

(b) For roof live loads of 40 psf or greater, a professional engineer or architect must determine the maximum sidewall opening permitted without perimeter pier or other supports.

(c) The location and installation of any perimeter pier support must not take the home out of compliance with the Manufactured Home Construction and Safety Standards (part 3280 of this chapter).

§ 3285.312 Footings.

(a) Materials approved for footings must provide equal load-bearing capacity and resistance to decay, as required by this section. Footings must be placed on undisturbed soil or fill compacted to 90 percent of maximum relative density. A footing must support every pier. Footings are to be either:

(1) *Concrete.*

(i) Four inch nominal precast concrete pads meeting or exceeding ASTM C 90-02a, Standard Specification for Loadbearing Concrete Masonry Units (incorporated by reference, see § 3285.4), without reinforcement, with at least a 28-day compressive strength of 1,200 pounds per square inch (psi); or

(ii) Six inch minimum poured-in-place concrete pads, slabs, or ribbons with at least a 28-day compressive strength of 3,000 pounds per square inch (psi). Site-specific soil conditions or design load requirements may also require the use of reinforcing steel in cast-in-place concrete footings.

(2) *Pressure-treated wood.*

(i) Pressure-treated wood footings must consist of a minimum of two layers of nominal 2-inch thick pressure-treated wood, a single layer of nominal ¾-inch thick, pressure-treated plywood with a maximum size of 16 inches by 16 inches, or at least two layers of ¾-inch thick, pressure-treated plywood for sizes greater than 16 inches by 16 inches. Plywood used for this purpose is to be rated exposure 1 or exterior sheathing, in accordance with PS1-95, Construction and Industrial Plywood (incorporated by reference, see § 3285.4).

(ii) Pressure treated lumber is to be treated with a water-borne adhesive, in accordance with AWPAs Standard U1-04 (incorporated by reference, see § 3285.4) for Use Category 4B ground contact applications.

(iii) Cut ends of pressure treated lumber must be field-treated, in accordance with AWPAs Standard M4-02 (incorporated by reference, see § 3285.4).

(3) *ABS footing pads.*

(i) ABS footing pads are permitted, provided they are installed in accordance with the pad manufacturer installation instructions and certified for use in the soil classification at the site.

(ii) ABS footing pads must be listed or labeled for the required load capacity.

(4) Other Materials. Footings may be of other materials than those identified in this section, provided they are listed for such use and meet all other applicable requirements of this subpart.

(b) *Placement in freezing climates.* Footings placed in freezing climates must be designed using methods and practices that prevent the effects of frost heave by one of the following methods:

(1) Conventional footings. Conventional footings must be placed below the frost line depth for the site unless an insulated foundation or monolithic slab is used (refer to §§ 3285.312(b)(2) and 3285.312(b)(3)). When the frost line depth is not available from the LAHJ, a registered professional engineer, registered architect, or registered geologist must be consulted to determine the required frost line depth for the manufactured home site. This is not subject to the provisions in § 3285.2(c) that also require review by the manufacturer and approval by its DAPIA for any variations to the manufacturer's installation instructions for support and anchoring.

(2) *Monolithic slab systems.* A monolithic slab is permitted above the frost line when all relevant site-specific conditions, including soil characteristics, site preparation, ventilation, and insulative properties of the under floor enclosure, are considered and anchorage requirements are accommodated as set out in § 3285.401. The monolithic slab system must be designed by a registered professional engineer or registered architect:

(i) In accordance with acceptable engineering practice to prevent the effects of frost heave; or

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(ii) In accordance with SEI/ASCE 32–01 (incorporated by reference, see § 3285.4).

(3) *Insulated foundations.* An insulated foundation is permitted above the frost line, when all relevant site-specific conditions, including soil characteristics, site preparation, ventilation, and insulative properties of the under floor enclosure, are considered, and the foundation is designed by a registered professional engineer or registered architect:

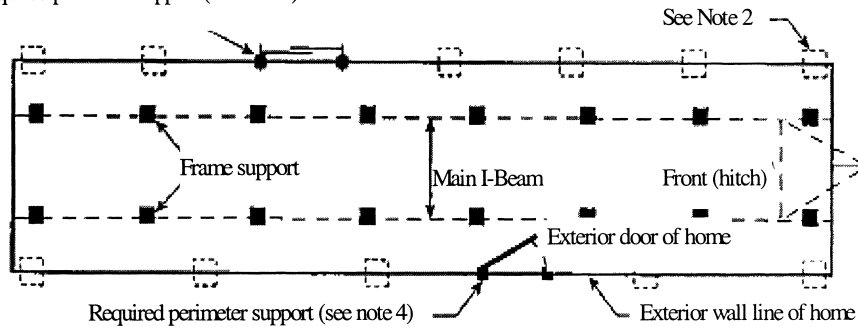
(i) In accordance with acceptable engineering practice to prevent the effects of frost heave; or

(ii) In accordance with SEI/ASCE 32–01 (incorporated by reference, see § 3285.4).

(c) *Sizing of footings.* The sizing and layout of footings depends on the load-bearing capacity of the soil, footings, and the piers. See §§ 3285.202 and 3285.303, and Table to 3285.312.

Figure A to § 3285.312 Typical Blocking Diagram for Single Section Homes

Required perimeter support (see note 4)



NOTES: 1. Refer to Table 1 of § 3285.303 for pier and footing requirements when frame blocking only is used.

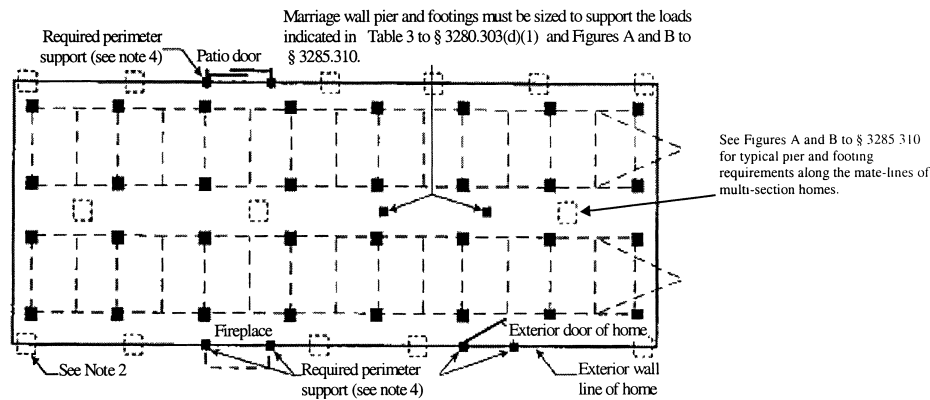
2. In addition to blocking required by § 3285.311, see Table 2 to § 3285.303 for maximum perimeter blocking loads.

3. End piers under main I-beams may be set back a maximum of 24 inches, as measured from the outside edge of the floor to the center of the pier.

4. Place piers on both sides of sidewall exterior doors, patio doors, and sliding glass

doors; under porch posts, factory-installed fireplaces, and fireplace stoves; under jamb studs at multiple window openings; and at any other sidewall openings 48 inches or greater in width. For roof loads of 40 psf or greater, a professional engineer or registered architect must determine the maximum sidewall opening permitted without perimeter supports. See §§ 3285.307 and 3285.311 for additional requirements and for locating perimeter supports.

Figure B to § 3285.312 Typical Blocking Diagram for Multi-section Home.



NOTES: 1. Refer to Table 1 to § 3285.303 for pier and footing requirements when frame blocking only is used.

2. In addition to blocking required by § 3285.311, see Tables 2 and 3 to § 3285.303 for maximum perimeter blocking loads.

3. End piers under main I-beams may be set back a maximum of 24 inches, as measured from the outside edge of the floor to the center of the pier.

4. Place piers on both sides of sidewall exterior doors, patio doors, and sliding glass doors; under porch posts, factory-installed fireplaces, and fireplace stoves; under jamb studs at multiple window openings; and at

any other sidewall openings of 48 inches or greater in width. For roof loads of 40 psf or greater, a professional engineer or registered architect must determine the maximum side wall opening permitted without perimeter supports or mating wall opening permitted without pier or other supports. See §§ 3285.307 and 3285.311 for additional information on requirements and for locating perimeter supports.

5. When an end pier under the mate-line also serves as a column pier, it may be set back a maximum of 6 in., as measured from the inside edge of the exterior wall to the center of the pier.

TABLE TO § 3285.312—THE SIZE AND CAPACITY FOR UNREINFORCED CAST-IN-PLACE FOOTINGS

Soil capacity (psf)	Minimum footing size (in.)	8 in. × 16 in. pier		16 in. × 16 in. pier	
		Maximum footing capacity (lbs.)	Unreinforced cast- in-place minimum thickness (in.)	Maximum footing capacity (lbs.)	Unreinforced cast- in-place minimum thickness (in.)
1,000	16 × 16	1,600	6	1,600	6
	20 × 20	2,600	6	2,600	6
	24 × 24	3,700	6	3,700	6
	30 × 30	5,600	8	5,800	6
	36 × 36	7,900	10	8,100	8
	42 × 42	⁴ 10,700	10	10,700	10
1,500	48 × 48	⁴ 13,100	12	13,600	10
	16 × 16	2,500	6	2,500	6
	20 × 20	4,000	6	4,000	6
	24 × 24	5,600	8	5,700	6
	30 × 30	⁴ 8,500	10	8,900	8
	36 × 36	⁴ 12,400	10	12,600	8
2,000	42 × 42	⁴ 16,500	12	⁴ 16,800	10
	48 × 48	⁴ 21,200	14	⁴ 21,600	12
	16 × 16	3,400	6	3,400	6
	20 × 20	5,300	6	5,300	6
	24 × 24	7,600	8	7,700	6
	30 × 30	⁴ 11,700	10	11,900	8
	36 × 36	⁴ 16,700	15	⁴ 16,900	10
	42 × 42	⁴ 21,700	18	⁴ 22,700	12

TABLE TO § 3285.312—THE SIZE AND CAPACITY FOR UNREINFORCED CAST-IN-PLACE FOOTINGS—
Continued

Soil capacity (psf)	Minimum footing size (in.)	8 in. × 16 in. pier		16 in. × 16 in. pier	
		Maximum footing capacity (lbs.)	Unreinforced cast- in-place minimum thickness (in.)	Maximum footing capacity (lbs.)	Unreinforced cast- in-place minimum thickness (in.)
2,500	16 × 16	4,300	6	4,300	6
	20 × 20	6,700	6	6,700	6
	24 × 24	⁴ 9,600	8	9,700	6
	30 × 30	⁴ 14,800	10	15,000	8
	36 × 36	⁴ 20,700	12	⁴ 21,400	10
3,000	16 × 16	5,200	6	5,200	6
	20 × 20	8,100	8	8,100	6
	24 × 24	⁴ 11,500	10	11,700	6
	30 × 30	⁴ 17,800	12	⁴ 18,100	8
	36 × 36	⁴ 25,400	14	⁴ 25,900	10
4,000	16 × 16	7,000	6	7,000	6
	20 × 20	⁴ 10,800	8	10,900	6
	24 × 24	⁴ 15,500	10	15,600	8
	30 × 30	⁴ 23,300	12	⁴ 24,200	10

NOTES: 1. The footing sizes shown are for square pads and are based on the area (in.²), shear and bending required for the loads shown. Other configurations, such as rectangular or circular configurations, can be used, provided the area and depth is equal to or greater than the area and depth of the square footing shown in the table, and the distance from the edge of the pier to the edge of the footing is not less than the thickness of the footing.

2. The 6 in. cast-in-place values can be used for 4 in. unreinforced precast concrete footings.

3. The capacity values listed have been reduced by the dead load of the concrete footing.

4. Concrete block piers must not exceed their design capacity of 8,000 lbs. for 8" × 16" single stack block and 16,000 lbs. for 16" × 16" double stack block.

5. A registered professional engineer or registered architect must prepare the design, if the design loads exceed the capacity for single or double stack concrete block piers shown in footnote 4.

§ 3285.313 Combination systems.

Support systems that combine both load-bearing capacity and uplift resistance must also be sized and designed for all applicable design loads.

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§ 3285.315 Special snow load conditions.

(a) *General.* Foundations for homes designed for and located in areas with roof live loads greater than 40 psf must be designed by the manufacturer for

the special snow load conditions, in accordance with acceptable engineering practice. Where site or other conditions prohibit the use of the manufacturer's instructions, a registered professional engineer or registered architect must design the foundation for the special snow load conditions.

(b) *Ramadas.* Ramadas may be used in areas with roof live loads greater than 40 psf. Ramadas are to be self-supporting, except that any connection to the home must be for weatherproofing only.

Subpart E—Anchorage Against Wind

§ 3285.401 Anchoring instructions.

(a) After blocking and leveling, the manufactured home must be secured against the wind by use of anchor assembly type installations or by connecting the home to an alternative foundation system. See § 3285.301.

(b) For anchor assembly type installations, the installation instructions must require the home to be secured against the wind, as described in this section. The installation instructions and design for anchor type assemblies must be prepared by a registered professional engineer or registered architect, in accordance with acceptable engineering practice, the design loads of the MHCSS, and § 3285.301(d).

(c) All anchoring and foundation systems must be capable of meeting the