



Evaluation #

201231 – O  
FN 20129031

Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Alternate Standard Evaluation

Standard

WHA Manufactured Home Frost-Protected Foundation Design

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### SCOPE OF EVALUATION

The alternative foundation design of the Wisconsin Housing Alliance has been evaluated for compliance with the related foundation design requirements of the current **Wisconsin Uniform Dwelling Code** s. SPS 321.40 and 321.15 – 321.18 for manufactured homes produced after April 1, 2007. Pursuant to s. SPS 320.24(3), the alternate standard and methodology as described below, and attached, is approved for use in the State of Wisconsin to satisfy the intent of the manufactured home foundation requirements found within the **Wisconsin Uniform Dwelling Code**.

### DESCRIPTION AND USE

This alternate standard allows the placement of manufactured home foundations that do not extend to the greater of 48” below grade or the local frost depth.

### LIMITATIONS OF APPROVAL UNIFORM DWELLING CODE

This approval is only valid for manufactured homes.

When this alternative standard has been utilized in the design of a project, a statement identifying that use shall be included with the project construction documents, including the Wisconsin

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Alternative Standard Evaluation number referenced above. Additionally, a copy of the attached Frost Free Design Usage Agreement, signed by the installer and by a representative of the Wisconsin Housing Alliance shall be provided to the enforcing code official.

**DISCLAIMER**

The department is not endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive or modify any code requirement not specified in this document.

**EXPIRATION**

This approval will be valid through December 31, 2017, unless modifications are made to the alternate standard and methodology or a re-examination is deemed necessary by the department.

Reviewed by: TGK

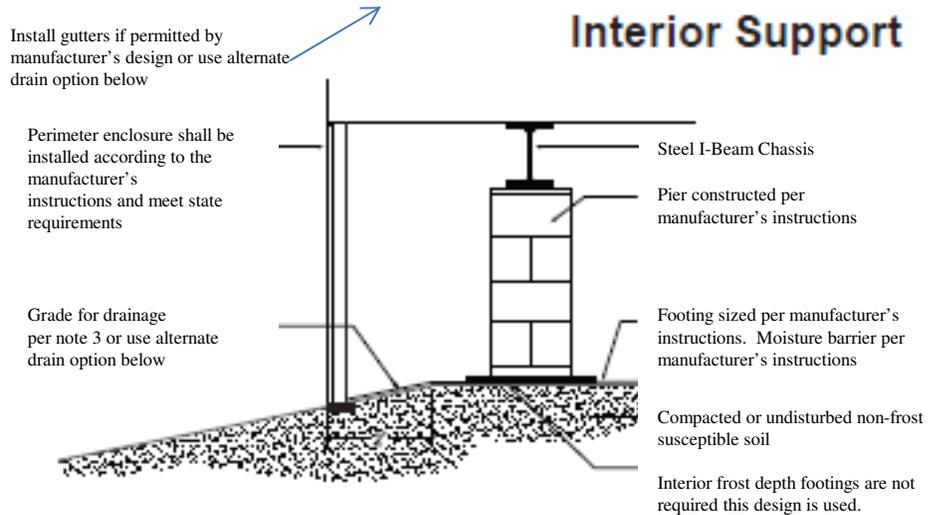
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Approval Date: April 14, 2012    By: Tom Kasper.  
Section Chief  
Division of Safety & Buildings

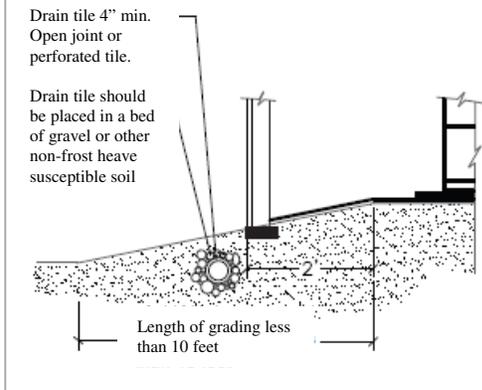
**Notes:**

1. This design requires non frost susceptible soil therefore a soils evaluation must be performed. The design is also not a substitute for compliance with other aspects of the manufacturer’s installation instructions. The soils evaluation shall be performed by a Wisconsin-certified soil tester (CST) or a Wisconsin-licensed professional soils scientist (PSS).
2. This design is for locations with non-frost susceptible soils or where the site has been improved by substitution of a non-frost susceptible base to a depth of 10 inches. Any introduced fill shall be compacted to 95% of modified Proctor. To minimize the chances of frost action due to subsurface ground water, establish that the ground water table during the winter season is below the 48 inch frost line. If ground water depth is determined to be above the local frost depth, this design cannot be used. The determination of the ground water table shall be performed by a CST or PSS to establish the "High groundwater elevation" as the higher of either the elevation to which the soil is saturated when observed as a free water surface, or the elevation to which the soil has been seasonally or periodically saturated as indicated by the highest elevation of redoximorphic features in the soil profile as defined in SPS 381.01(119).
3. All drainage shall be diverted away from the home and grading must slope a minimum of 1/2-inch per foot away from the foundation for a distance of 10 feet. When site conditions do not allow the grade to slope for a distance 10 feet, a drain tile may be installed, sloping away and terminating at more than 10 feet from the home.
4. Rain gutters or drain tile shall be installed to direct water no less than 5 feet from the home.
5. A perimeter enclosure is required meeting requirements provided by the manufacturer’s installation manual. Any perimeter enclosure terminating above the frost line must be designed so as not to transfer forces due to frost heave to the home.
6. Venting of the enclosure shall follow the manufacturer’s instructions.

**Interior Support**



**Detail A: Alternative Drainage Option**



**Non-Frost Susceptible Soils**  
 Frost heaving requires a frost-susceptible soil, a continual supply of water below (a water table) and freezing temperatures, penetrating into the soil. Frost-susceptible soils are those with pore sizes between particles and particle surface area that promote capillary flow. Silty and loamy soil types, which contain fine particles, are examples of frost-susceptible soils. The Wisconsin Uniform Dwelling Code adopts the 2001 ASCE 32 standard, Design & Construction of Frost-Protected Shallow Foundations, which classifies soil as being frost susceptible if 6 percent or more constituent particles pass through a 0.075 mm (No. 200) sieve.  
Non-frost-susceptible soils from Table SPS 321.18-A include those not crossed out on page 2 of this design.

**Perimeter Support**

Perimeter support shall be according to the manufacturer’s instructions but generally shall be by one of these types:

1. An engineered support beam transferring the load back to the nearest support column.
2. A frost protected pier within 18 inches of the perimeter wall.
3. A frost protected perimeter wall made of masonry or other material.

Description of Backfill Material	Unified Soil Classification	Design Lateral Soil Load <sup>a</sup> PSF per Foot of Depth
Well graded, clean gravels; gravel-sand mixes	GW	30c
Poorly graded clean gravels; gravel-sand mixes	GP	30c
Silty gravels, poorly graded gravel-sand mixes	GM	40e
Clayey gravels, poorly graded gravel and clay mixes	GC	45e
Well-graded, clean sands; gravelly sand mixes	SW	30c
Poorly graded clean sands; sand-gravel mixes	SP	30c
Silty sands, poorly graded sand-silt mixes	SM	45e
Sand-silt clay mix with plastic fines	SM-SC	45d
Clayey sands, poorly graded sand-clay mixes	SC	60d
Inorganic silts and clayey silts	ML	45d
Mixture of inorganic silt and clay	ML-CL	60d
Inorganic clays of low to medium plasticity	CL	60d
Organic silts and silt clays, low plasticity	OL	b
Inorganic clayey silts, elastic silts	MH	60d
Inorganic clays of high plasticity	CH	b
Organic clays and silty clays	OH	b

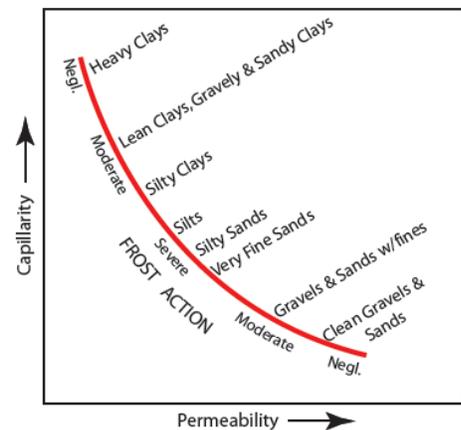
<sup>a</sup>Design lateral soil loads are given for moist conditions for the specified soils at their optimum densities. Actual field conditions shall govern. Submerged or saturated soil pressures shall include the weight of the buoyant soil plus the hydro-static loads.

<sup>b</sup>Unsuitable as backfill material.

<sup>c</sup>For relatively rigid walls, as when braced by floors, the design lateral soil load shall be increased for sand and gravel type soils to 60 psf per foot of depth. Basement walls extending not more than 8 feet below grade and supporting flexible floor systems are not considered relatively rigid walls.

<sup>d</sup>For relatively rigid walls, as when braced by floors, the design lateral load shall be increased for silt and clay type soils to 100 psf per foot of depth. Basement walls extending not more than 8 feet below grade and supporting flexible floor systems are not considered relatively rigid walls.

<sup>e</sup>Soil classes are in accordance with the Unified Soil Classification System, ASTM D2487, and design lateral loads are for moist soil conditions without hydrostatic pressure.





**Frost Free Design Usage Agreement**  
(For members of WI Housing Alliance)

**Business Name:** \_\_\_\_\_ **Phone:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Address where installation will occur:**  
\_\_\_\_\_  
\_\_\_\_\_

**Donation Requested for use of design: \$100.00**

(This donation will be a one-time fee used to offset the cost of engineering for the design, the State approval procedure and database to keep users posted of any updates to the design in the future.)

**Disclaimer:**

(This design was engineered and stamped by Ronald F. Hansing, Professional Engineer with TR Arnold and Associates, Inc., requested by the Wisconsin Housing Alliance, Inc. and approved by the State of Wisconsin, Department of Safety and Professional Services. The plan is conditioned upon approval for use by the home manufacturer, installation by a licensed manufactured home installer and soil conditions being set to the standards in the plan.)

**Hold Harmless Agreement for Use of Frost Free Foundation Design**

\_\_\_\_\_, its successors and assigns, hereby agrees to save and hold harmless the TR Arnold & Associates, the Wisconsin Housing Alliance and the State of Wisconsin, any of their employees from all cost, injury and damage including court costs, expenses of litigation and reasonable attorneys' fees incurred by any of the above, and from any other injury or damage to any person or property whatsoever, any of which is caused by an activity, condition or event arising out of the performance, preparation for performance or nonperformance of the frost free foundation design identified as Exhibit A.

This agreement on is made on \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
(Authorized signature of Installer)

Approval by Wisconsin Housing Alliance: \_\_\_\_\_ *Sample* \_\_\_\_\_ Date \_\_\_\_\_  
(Authorized Signator for WI Housing Alliance)

**Payment:**

**Payment must be received and this form completed prior to the release of the design.**

Check enclosed OR Credit Card information below:

**CC Payment: Mastercard / Visa** CC# \_\_\_\_\_ Exp. \_\_\_\_\_ CVV Code \_\_\_\_\_

**Name of Cardholder** \_\_\_\_\_

**Cardholder Address (if different from above)** \_\_\_\_\_

**Fax or mail payment and request form to:**

Wisconsin Housing Alliance, 301 N. Broom St., Suite 101, Madison, WI 53703 (608) 255-3131 Phone (608) 255-5595 Fax

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