Code Compliance Information
for Diamond Pier® Foundations
in the State of Minnesota

This document was produced in September 2013. Codes are constantly changing, however, so please check with your local building code official for any amendments or revisions that may apply.

Pin Foundations, Inc.
Gig Harbor, Washington
Phone 866-255-9478 / Fax 253-858-8607
www.pinfoundations.com or www.diamondpier.com
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Procedure
The procedure when seeking code approval for any project involves the submittal of a code-compliant design to the local building code official, along with the building permit application. The project then goes through a plan review. If the building official finds the project meets the intent of the code, then the project will be approved and the building permit issued. This is true regardless of how common a design might be; even a traditional concrete pier footing typically accepted by a code official as prescribed in R403.1.4.1 must be reviewed to ensure that site-specific conditions and the application meet the intent of the code. There may be cases where the prescriptive code is not satisfactory and additional means and measures are required. There is no product, design, or method of construction that is approved until a building official stamps the project as approved.

For Diamond Pier foundations, the procedure is to submit the Diamond Pier product as an alternate method with the application for the building permit. This is accomplished by attaching a detail of the Diamond Pier product in the project drawings, along with the layout and spacing of the piers, and including the product load chart. Also, it is important to include copies of ICC-ES Evaluation Report No. ESR-1895 and frost performance documents (these documents are available on the manufacturer’s website www.diamondpier.com).

Submittal
Each project submittal using the Diamond Pier foundations must be reviewed by the local building code official to ensure that site-specific conditions and product applications meet the requirements of ESR-1895. Note that paragraph 5.1 of ESR-1895 states, in part, that the Diamond Pier foundation assemblies must be installed in accordance with the full instructions given in the Installation Manual published by the manufacturer, Pin Foundations, Inc. (PFI).

During the review process, the building official considers the scope of the project, the project structure, soils information, and site conditions to ensure that the Diamond Pier product is being installed in accordance with its published capacities and that the published capacities and evidence of system performance submitted comply with the intent of the 2007 Minnesota State Building Code.

Once the building official determines that the proposed design is satisfactory and complies with the intent of the code, the use of the Diamond Pier product shall be approved.

Code Compliance Information
The Diamond Pier Foundation System is IRC code compliant, and it also complies with the 2007 Minnesota State Building Code as amended when used in accordance with ESR-1895 and PFI’s published Installation Manual.

The path to approval is via section 1300.0110, subpart 13: Alternative materials, design, and methods of construction and equipment:

1300.0110 DUTIES AND POWERS OF BUILDING OFFICIAL.
Subpart 1. General. The building official shall enforce the code. The building official may render interpretations of the code and adopt policies and procedures in order to clarify its application. The interpretations, policies, and procedures shall be in conformance with the intent and purpose of the code. The policies and procedures shall not have the effect of waiving requirements specifically provided for in the code.

Subpart 13. Alternative materials, design, and methods of construction and equipment. The code is not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by the code, provided that any alternative has been approved. An alternative material, design, or method
of construction **shall be approved** where the building official finds that the proposed design is satisfactory and **complies with the intent of the code**, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in the code in quality, strength, effectiveness, fire resistance, durability, and safety. The details of any action granting approval of an alternate shall be recorded and entered in the files of the Department of Building Safety.

The prescriptive code governing traditional concrete pier footings for decks is described in paragraph R403.1.4.1.

![Frost Depth Map](image)

**R403.1.4.1 Frost protection.** Except where otherwise protected from frost, foundation walls, piers, and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table R301.2(1);
2. Constructing in accordance with Section R403.3;
3. Constructing in accordance with ASCE 32;
4. Erected on solid rock; or
5. Constructing in accordance with chapter 1303.

Exception: Decks not supported by a dwelling need not be provided with footings that extend below the frost line.

**The intent of the 2007 Minnesota State Building Code R403.1.4.1 is to:**

Ensure that concrete pier footings provide adequate bearing to support the total load of the project and “protect the structure from the negative effects of frost heave.”

The Model DP-50 Diamond Pier system with 50” pins meets this intent for the uses defined in ESR-1895, paragraph 2.0, residential decks, covered decks, stairways, and walkways.

**Submittal Evidence**

The Diamond Pier DP-50 foundation has proven to provide sufficient bearing and frost heave resistance in Minnesota. The testing and performance evidence shows that the Diamond Pier product provides adequate bearing support for the total load of the project, and that the structure is protected from the negative effects of frost heave **at least as well as, or better than, the equivalent traditional concrete pier footing prescribed by the 2007 Minnesota State Building Code.**

**Load Bearing Testing**

ESR-1895, paragraph 4.1, provides evidence of bearing capacity using DP-50 foundations with 36” pins equal to a 1.8-square-foot bearing area in 1500 psf minimum soils. (This is 2700 lb capacity in 1500 psf soils.) Professional Services Industries (PSI) of Portland, Oregon, accredited by International Accreditation Service, Inc. (IAS), conducted load testing services on April 18, 2006, in accordance with ASTM D1143. See the full engineering report posted on PFI’s website [www.diamondpier.com](http://www.diamondpier.com).
Uplift and Lateral Load Testing

Earth Engineers, Inc. (EEI) of Vancouver, Washington, conducted a number of tasks related to assisting PFI in evaluating the load carrying capacity of different configurations of cross pin groups in a 1500 psf soil stratum. These tasks were completed by the same engineer that conducted the PSI tests, Troy Hull, P.E. of EEI (see EEI Report No. 07-020-8 available on PFI’s website).

Uplift Comparison

A Diamond Pier foundation provides 2.5 times the uplift value over a traditional concrete pier footing used in Minnesota, and a Diamond Pier system resists the alignment/jacking actions typically seen with a concrete pier footing.

- A 12” diameter x 48” deep concrete cylinder footing provides an uplift resistance of 465 lb (dead load calculation).
- The Diamond Pier DP-50 foundation with 50” pins provides an uplift resistance of 1175 lb.

Field Testing/Performance

PFI also provides evidence of equivalency for frost heave resistance by providing equal or better uplift resistance and 20 years of independently documented field performance. These documents are available on PFI’s website.

- 2005 National Performance Affidavits: A series of testimonials and engineers’ opinion letters attesting to the performance of the system in a wide variety of climates and conditions.

- 2010 Frost Performance Report: A Minnesota engineer’s certified report of a series of monitored local deck installations, including a review from Colorado Code Consulting. Colorado Code Consulting provides educational seminars for building and residential code, including specific courses addressing the review of alternate building products. Colorado Code Consulting states:

“[In accordance with the Minnesota Building Code (MBC) Minnesota Rules Section 1300.0110, Subpart 13 Alternate Methods, it is my professional opinion that this report demonstrates that Diamond Pier DP-50 foundations have been proven to protect attached, permanent secondary structures (such as decks and stairs) from frost heave. Therefore, the piers comply with the intent of the Minnesota Code Section 1309.0403 and its amended IRC section R403.1.4.1 for footing frost protection. The intent of these provisions is to ensure footings and the permanent structures they support to be protected from the negative effects of frost heave. Diamond Pier foundation’s track record proves that it provides for the IRC’s full frost protection intent.”

Tom Meyers, Colorado Code Consulting
• **2013 Nebraska State Engineer’s Letter:** Review and evaluation of 2010 Frost Performance Report by a professional structural engineer for the state of Nebraska.

> “I have reviewed the DP-50 Diamond Pier Frost Performance Report, consisting of the preface, a letter from Thomas Meyers, CBO and a report by Steven A Schmidt, PE. Additionally, I have reviewed ICC-ES Evaluation Report, ESR-1895. These documents adequately certify that the DP-50 Diamond Piers perform acceptably for detached or attached deck structures subjected to frost heave conditions.”

Paul C. Gilham, P.E.S.E.

• **2011 Observational Report:** A direct side-by-side comparison of the Diamond Pier foundation system to a conventional concrete footing.

**Additional Documentation**

AC336, ICC-ES Acceptance Criteria for Precast Concrete Pier Foundation Assemblies.

**Conclusion**

The evidence submitted and described in this document clearly demonstrates equal or better performance of the Diamond Pier foundation system as specified in R403.1.4.1 of the 2007 Minnesota State Building Code, section 1300.0110, subpart 13, Alternative materials, design, and methods of construction and equipment.

There are over 10,000 DP-50 Diamond Pier foundation systems in the ground in very severe frost heave zones in central and northern Minnesota. Upon request, PFI can supply information for dozens of sites and subdevelopments where traditional concrete piers accepted by Minnesota State Code have failed to adequately resist frost heave. Diamond Pier systems provided as an alternative have resisted frost heave at these sites since 2007.

Pin Foundations, Inc., does not advocate a blanket approval of the Diamond Pier product by any building code official. PFI is dependent on the review process to ensure that the Diamond Pier product is used in accordance with the application for which it is intended—in normal construction conditions—and within the limits of the system. This process protects the homeowner, the builder, and PFI as the manufacturer. The Diamond Pier product should not be used until the local code official approves its use as submitted in the permit application.

Conversely, PFI does not agree with a blanket denial of the Diamond Pier product by any building code official without proper project-specific review. A proper project-specific review defines for the builder or applicant any special project-specific conditions that may exist, and provides an explanation of whether the intent of the code has or has not been met. In the event that the code official denies the use of the Diamond Pier product as an alternate method, the building code official shall document the reason for the denial per section 1300.0120, subpart 8, and provide a written copy to the permit applicant. The building code official may deny the use of the Diamond Pier system if the intent of the code has not been met or if the project is not installed in accordance with the instructions in PFI’s Installation Manual or in accordance with ESR-1895, but in all cases, a proper project review must be done without prejudice.