with carbide blade, Saw Zaw, heavy duty drill with half inch wood bits 10" long, hammer drill (if attaching ledger to existing poured concrete wall), adjustable wrench, chalk line, measuring tape (steel), plumb bob with string, stain and brushes. Your friendly local materials supplier should provide you with the list of building materials. Good luck! But remember something: No amount of coaching and reading and studying of how-to deck building manuals (even if written by the Bob Villa of decks) can prepare you for every contingency and every possible problem. If you develop a problem or have a question or don't really know what to do... get help! Ask somebody who knows! Don't be hard headed and muddle through

on your own. There are plenty of folks around who can offer good, sound advice. Find one and ask him.

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This material is not warranted or guaranteed in any way. The author and this website make no claims for it's accuracy and the reader understands and agrees not to hold the author or the owner of this website responsible for errors or omissions. Hey, in this sue happy country of ours, I'd be crazy not to put this disclaimer on it! And you know I'm right.

"HINTS & TIPS: A Guide to Avoiding Common Deck Building Problems"

Question: *"Should I run my decking flush with the threshold of my house door or run the decking a few inches lower so I step down onto my deck?"*

Answer: It is much better to have at least a 4" to a 6" step down from your house to the deck. The reasons are multiple: 1) Rain can occasionally force itself underneath a threshold and consequently rot out a sub floor. 2) People expect to step down when leaving a house. A flush deck may make folks stumble. 3) A small elevation difference at the house will tend to keep leaves, snow and debris from blowing into your house when you open the door.

Question: *"Suppose I want to build a deck now with the intention of building a screen porch on the deck at a later time. Is there anything I should do now to make it easier then?"*

Answer: You bet. Run screen over your floor joists in the area of your future porch. Then attach your decking. This will cost you a few dollars and a few minutes extra now... but will save much more money, time and aggravation later. Another thing: You must know exactly where the walls of your future porch will go, and which walls will be "load bearing" (meaning which walls carry the weight of the roof). The structure under these future load bearing walls will need to be beefed up to handle the extra loading when the porch is built. It will be a lot easier to add the extra joists, beams and footings now rather than later. We can offer you consulting for this aspect of your deck, or you can speak with an engineer or architect. Your local building plan reviewer should also be able to help (and he's free). Same for a future spa or hot tub... though we have recently added an optional universal hot tub substructure to our plans and materials list which is designed to sustain the weight of an average fully loaded spa. But ALWAYS OBTAIN APPROVAL FROM YOUR LOCAL PLAN REVIEWER before building a deck which will hold a future screen porch or future hot tub. Plan ahead.

Question: *"Should I space my deck boards to let the rain water through? And if so, how far apart? The width of a 16d nail like my last deck builder did?"*

Answer: Spacing of deck boards was started when carpenters only had kiln dried, non pressure treated wood. The boards would not shrink much at all, but they would rot if water was allowed to stand on them. Therefore spacing was needed to allow rain water to drain between the boards. Today the opposite is true. The boards are pressure treated and will not rot should water stand on them...

and, because they come usually quite wet from the supplier, they shrink. Consequently you should never "gap" the boards. Rather butt them together as tightly as possible. They will normally dry and shrink producing between 1/8" to 1/2" gap depending upon a variety of conditions. Too often homeowners (and even some deck builders) will "gap" pressure treated decking. This can result in unsightly spaces which also act as "high heel catchers" which are both annoying and dangerous.

Question: *"Isn't it true that the deck boards should be laid so that the "cup" of the end grain is down? I've heard that this prevents warping."*

Answer: This is one of the widest held misconceptions, even among experts. The reason, though, is quite simple: A deck board exposed to the sun will dry out on the top surface while the bottom surface remains in shade and therefore contains more water. It matters not that the grain is cupped down if the top side is dry and the bottom side is moist. The top half WILL shrink and the bottom half WILL expand. Result: Upward cupping. It is almost inevitable. (I say "almost" because there are a couple of things you can do to minimize this cupping including sealing the deck boards, screwing them down, or gluing the deck boards while using a "twist" or "ridge" nail) We support this conclusion with our own evidence. We have done it both ways, only to come back in a month or two and find that ALL the deck boards cupped upwards, regardless of which way they were laid. So our policy is therefore simple: Lay the BEST LOOKING side up.

Question: *"What is more important, a large footing hole, or a deep footing hole? Also, doesn't filling up the hole with concrete help to support the weight better?"*

Answer: The footing hole must be only deep enough to do two things: 1) The concrete at the bottom must rest on "solid, undisturbed soil". That is, it must rest on hard, virgin soil... not fill dirt or dirt that will not sustain the weight of a deck or porch. If you have any question about the loading capability of your particular soil, you should hire a soil consultant who can perform a simple test on your soil (cost normally between \$200 and \$300) to determine IF it will hold a deck, and how large your footings must be. 2) Once this requirement is fulfilled, the depth is determined by your local frost line. Obviously the further north you live, the further down you must dig to avoid the frost line. Speak to your local building plan review to obtain this information. Once you know how deep to dig, the size of the bottom of the hole is extremely important. It must be large enough to distribute the weight carried by the post you put in the hole. We calculate that for you in our building plans. Be sure not to fudge on these dimensions. For example, if our specs call for a hole 18"x18" (F8 on the plan) at the bottom, be sure you dig a hole that is a minimum of 18" x 18" square (not circular!) at the bottom. Err on the side of larger rather than smaller. Don't skimp on footing dimensions. One last thing: There is no need to overkill by filling the hole with concrete. Eight inches is fine. The shear strength of concrete is incredible. Don't waste your money with more concrete than you need.

Question: *"Should I sink the post into the concrete? I've heard that this is good so that the post won't move side to side."*

Answer: Never. Reason: When you backfill the hole with dirt, pack it around the post every few inches as you backfill up. Mound up the remaining dirt around the post so that rain will not produce a sunken area around your post. The packed dirt will prevent any shifting of the post. But if you sink the post into the concrete you are asking for trouble. 1) The further down the post is inside the concrete, the less concrete is UNDER the post where it belongs. The whole purpose of the concrete is the distribution of the weight of the post. If the post is resting on 1" of concrete (we've heard of worse

cases), how much of the concrete is actually discharging the load? 2) The post is more likely to punch through the concrete the lower it is. 3) The coefficient of expansion and contraction for wood is different from that of concrete. This means that there will develop a small crack between the wood and the concrete that will allow water to gain access. If that water freezes, you may well crack the block of concrete. Cracked concrete does not adequately disburse weight.

Question: *"Should I fasten the post to the concrete?"*

Answer: The reason for this practice is to prevent a deck from lifting during an unusual wind storm. If you live in an area know for unusual updrafts, or if your local building plan reviewer suggests it, anchor each post with a "post to concrete clip". Some folks sink a lag bolt into the concrete (pointed up) and then screw a post into the bolt. This practice prohibits moving the post to line it up with the beam above and making it vertical (plumbing it), however. Therefore using the post clip is preferred.

Question: *"Should I use screws to attach the deck boards to the joists? I want to prevent those ugly, dangerous nail pops after a few years."*

Answer: You can, but you will need a special tool to install screws quickly. They are more expensive, and normally considered overkill. Reason: Twist or ridged nails provide tremendous holding power. Also, be sure to run a small bead of exterior wood adhesive (for pressure treated wood) down each joist to provide extra holding power. The wood glue also greatly reduces any tendency for the deck boards to squeak or cup. The combination of twist nails and wood glue is both cheap and very efficient.

Question: *"Do galvanized nails ever rust?"*

Answer: Yes they do. The advantage is that they retard rusting. But they do not stop it.

Question: *"Should I install the deck boards parallel to the house or on a diagonal?"*

Answer: Diagonal decking is aesthetically pleasing, but also tends to "lock" the deck together which prevents lateral movement relative to the house. If you have ever been on a deck and moved suddenly (or stopped moving suddenly), you may have noticed it shimmy somewhat. This is caused by inadequate bracing. Diagonal decking greatly reduces this effect and eliminates the need for cross bracing underneath.

Question: *"Is there any significant difference between .4 retention pressure treatment and .6 retention pressure treatment?"*

Answer: There is more of the pressure treatment fluid in a .6 retention item. See your local building plan reviewer to determine what is acceptable for your area.

Question: *"There are so many deck stains and sealers available... can you give me some guidance on what you prefer?"*

Answer: Certainly. We have had some experience with deck sealers... and we only suggest one brand: Sikken's which is made by Akzo Nobel Coatings Inc. of Troy, Michigan. Their phone number is 800 833-7288. Call and ask them for the nearest distributor. I personally have never seen any

product that can even come close to the look and durability of this product. It ain't cheap... but you will probably save money in the long run because it doesn't require as many re-coatings to stay looking absolutely beautiful. Just make sure you follow the manufacturer's directions to the letter. It's only drawback is that it is not considered by some as easy to use as everyday paint.

Question: "Should the 2x2 pickets on my railing run all the way to the deck floor?"

Answer: This is normally just a matter of personal preference, but we do recommend stopping the pickets 3.5" (width of a 2x4 block you can use as a spacer) from the floor by nailing them to a horizontal 2x4. Reason: It's more cost efficient to get 3 pickets out of a typical 8' 2x2. And, it's convenient to sweep snow, dirt or leaves through this space at the bottom of the railing.

Question: "Is there any benefit to closing in the stair risers other than looks?"

Answer: Enclosed stair risers certainly do look more finished... but they also prevent injury should a foot slip between the treads. Just be sure to hold the riser enclosure board up close to the tread above it so it adds support to the tread nosing. Each nosing should extend beyond the riser enclosure board by not more than 1".

Question: "Are there any benefits to using 5/4x6 decking over 2x6 decking?"

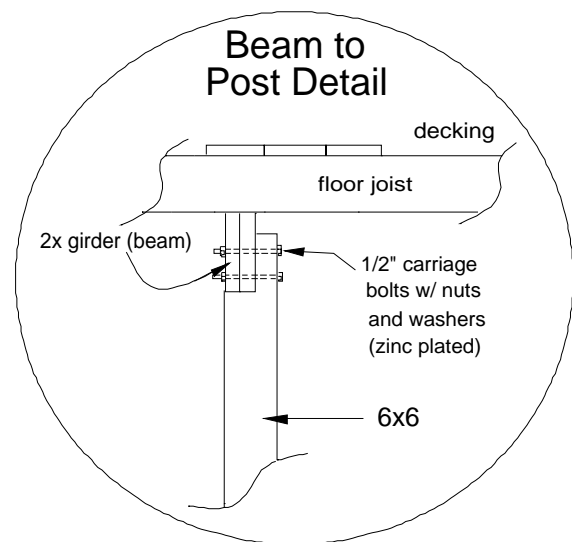
Answer: 2x6 decking is 1/2" thicker so it's obviously stronger. But 5/4x6 is a little prettier due to having rounded edges (called "bull nosing" if each edge is rounded a lot, or "eased edge" if rounded just a little). It may well boil down to cost. Compare with your local materials suppliers. Their respective prices normally remain close.

Question: "Isn't it smarter to use 6x6 posts to support my deck as opposed to 4x4s?"

Answer: Undoubtedly 6x6 posts look better... more massive. And even though 4x4s can typically sustain the loading of a deck (better check with local Plan Review before using 4x4s), we still recommend 6x6s simply because it is easier to attach the beam to the pocket you make on the top of the 6x6.

Question: "Any problem attaching my deck to a cantilevered (overhang) portion of my house?"

Answer: Don't do it. Most local building codes prevent this practice. The reason is because many folks will attach the deck band to the house band which has only been NAILED into the house joists. Therefore half of the weight of their deck is supported by the shear strength of a few nails! Be safe and run an extra beam under the deck at the area where it attaches to the house. Or, you can remove the existing house band, and run your deck floor joists back until they rest on the house foundation wall. (Always be sure to flash your deck to prevent water from gaining access to your house.) Or, step your deck down and attach the deck band to the house wall (normally concrete).



Question: *"Any problem attaching my deck band to that thin plywood house band they use today with those plywood joists?"*

Answer: Don't do it. Be sure you attach the deck band to a SOLID house band that rest on top of a solid foundation wall. Some localities permit attaching the deck band to a 1.5" thick plywood house band or to a typical 2x10 or 2x12 house band only. Check with your local building plan review to be sure. If you have a thin (less than 1.5" thick) plywood house band, you must either support the deck at the house with another beam, or you will want to install blocking of 2x8s or 2x10s behind your house band and between your house floor joists such that the blocking is resting on the house foundation wall and is securely attached to the existing house floor joists on either side. Then carriage bolt through the deck band, through the house band, and through the 2x blocking, installing nuts and washers on the other ends.

Question: *"Should I "pitch" the deck so that water runs off?"*

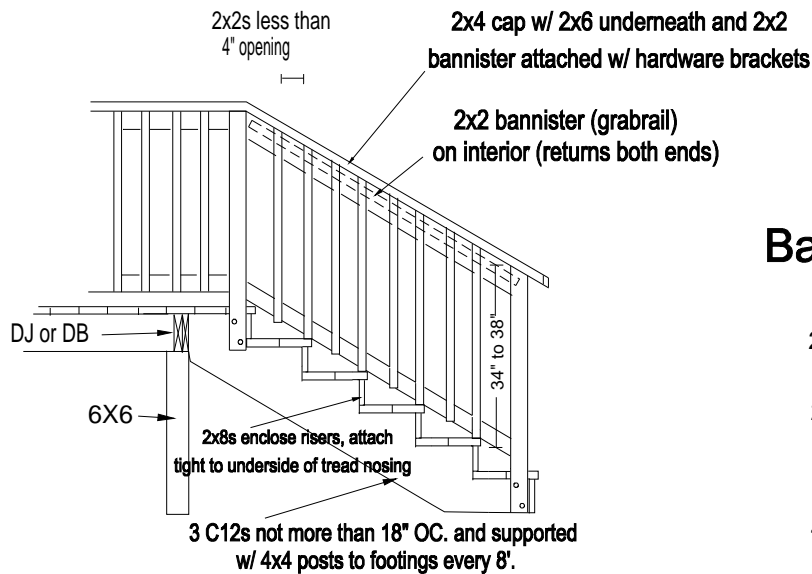
Answer: You can but understand that footings will typically sink 1/2" or so (unless your footings are on solid rock in which case you should pitch it 1/2" for each 12' of horizontal distance) which will allow for proper pitching. Therefore, under most conditions, you can install your deck with a very slight pitch. One more tip: Be sure you install aluminum flashing between the deck joists and up inside your siding to prevent water from gaining access to your house. If a deck is not flashed properly, we have seen water gain entrance to a house in the case where the decking was run parallel to the house. Apparently the water in such cases is allowed to "pile up" so to speak, against the house... rather than drain off when the decking is run on a diagonal and is slightly pitched away from the house.

Question: *"Which should I use... #1 or #2 decking?"*

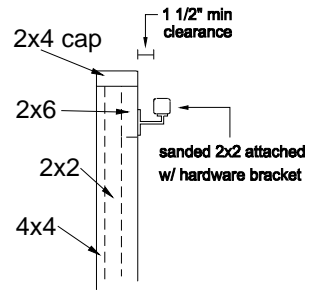
Answer: #1 decking has less knots in it per board foot... that's the only difference... except for cost. It really depends on your preferences. Personally inspect your materials supplier's stock of #1 and #2 decking. Are a few less knots worth the price difference (which is significant in many cases... typically \$.50/sq ft more for #1)? Some folks like the look of knots in wood. Adds character. Others are afraid the knots will fall out later and produce unsightly holes. My advice would be this: If the knots in the #2 are small (1" or less) or if you will seal your deck with an excellent wood finish (like Sik-kens) which will prevent drying, shrinking and knots falling out, then buy the #2 and put your money into an outstanding sealer.

The accuracy of this publication's information is not guaranteed in any way. Always obtain local Building Plan Review authorization before beginning any construction project.

Stair Detail

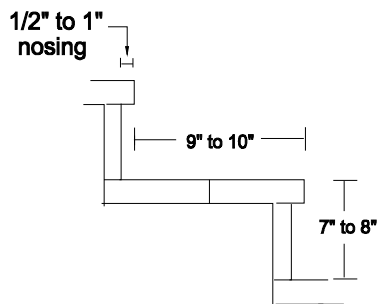


Bannister Detail



Note: C12 (2x12 carriage) can be attached directly to DJ or DB as shown. Or the first tread can be a step down by C12 being supported by treated plywood or metal straps fastened to DJ or DB.

Tread & Riser Detail

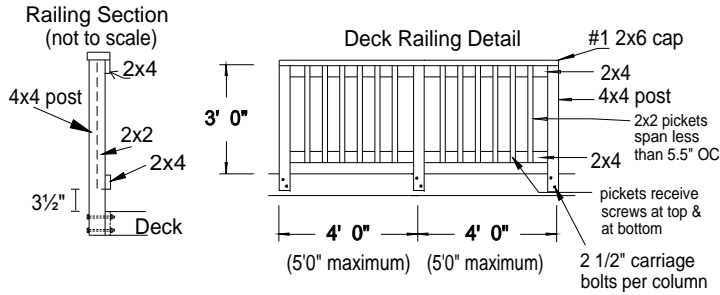


Note: 7" riser w/ 10" tread is most comfortable, especially for elderly or for children.

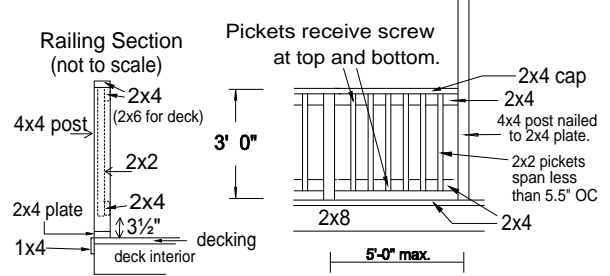
Note: Risers must not vary by more than 1/4"

Various Railing Detail Drawings

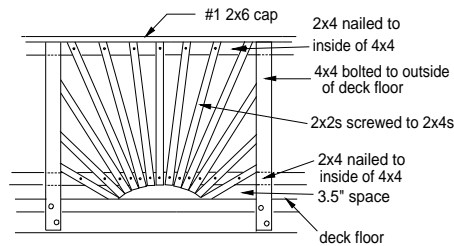
Detail for Handrail Bolted to Outside of Deck Floor



Alternative Screen Porch or Screen Gazebo Handrail Detail

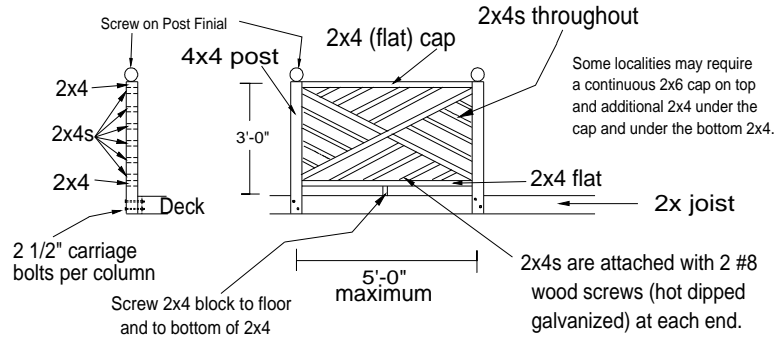


Sunburst Railing Detail



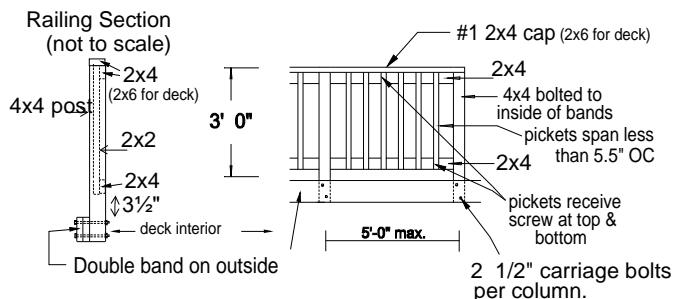
Note: Space 2x2s such that a 4" diameter sphere shall not be able to pass through the railing at any point.

Chippendale Handrail Detail

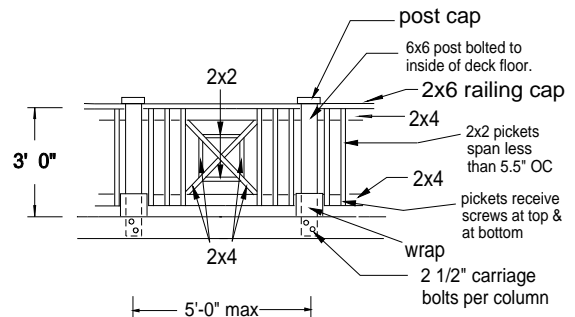


A 4" diameter sphere shall not be able to pass through any part of the Chippendale handrail. Be sure to check with your local Plan Review before building to determine if the above design meets their criteria. Some localities require additional 2x4 framing.

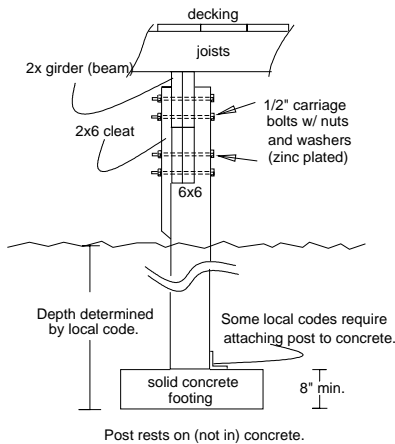
Detail for Handrail Bolted to INSIDE of Gazebo, Deck or Porch Floor



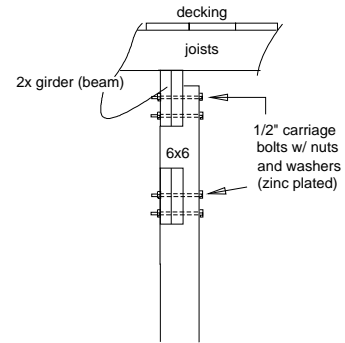
Detail for "Window Frame" Handrail Bolted to Inside of Deck Floor



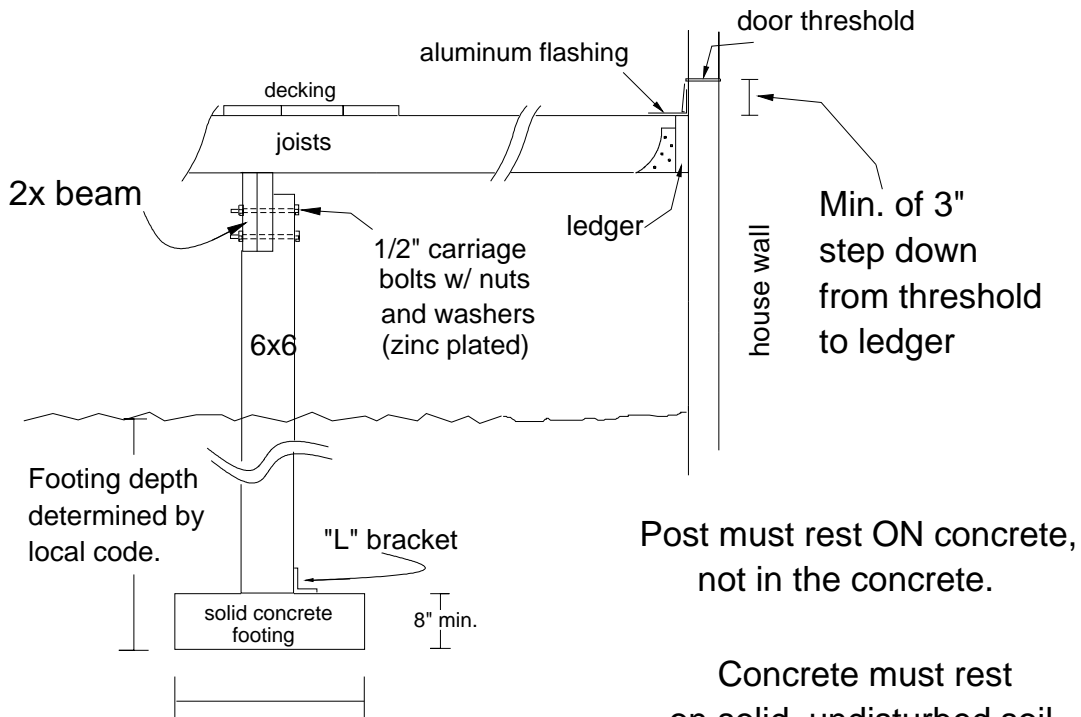
Piggyback Beams to Post



Normally a single beam rests on the 6x6 support post. Occasionally a "piggyback" configuration is needed when there are level changes as shown here.



Footing to Post to Beam to Joist to Ledger Detail

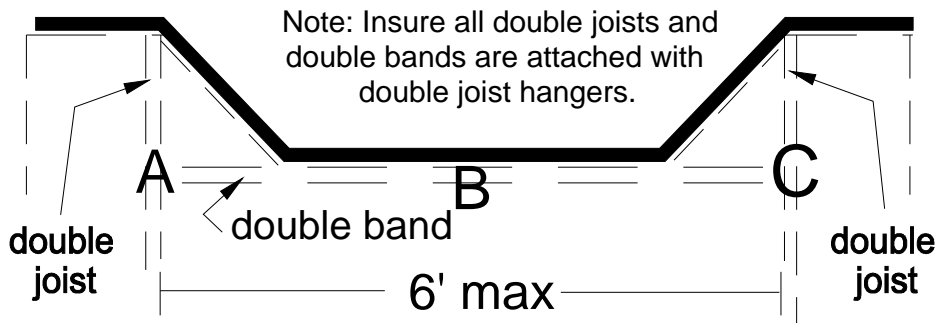


Width of footing is determined by loading formula.
(Verify size with your local Plan Review)

Post must rest ON concrete, not in the concrete.

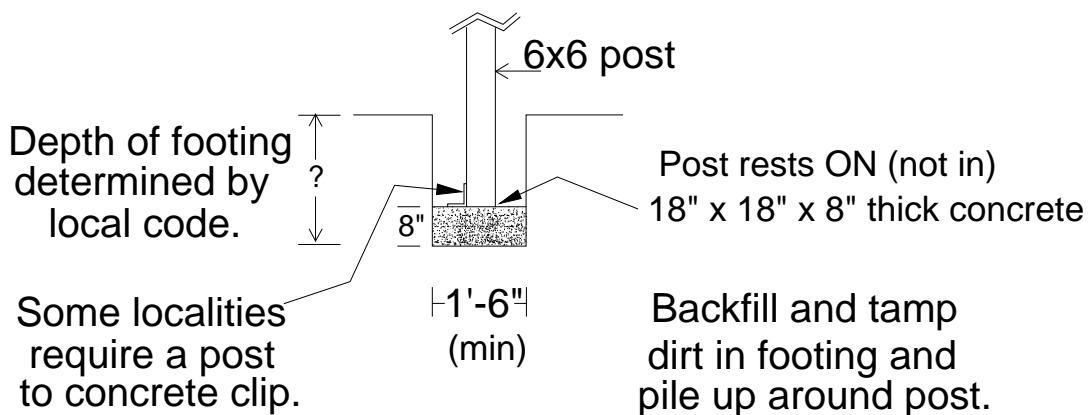
Concrete must rest on solid, undisturbed soil.

Bay Window or Chimney Framing Detail



If the distance from A to C exceeds 6', position an F8 footing under the double band at B. If a footing is added under the double band at B, do not allow the distance from A to B to exceed 6' or the distance from B to C to exceed 6'.

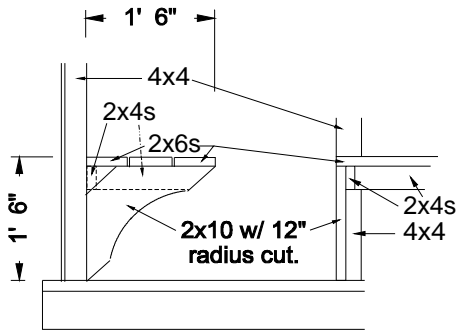
Typical F8 (min) Footing Detail



The minimum size of a footing is an F8 (18"x18"). However, there are loading conditions which require larger footings which must be determined by loading formula calculations.

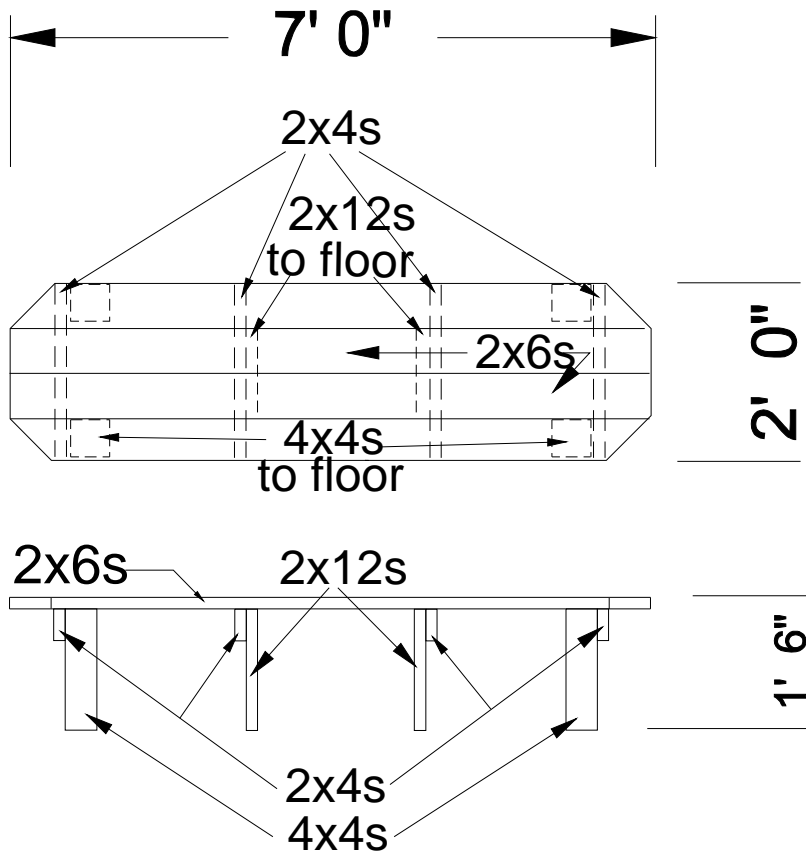
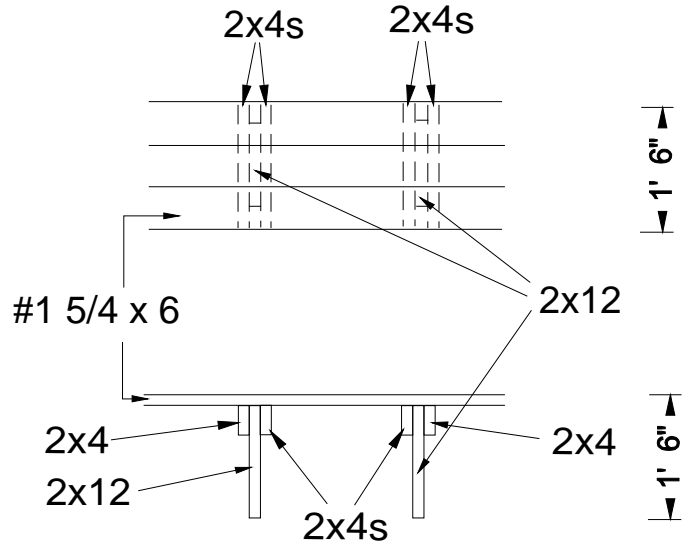
Bench Detail

(handrail condition)



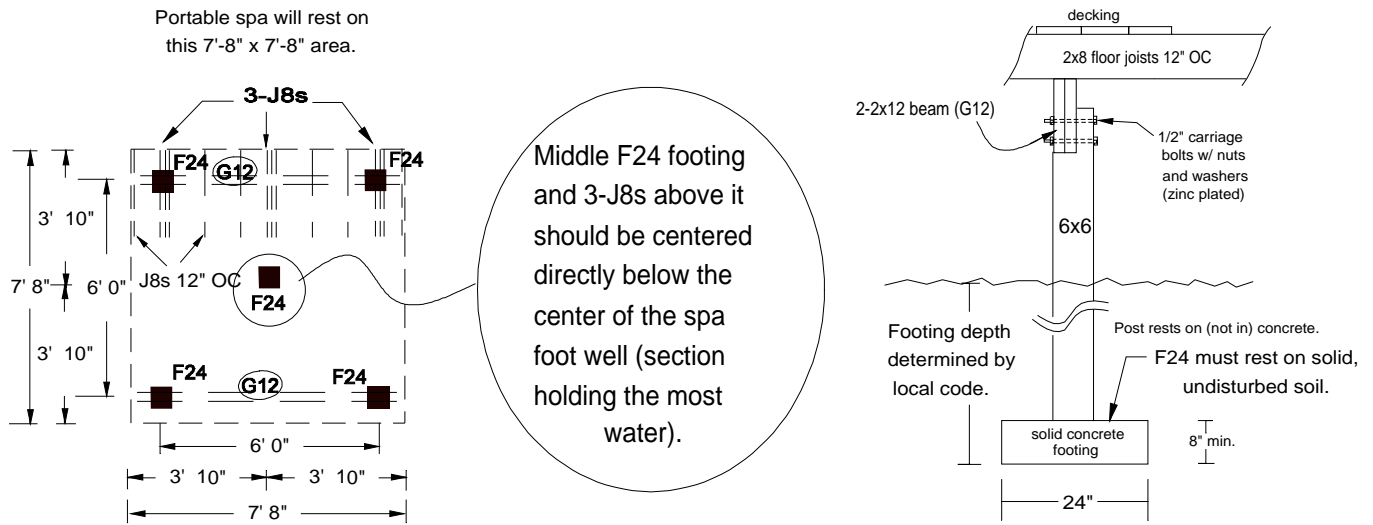
2x10s braced against and nailed to every 4x4 post.

(no handrail condition)

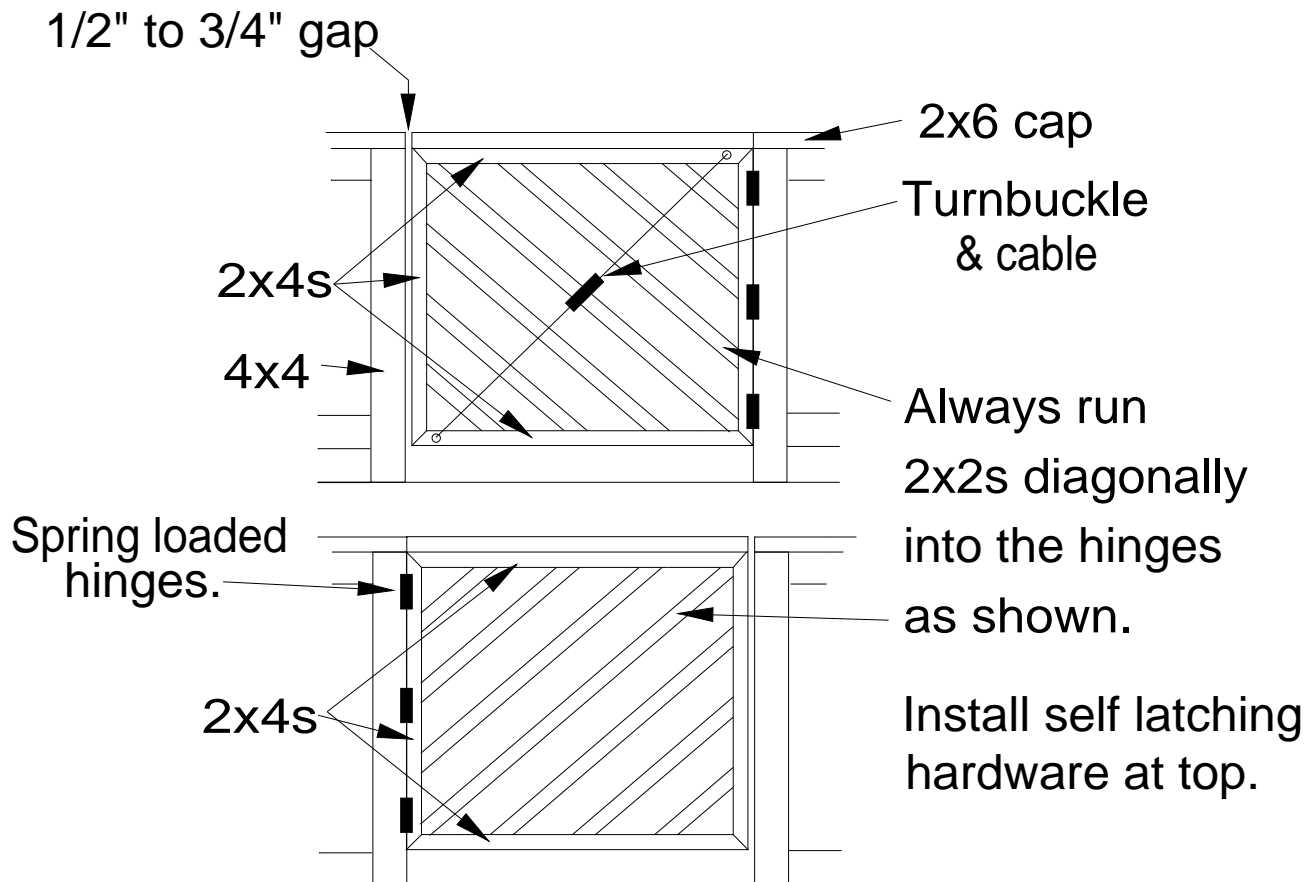


Coffee Table Detail

Spa Support Detail

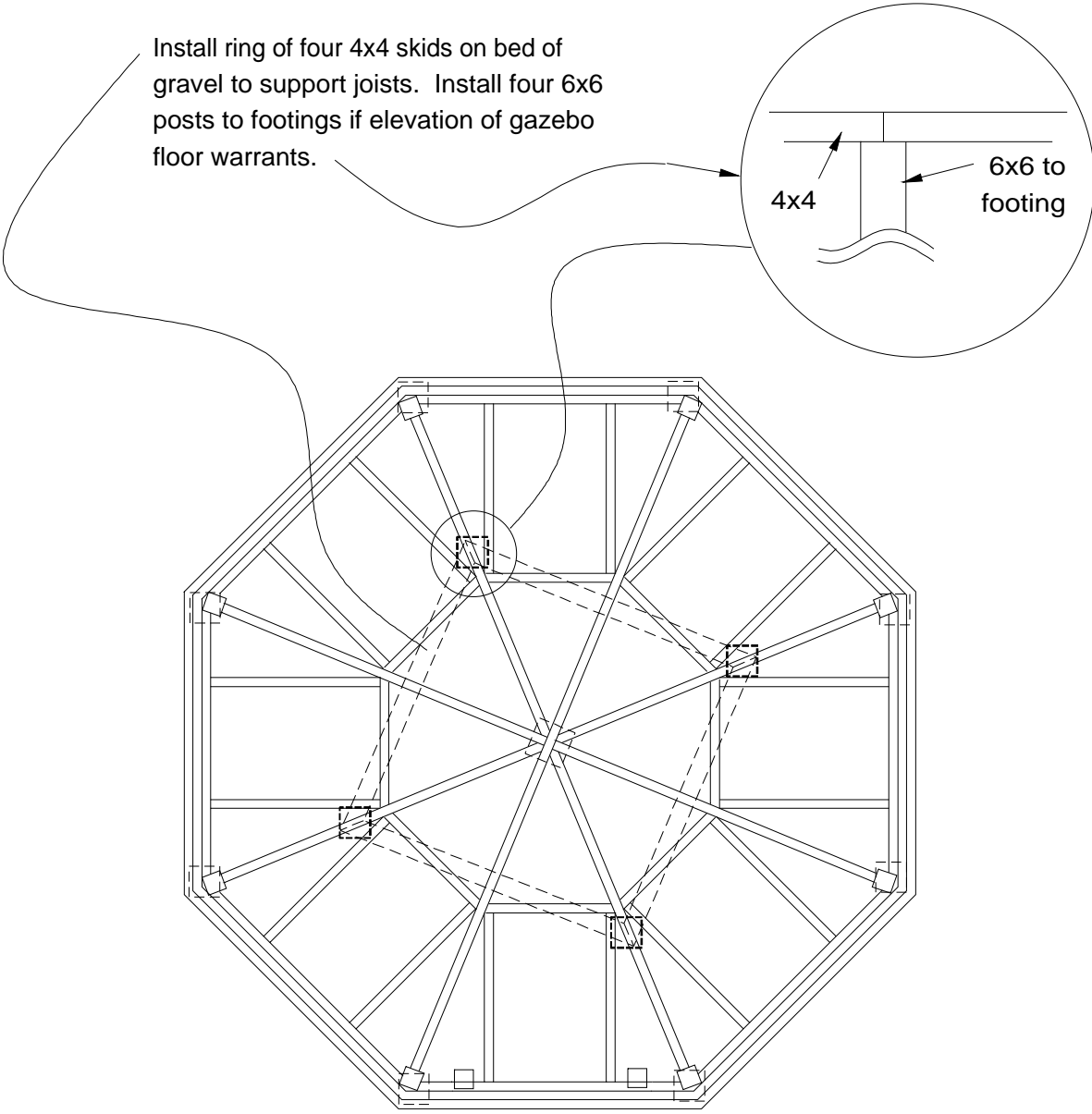


Gate Detail



Important
Use this 4x4 skid support with the floor plan for the Octagon or Victorian Bandstand gazebos only.

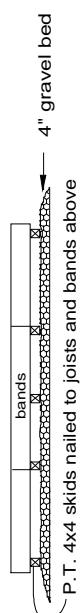
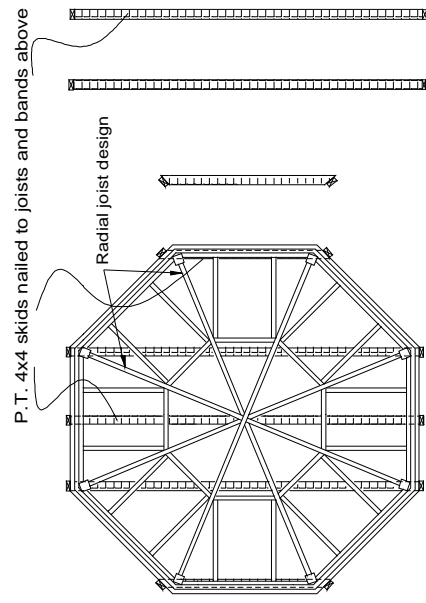
Detail Drawing for the 4x4 Skid Support



Drawing Not to Scale

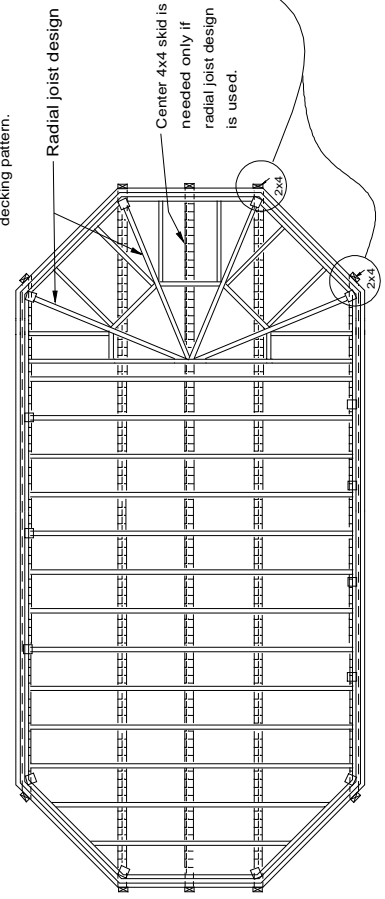
Alternative Substructure for Typical Octagon Gazebo Floor

(All kits and pre-built gazebos are supported this way)

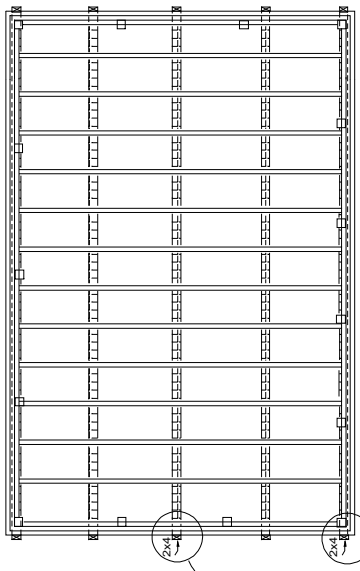


Note: All kits and pre-built gazebos use the radial floor joist design at both ends of the oval gazebos. The center 4x4 skid is needed only if this radial joist design is in use. On the other hand, our Building Plans for the oval gazebos show the joist pattern as parallel as shown on the left side. The radial joist design is needed to support the octagonal decking pattern.

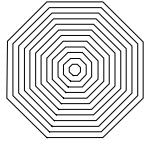
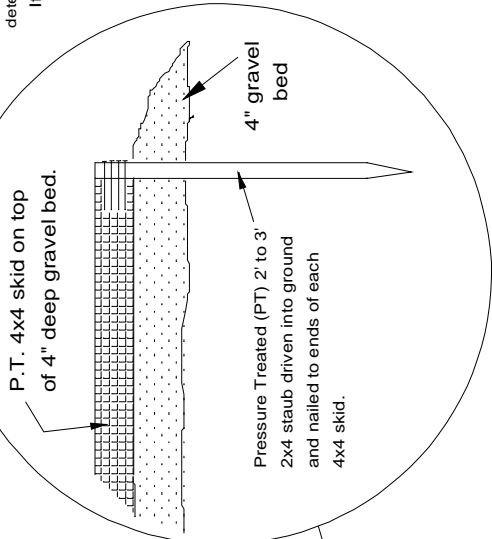
Alternative Substructure for Typical Oval Gazebo Floor



Alternative Substructure for Typical Rectangular Gazebo Floor



Note: The Amish gazebo kits and pre-built gazebos are designed with this alternative substructure 4x4 skid system depicted on this page. This system is acceptable to many (not all) local Building Officials. If you are building from our Building Plans and you are using this alternative substructure 4x4 skid system... or if you are ordering a pre-built gazebo, please check with your local Plan Review to determine if this design is acceptable. If it is not acceptable, you will need to use the footing to post substructure design that is depicted on each set of our Building Plans.



Radial joist design is used to support octagon decking pattern (shown above).

