



Frame Foundations for Modular Structures



Direct Connect to Grade Beams for Decks



Porches, Carports



Stairways

What can be Built with Diamond Piers™ ?

The Diamond Pier can support just about any structure that will connect to a post or beam bracket. Decks, porches, carports, walkways, ramps, stairs, gazebos, sheds - you name it !

Pier spacing, size and pin length depend on the soils, the weight of the structure itself and the live loads the structure is meant to carry - snow, people, hot tubs, etc. Some structures may require more in-depth load analysis.

On sloping sites, tall posts should be braced, as with any similar structure. Steep sites greater than 2:1 are not right for the Diamond Pier™, as the downhill Pin will not have enough soil to bear in.

On gentle slopes, series of piers may be set at differing heights to adjust for level. The pier may also be set completely below grade if preferred, or recessed from the outer edge of framing members in order to allow perimeter skirting to be constructed.

Brackets are structurally interchangeable on the two pier sizes, however larger brackets may hang over the top of the DP-50, thus requiring a heavy duty model with a minimum 12 gauge steel.

Typically the system is not appropriate for fence construction.



Walkways, Bridges



Heavy Decks, Big Timbers



Decks on Sloping Sites

Field Inspections?

Inspectors need to verify Pin length. Pins can be installed before inspection with the use of plugs inserted in the lower end of the pin before driving. The inspector can then slide a tape down the inside of the installed Pin to verify its length.



Inspection Plugs



Pin Removal

Piers suffering a structural crack during Pin driving should be removed and replaced. Surface chips are not structural cracks.

Piers installed out of plumb more than 5 degrees should be reset before loading.

Are they Code Approved?

Diamond Piers™ are now Third Party tested, and the bearing results for the DP-50 pier with 36 inch Pins have been submitted for National Code Evaluation. The full report is available on our website. The Piers also meet all ASTM and ACI 318 standards for pre-cast concrete products, and all ASTM standards for galvanized steel hardware and supplied pins.

Trouble Installing?

A pier set in the wrong location can be moved! Just turn and lift the Pins with a pipe wrench to corkscrew them out. The pier may be also be rotated to avoid rocks or roots, and the Pins re-driven.

Most brackets have an extra large attachment hole, allowing for horizontal adjustment.

Rocks or roots may also be dug to and removed, as long as the soil is repacked before pin driving.

Pins may be cut off if they hit deep impenetrable obstructions. See Install Instructions for details. A list of appropriate driving hammers and bits is available on the website.

DON'T DIG IT - DRIVE IT !

Diamond Piers™

US Patent #5039256 & #6910832

"Exceptional" -Scherl-Wilson Columbus, Ohio

"These things are the greatest" -Taylor Bros.Constr Long Island, NY

"Faster and more economical than pouring your own."

- Niosi Construction Tacoma, WA

NOW Third Party Tested!



www.pinfoundations.com

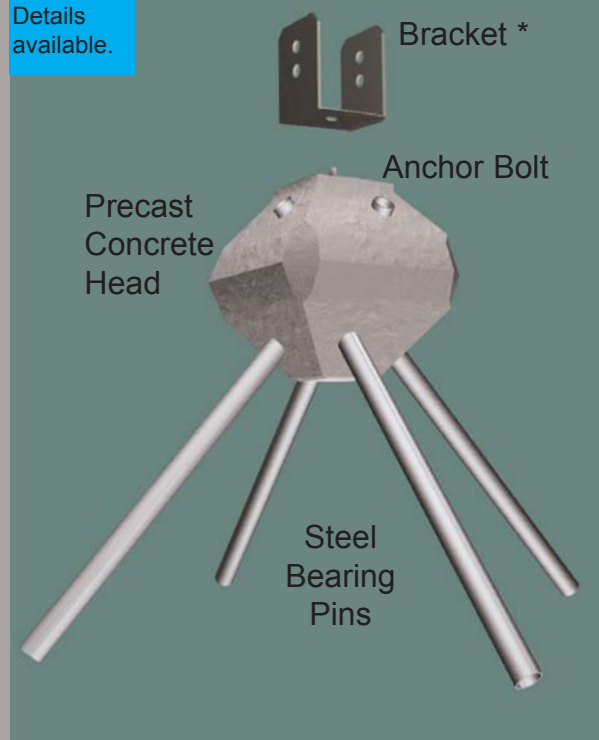
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CADD Details available.



What is a Diamond Pier ?

The **Diamond Pier™** is a unique combination of pre-cast concrete and steel bearing pins. Together they form a solid foundation that reaches deep into the ground - **without having to dig or pour concrete!**

The pier is light enough to hand carry, and installs right at surface grade with simple hand held tools. (See *Installation below.*) It can be used in any penetrable soil - sands, silts, clays and small rounded gravels. It is *not* intended for rocky soils, ledge, deep marine applications, loose fill, deep peats or perma-frost.

Once fixed in the ground, the foundation has an excellent bearing capacity, and the added benefit of uplift and lateral resistance. Post or beam brackets are attached to an anchor bolt pre-cast in the top of the pier, and **framing can begin immediately** - no digging, no concrete curing; no soil spoils piles to remove.

The first prototype of the Diamond Pier™ was installed in 1984, supporting a deck that still stands level today. (See *photo above.*) The pier was patented in 1992, and has been used on Public projects across the country for more than a decade. The smaller Pier with 36 inch Pins has now been Third Party tested according to National Code guidelines, and is available to builders throughout the United States.

Diamond Piers™ are simple to use, and **save time, mess and money.**



First deck on prototype pier - 1984
Lawrence, New York



Soils heave past pier.

Do they work in Frost Heave?

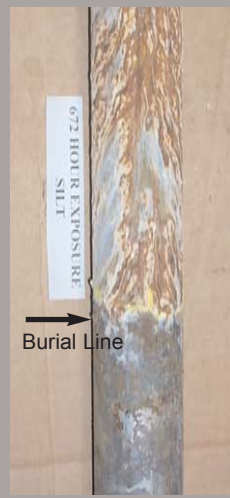
Yes. The concrete is air-entrained for severe climates, and the bottom half of the pier is pointed, which acts to cleave shallow heaving soils that move past the sides of the concrete head while the Pins keep the pier locked rigidly in place. For freezing to 3-1/2 foot depths and/or heaves of 1" or less, the small pier may be used. For more severe heave, where all types of foundations are at risk, the larger pier is required, and may need loose gravel backfill around the head. Pin length and local frost depth - in inches - should match. Example: For 42" FD use min. 42" Pins.



Will the Pins Rust away?

No. The galvanized Pins are protected from significant corrosion because they are buried and can't get oxygen. Pins supplied will last the life of the structure, and may be extracted and replaced overtime.

Some industrial sites or unique soils may require Pins with additional protection, or stainless steel.

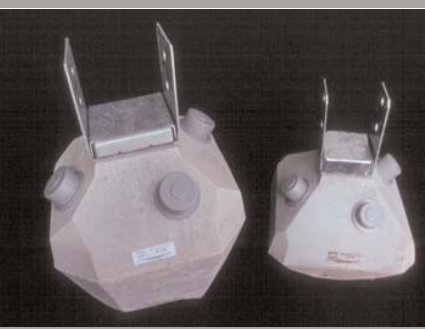


Salt Corrosion Test

How much load can a Diamond Pier carry?

There are two pier sizes. Their respective bearing capacities are based on Pin length and the soils they are engaged in. This is further described in the BEARING section below. The concrete heads though each have a maximum breaking strength when they are supporting a vertical load. The DP-50, reaches its strength limit at **4000 lbs.** of load. The DP-100 reaches its strength limit at **8000 lbs.** of load. These limits are based on concrete strength and pin bending tests done in our lab. They are not soil bearing capacities.

Each pier has different Pin diameters - 1" nominal for the DP-50, and 1-1/2" nominal for the DP-100. They weigh 50 and 100 pounds, respectively.



DP-100 and DP-50 DIAMOND PIERS™ with 6x6 and 4x4 brackets



Concrete Strength Test

How are Diamond Piers Installed?

The Piers are simple to install using small, lightweight, construction tools. The concrete head is simply set in a shallow hole cut just a few inches into the surface soils, and the pins are driven through it and capped.

First, set the pier to its proper height, typically to its mid-point or deeper, depending on the structure and topography. Make sure that it is level and in its proper location, then pack the little bit of dirt removed back around the edges of the pier to fix it in place for pin driving.

Verify that there are no buried utilities and that your gloves and goggles are on. Slide pairs of pins into opposing holes, being careful not to tip the pier out of level. Hold the pin up against the top side of the concrete driving hole and sledge the Pins partway into the surrounding soil - maintaining plumb, and working around the pier on opposing pins until they begin to bite in the soil and lock the pier rigidly in place.

A small demo hammer with a pin driving bit is the optimum driving tool for finishing the Pin driving. As with the sledging, make sure the Pin is held against the top side of the driving hole as you drive it. This ensures that you will not crack or damage the concrete head.



Hold pin up against the top side of the driving hole when driving.



For some structures, dead load may be applied before driving pins, or applying caps.

Leave the tops of the Pins protruding from the concrete approximately 3/4", and cover them with the end caps provided. For some structures, the framing dead loads may be applied before finally sealing the caps to the head with adhesive caulk. If there is enough room under the structure to drive Pins, a good part of it may be framed, squared and plumbed before finishing the Pin driving.

The small piers should take about 10 minutes each to install - 20 minutes for the big ones - depending on Pin length, and soil density. **And the Diamond Pier is totally removable!** If you put it in the wrong place, the Pins can be rotated back out and the pier relocated.

(See *back page for more information on removing Pins, or applying inspection plugs before Pin driving. Complete Installation Instructions can be downloaded from our website - www.pinfoundations.com.*)

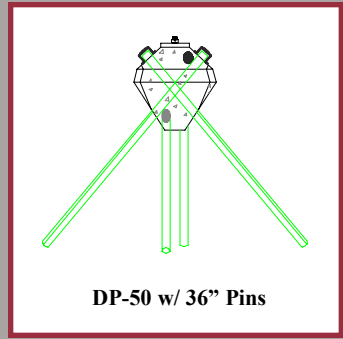
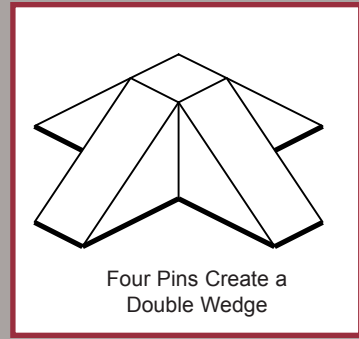


Make sure to remove any deformations on the end of the pin, and caulk and seal the cap.

BEARING



Bearing Load Test - Pier and Pins Push against the Soil as a Single Solid Shape.



The Diamond Pier is a bearing system, and performs in the soil much like any flat bottom footing. Because the pins are short, very stiff, and locked in the pier under load, the entire foundation pushes against the soil as a single solid shape. Each pair of pins, acting in unison, bears on a wedge of soil immediately below it. Four pins create a double bearing wedge. In plan, this wedge has a base square footage area that can be applied to a given soil's psf just like a conventional concrete footing.

This chart shows the Third Party tested bearing strength of the DP-50 pier w/ 36" Pins, as it compares to conventional flat base round and square footings.

RESIDENTIAL SOIL TYPES IRC 2003/2006, Table R401.4.1	CAPACITIES		Diamond Pier™
	CYLINDER	CUBE	
	18" dia.	16"sq.	DP-50, 36" Pins
2000 psf soil sands, silty sand, clayey sand, gravels clayey gravels, silty gravels	3540 #	3560 #	3600 #
1500 psf soil clays, silts, clayey silts, silty clays sandy clays, sandy silts	2655 # (1.77 SF)	2670 # (1.78 SF)	2700 # (1.8 SF Equiv. Bearing)

NOTES: 1. Cylinder and Cube capacity based on 12 inch depth into natural grade, and deeper cylinders, 2 to 4 feet down, formed in waxed or plastic forms to the full depth of the hole.
2. Pins longer than 36 inches may be required in some frost or expansive soil zones.