

## Model Manufactured Home Installation Standards

### 2003 Edition

#### Origin and Development of Model Manufactured Home Installation Standards

This first edition of *Model Manufactured Home Installation Standards* was developed as a result of numerous actions that established themselves in the manufactured housing regulatory climate. First, it should be noted that the previous responsibility for management of the ANSI standard for this subject was with the National Conference of States on Building Codes and Standards (NCSBCS). Their document, NCSBCS A 225.1, 1994 edition, *Manufactured Home Installations*, formed the basis for this edition of *Model Manufactured Home Installation Standards*. Responsibility for the ANSI standard was transferred to NFPA in 2001.

The second area that highlighted need for installation standards was passage of the Manufactured Housing Improvement Act (MHIA) of 2000. Although the MHIA was not implemented until 2001, the act established a broad set of criteria to ensure that changes could be effectively promulgated with respect to the design, construction, and installation of the stock of manufactured homes. A key provision of the MHIA was the need to establish an installation standard that could be utilized by the U.S. Department of Housing and Urban Development (HUD), the ultimate overseer of manufactured homes.

The installation criteria in these standards are widely varied and cover a range of subjects. As written, the Model Manufactured Home Installation Standards are intended to be applied to new installations, regardless of whether they are at new or existing manufactured housing sites. These criteria are intended to be adopted and enforced by the authority having jurisdiction when an alternative state standard does not exist.

In addition to covering the basic administrative features and criteria, provisions are included for site preparation work, foundations, procedures during onsite installation/erection, as well as management of appliances and utility connections. These provisions govern single-section as well as multisection homes and provide requirements for everything from interconnection criteria for multisection homes to anchor provisions to restrict movement from wind loads.

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Key to Abbreviations:  
GI General Interest  
P Producer  
PO Public Official  
U User

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## NFPA

# Model Manufactured Home Installation Standards

## 2003 Edition

**NOTICE:** Information on referenced publications can be found in Chapter 2.

### Chapter 1 Administration

**1.1 Scope.** These model standards shall cover the initial installation of manufactured homes wherever sited in the United States and its territories. The manufacturer's installation instructions shall apply under either of the following conditions:

- (1) To items not covered by this standard
- (2) Where the manufacturer's approved installation instructions provide a specific method of performing a specific operation or assembly

#### 1.2 Purpose. (Reserved)

**1.3 Application.** The provisions of this standard shall apply to manufactured homes used as dwelling units. This standard makes no provisions for other residential occupancies.

**1.3.1** This standard shall not apply to manufactured homes used for other than dwelling purposes.

**1.3.2** The provisions of this standard shall not apply to recreational vehicles as defined in NFPA 1192-02, *Standard on Recreational Vehicles*, or to park trailers as defined in ANSI A119.5-98, *Recreational Park Trailers*.

**1.3.3** The provisions of this standard shall apply to park trailers labeled as manufactured homes.

**1.3.4** The manufactured homes covered by this standard shall comply with the U.S. Department of Housing and Urban Development (HUD) federal Manufactured Home Construction and Safety Standards (MHCSS) Program, as set forth in 24 CFR 3280, *Manufactured Home Construction and Safety Standards*, and 24 CFR 3282, *Manufactured Home Procedural and Enforcement Regulations*.

**1.3.5** This standard is designed to be adopted by authorities having jurisdiction who have responsibility for the safety and health of manufactured home users.

#### 1.3.6 Installation of Manufactured Homes in Flood Hazard Areas.

**1.3.6.1 Definitions.** Terms used in this section shall be as defined in 44 CFR 59.1 of the National Flood Insurance Program (NFIP) regulations.

**1.3.6.2 Applicability.** The requirements of this section shall apply to the initial installation of manufactured homes located wholly or partly within the flood hazard area.

**1.3.6.3 Preinstallation Considerations.** Prior to the initial installation of a manufactured home, it shall be determined whether the home site lies wholly or partly within a special flood hazard area as shown on the authority having jurisdiction's (AHJ's) Flood Insurance Rate Map, Flood Boundary and Floodway Map, or Flood Hazard Boundary Map. If so,

located, the map and supporting studies adopted by the jurisdiction shall be referenced to determine the flood hazard zone and base flood evaluation at the site. Permits shall be required in accordance with 44 CFR 60.3(a)(1) or 44 CFR 60.3(b)(1) and the AHJ.

#### 1.3.6.4 General Elevation and Foundation Requirements.

**1.3.6.4.1 Methods and Practices.** Manufactured homes located wholly or partly within special flood hazard areas shall be installed using methods and practices that minimize flood damage during the base flood, in accordance with the AHJ, 44 CFR 60.3(a) through (e), as applicable, and other provisions of 44 CFR referenced by those paragraphs.

**1.3.6.5 Related NFIP Guidance.** See FEMA 85-85, *Manufactured Home Installation in Flood Hazard Areas*.

**1.4 Term Use.** The term *manufactured home* where used in this document shall be permitted to be used interchangeably with *home*.

### Chapter 2 Referenced Publications

**2.1 General.** The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

**2.2 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, P. O. Box 9101, Quincy, MA 02269-9101.

NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, 2000 edition.

NFPA 501, *Standard on Manufactured Housing*, 2003 edition.  
NFPA 501A, *Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities*, 2003 edition.

NFPA 1192, *Standard on Recreational Vehicles*, 2002 edition.

#### 2.3 Other Publications.

**2.3.1 ANSI Publication.** American National Standards Institute, Inc., 11 West 42nd Street, 13th floor, New York, NY 10036.

ANSI A119.5, *Recreational Park Trailers*, 1998.

**2.3.2 ASTM Publications.** American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM C 90, *Standard Specification for Loadbearing Concrete Masonry Units*, 2002.

ASTM D 3953, *Standard Specification for Strapping, Flat Steel and Seals*, 1997.

**2.3.3 AWWA Publications.** American Wood-Preservers' Association, P.O. Box 5690, Granbury, TX 76049.

AWPA C2, *Standard for the Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties, by Pressure Processes*, 2001.

AWPA C9, *Plywood — Preservative Treatment by Pressure Processes*, 2000.

**2.3.4 U.S. Government Publications.** U.S. Government Printing Office, Washington, DC 20402.

FEMA 85, *Manufactured Home Installation in Flood Hazard Areas*, 1985.

Title 24, Code of Federal Regulations, Part 3280, *Manufactured Home Construction and Safety Standards*.

Title 24, Code of Federal Regulations, Part 3282, *Manufactured Home Procedural and Enforcement Regulations*.

### Chapter 3 Definitions

**3.1 General.** The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not included, common usage of the terms shall apply.

#### 3.2 Official Definitions.

**3.2.1 Approved.** Acceptable to the authority having jurisdiction.

**3.2.2 Authority Having Jurisdiction (AHJ).** The state, organization, office, or individual assigned responsibility by the Department, as applicable, for approving equipment, materials, an installation, or a procedure.

**3.2.3 Labeled.** Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

**3.2.4 Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

**3.2.5 Shall.** Indicates a mandatory requirement.

**3.2.6 Should.** Indicates a recommendation or that which is advised but not required.

**3.2.7 Standard.** A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

#### 3.3 General Definitions.

**3.3.1 Anchor.** A device placed at the manufactured home site designed to transfer home anchoring loads to the ground.

**3.3.2 Anchoring Equipment.** Ties, straps, cables, turnbuckles, chains, and other approved components, including tensioning devices, that are used to secure a manufactured home to anchors.

**3.3.3 Anchoring System.** A combination of anchoring equipment and anchors that will, when properly designed and installed, resist the uplift, overturning, and lateral forces on the manufactured home.

**3.3.4 Base Flood.** The flood having a 1 percent chance of being equaled or exceeded in any given year.

**3.3.5 Base Flood Elevation (BFE).** The elevation of the base flood, including wave height, relative to the datum specified on a jurisdiction’s flood hazard map.

**3.3.6 Crossovers.** Utility connections in multisection homes that are located where the sections are joined. Crossover connections include heat ducting, electrical circuits, water pipes, drain plumbing, and gas lines.

**3.3.7 Design Flood.** The greater of either (1) the base flood or (2) the flood so designated by the jurisdiction as its regulatory flood, with a 1 percent chance, or less, of being equaled or exceeded in any given year.

**3.3.8 Design Flood Elevation (DFE).** The elevation of the design flood, including wave height, relative to the datum specified on a jurisdiction’s flood hazard map.

**3.3.9 Flood Hazard Area.** The greater of either (1) the special flood hazard area shown on the flood insurance rate map or (2) the area subject to flooding during the design flood and shown on a jurisdiction’s flood hazard map, or otherwise legally designated.

**3.3.10 Flood Hazard Map.** A map delineating the flood hazard area and adopted by a jurisdiction.

**3.3.11 Footing.** That portion of the support system that transmits loads directly to the soil.

**3.3.12 Installation.** Assembly, at the site of occupancy, of all portions of the manufactured home, connection of the home to utility connections, and installation of support and anchoring systems.

**3.3.13 Installation Alteration.** The addition, modification, or removal of any components of the required ground support or anchoring systems.

**3.3.14 Installation Instructions.** Instructions provided by the manufacturer that accompany each manufactured home and detail the manufacturer’s requirements for ground support, anchoring systems, and other work completed on site.

**3.3.15 Lowest Floor.** The floor of the lowest enclosed area of a manufactured home. An unfinished or flood resistant enclosure, used solely for vehicle parking, home access or limited storage, shall not be considered the lowest floor, provided the enclosed area is not constructed so as to render the home in violation of the flood-related provisions of this standard.

**3.3.16 Manufactured Home.** A structure, transportable in one or more sections, which, in the traveling mode, is 8 body-ft (2.4 m) or more in width or 40 body-ft (12.2 m) or more in length or, when erected on site, is 320 ft<sup>2</sup> (29.7 m<sup>2</sup>) or more and which is built on a permanent chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected to the required utilities, and includes plumbing, heating, air-conditioning, and electrical systems contained therein; except that such terms shall include any structure which meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square feet in a structure are based on the structure’s exterior dimensions, measured at the largest horizontal projections when erected on site. These dimensions include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows.

**3.3.17 Manufactured Home Accessory Building or Structure.** A building or structure that is an addition to or supplements the facilities provided by a manufactured home.

**3.3.18 Manufactured Home Gas Supply.** A listed connector designed for connecting the manufactured home to the gas supply source.

**3.3.19 Manufactured Home Site.** A designated parcel of land designed for the accommodation of one manufactured home, its accessory buildings or structures, and accessory equipment, for the exclusive use of the occupants of the home.

**3.3.20 Pier.** That portion of the support system between the footing and the manufactured home, exclusive of shims. Types of piers include, but are not limited to, the following: (1) manufactured steel stands; (2) pressure-treated wood; (3) manufactured concrete stands; and (4) concrete blocks.

**3.3.21 Ramada.** Any freestanding roof or shade structure, installed or erected above a manufactured home or any portion thereof.

**3.3.22 Skirting.** A weather-resistant material used to enclose the space from the bottom of the manufactured home to grade.

**3.3.23 Stabilizing Devices.** All components of the anchoring and support systems, such as piers, footings, ties, anchoring equipment, anchors, or any other materials and methods of construction, that support and secure the manufactured home to the ground.

**3.3.24 Structure.** That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

**3.3.25 Substantial Damage.** For manufactured homes, including support and anchoring systems, located wholly or partly within the flood hazard areas, damage of any origin whereby the cost of restoring the manufactured home, including support and anchoring systems, to its predamage condition would equal or exceed 50 percent of the market value of the manufactured homes, including support and anchoring systems.

**3.3.26 Substantial Improvement.** For manufactured homes, including support and anchoring systems located wholly or partly within the flood hazard area: (1) any repair, addition, reconstruction, rehabilitation or improvement of the manufactured home, including support and anchoring systems, the cost of which equals or exceeds 50 percent of the market value of the manufactured homes, including support and anchoring systems; (2) if a manufactured home, including support and anchoring systems, has sustained substantial damage, any repairs or reconstruction regardless of the actual work performed. Substantial improvement shall not include any project or improvement of a manufactured home required to correct existing health, sanitary, or safety code violations identified by the AHJ, and that are the minimum necessary to assure safe living conditions.

**3.3.27 Support System.** Pilings, columns, footings, piers, foundation walls, shims, and any combination thereof that, when properly installed, support the manufactured home.

**3.3.28 Tie.** See 3.3.2, Anchoring Equipment.

**3.3.28.1 Diagonal Tie.** A tie intended to resist horizontal or shear forces and to resist vertical, uplift, and overturning forces.

**3.3.28.2 Vertical Tie.** A tie intended to resist uplifting and overturning forces.

**3.3.29 Utility Connection.** The connection of the manufactured home to existing utilities that include, but are not limited to, electricity, water, sewer, gas, or fuel oil.

## Chapter 4 General

### 4.1 Preinstallation Considerations.

**4.1.1** Prior to location or relocation of a manufactured home, the authority having jurisdiction shall be contacted for installation and permitting requirements.

**4.1.2 Flood Hazard Areas.** For manufactured homes installed on a manufactured home site located wholly or partly in a flood hazard area, a lowest level inspection and certification of the elevation of the floor shall be required.

**4.2 Alterations.** Prior to alteration of a home installation, the authority having jurisdiction shall be contacted to determine if plan approval and permits are required.

**4.3 Installation Considerations.** The items listed in 4.3.1 through 4.3.4.2 shall be reviewed prior to installing the manufactured home.

**4.3.1 Floor Plan.** The floor plan of the home shall be approved and shall include information regarding minimum pier capacities for mating line pier (mandatory design perimeter piling), pertinent electrical information, and detailed structural requirements required by 24 CFR Part 3280.

#### 4.3.2 Utility Schematics.

**4.3.2.1** The utility schematics shall be approved and shall show the configuration of the different utility systems in the home (water, drain, and gas).

**4.3.2.2** The drain schematic shall indicate any portion of the drain system that requires site installation for final assembly.

**4.3.2.3** Field assembly shall be necessary for any "shipped loose" system parts.

**4.3.3 Home Installation Manual Supplements.** Supplemental pages shall be permitted to be included with the home, outlining special features in the home that are not covered or that differ from this document.

#### 4.3.4 Design Zone Maps.

**4.3.4.1** The design zone maps shall be those identified in 24 CFR Part 3280.

**4.3.4.2** The design zone maps and the information on the data plate shall be reviewed to determine if the home site is within acceptable boundaries.

## Chapter 5 Site Preparation

**5.1 Access for Transporter.** Before attempting to move a home, it shall be ensured that the transportation equipment and home can be routed to the installation site and that all special transportation permits required by the state, county, or municipality have been obtained.

**5.2 Encroachments and Setback Distances.** Local laws regarding encroachments in streets, yards, and courts shall be

obeyed, and permissible setback distances from property lines and public roads shall be met.

**5.3 Fire Separation Distance.** Fire separation distances shall be in accordance with the more stringent requirements of the AHJ or Chapter 6 of NFPA 501A-03.

**5.4 Issuance of Permits.** All necessary local permits shall be obtained and all fees shall be paid.

**5.5 Soil Conditions.**

**5.5.1 Requirements.** To help prevent settling or sagging, the home shall be sited on firm, undisturbed soil or fill compacted to at least 90 percent of its maximum relative density.

**5.5.2 Bearing Capacity.**

**5.5.2.1** The bearing capacity of the soil shall be determined in accordance with 5.5.3 before the foundation is designed.

**5.5.2.2** If the soil capacity cannot be determined by either local soil records or by tests as specified in 5.5.3, but its type can be identified, the foundation bearing pressures shown in Table 5.5.2.2 shall be permitted to be used.

**Table 5.5.2.2 Soil Bearing Capacities**

General Description of Soils	
Soil Type Based on the Unified Classification System	Allowable Pressure (psf)*
Rock or hard pan	4000 and up
Sandy gravel and gravel	2000
Sand, silty sand, clayey sand, silty gravel, or clayey gravel	1500
Clay, sandy clay, silty clay, or clayey silt	1000
Uncommitted fill (types of soil not listed)	Special analysis required
Peat or organic clays	Special analysis required

Note: This table is to be used only when none of the following is available:

1. Soil testing investigation and analysis of the site
2. Compliance with the local building code
3. Competent opinion by a local engineer or building official

\*No allowances made for overburden pressure, embedment depth, water table height settlement problems.

**5.5.2.3** If the bearing capacity of the soil cannot be identified, 7.5.2.4.1 and Table 5.5.2.2 shall be used unless the soil appears to be composed of peat, organic clays, or uncompacted fill or appears to have unusual conditions.

**5.5.2.4** If the soil appears to be composed of peat, organic clays, or uncompacted fill or appears to have unusual conditions, a registered professional geologist, a registered professional engineer, or an architect shall be consulted.

**5.5.3 Soil-Bearing Testing Methods and Equipment.** A pocket penetrometer or any other method acceptable to the authority having jurisdiction shall be permitted to be used.

**5.6 Removal of Organic Material.** Removal of all decayable material, such as grass, roots, twigs, and wood scraps, from beneath the home is required in areas where footings are to be placed, to minimize settling of footings and insect damage.

**5.7 Drainage.**

**5.7.1 Purpose.** Drainage shall be provided that prevents water build-up under the home, shifting or settling of the foundation, dampness in the home, damage to siding and bottom board, buckling of walls and floors, and problems with the operation of doors and windows.

**5.7.2 Elimination of Depressions.**

**5.7.2.1 Drainage.**

**5.7.2.1.1** The home site shall be graded to permit water to drain from under the home. (See Figure 5.7.2.1.1.)

**5.7.2.1.2** All drainage shall be diverted away from the home.

**5.7.2.2 Sloped Site Considerations.** Sloped sites shall be protected from surface runoff from the surrounding area.

**5.7.3 Drainage Structures.** Ditches and culverts shall be permitted to be used to drain surface runoff and to be included in the overall site preparation.

**5.7.4 Gutters and Downspouts.** When gutters and downspouts are installed, the runoff shall be directed away from the home.

**5.8 Ground Moisture Control.**

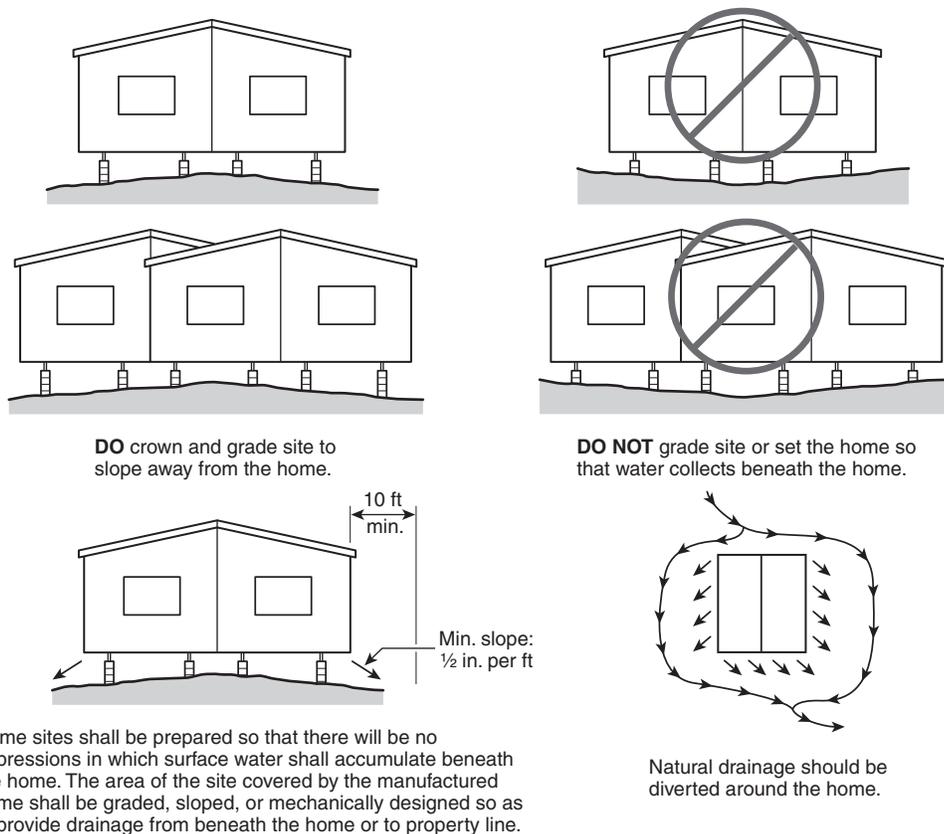
**5.8.1 Vapor Retarder.** If the space under the home is to be enclosed with skirting or other material, a vapor retarder that keeps ground moisture out of the home shall be installed except in arid regions with dry soil conditions or where approved by the authority having jurisdiction.

**5.8.2 Acceptable Types of Ground Cover.** A minimum of 6-mil (0.15 mm) polyethylene sheeting or its equivalent shall be used.

**5.8.3 Proper Installation.**

**5.8.3.1** When the entire area under the home is required to be covered with the sheeting as noted in 5.8.1, it shall be overlapped at least 12 in. (305 mm) at all joints.

**5.8.3.2** Where soil and frost conditions permit placement of footings at grade level, the sheeting shall be placed directly beneath the footings.



**FIGURE 5.7.2.1.1 Grading B Drainage.**

## Chapter 6 Foundations

### 6.1 General.

**6.1.1** Foundations for manufactured home installations shall be constructed in accordance with Chapter 6.

**6.1.2** Installations proposing different detailed specifications other than provided in Chapter 6 (such as block size or loads) shall be verified by engineering data.

**6.1.3** Details, plans, and/or test data shall be submitted to the authority having jurisdiction for approval.

**6.1.4** Alternative foundation systems or designs, when approved by the AHJ, shall be permitted by 6.1.4.1 or 6.1.4.2.

**6.1.4.1** Systems or designs shall be manufactured in accordance with their listings by a nationally recognized testing agency based on a nationally recognized testing protocol.

**6.1.4.2** Systems or designs shall be prepared by a registered professional engineer or architect.

**6.1.5 Flood Hazard Areas.** In flood hazard areas, the piers, anchoring, and support systems shall be capable of resisting loads associated with design flood and wind events.

### 6.2 Piers.

**6.2.1 General.** The piers used shall be capable of transmitting the vertical live and dead loads to the foundation below.

### 6.2.2 Acceptable Piers — Materials Specification.

**6.2.2.1** Piers shall be permitted to be concrete blocks, pressure-treated wood having 0.60 pcf (94 N/m<sup>3</sup>) retention in accordance with AWPAC9-00, *Plywood — Preservative Treatment by Pressure Processes*, or adjustable metal or concrete piers as shown in 6.2.3.2.1.

**6.2.2.2** Manufactured piers shall be listed or labeled for the required load capacity.

### 6.2.3 Design Requirements.

#### 6.2.3.1 Load-Bearing Capacity.

**6.2.3.1.1** The load that each pier must carry shall depend on such factors as the dimensions of the home, the roof live load, the spacing of the piers, and the way the piers are used to support the home.

**6.2.3.1.2** Center beam/marriage wall blocking shall be required for multisection homes.

#### 6.2.3.1.3 Pier Loads.

**6.2.3.1.3.1** Table 6.2.3.1.3.1(a), Table 6.2.3.1.3.1(b), and Table 6.2.3.1.3.1(c) for pier loads shall be used when the manufacturer's installation instructions are not available.

Table 6.2.3.1.3.1(a) Pier Spacing without Frame Blocking

Pier Spacing	Roof Live Load (psf)	Location	Load (lb)	Typical 16 in. × 16 in. Concrete Footing Pyramids Soils Bearing Capacity					
				1000 psf	1500 psf	2000 psf	2500 psf	3000 psf	4000 psf
4 ft 0 in.	20	Frame	2900	2	2	1	1	1	1
	30	Frame	3300	2	2	1	1	1	1
	40	Frame	3600	2	2	1	1	1	1
6 ft 0 in.	20	Frame	4200	3	2	2	1	1	1
	30	Frame	4700	3	2	2	1	1	1
	40	Frame	5200	3	2	2	1	1	1
8 ft 0 in.	20	Frame	5500	1	1	1	1	1	1
	30	Frame	6200	2	1	1	1	1	1
	40	Frame	6900	2	2	1	1	1	1
10 ft 0 in.	20	Frame	6800	4	3	3	1	1	1
	30	Frame	7600	6	4	3	2	2	2
	40	Frame	8500	6	4	3	2	2	2

Notes:

1. Frame blocking only; perimeter support is not required except at openings.
2. Refer to Figure 6.3.3 for footing pyramids layout or to Table 6.3.3(a) for poured footing design.

Table 6.2.3.1.3.1(b) Pier Spacing with Pier Blocking

Maximum Pier Spacing	Roof Live Loads (psf)	Location	Load (lb)	Typical 16 in. × 16 in. Concrete Footing Pyramids Soils Bearing Capacity					
				1000 psf	1500 psf	2000 psf	2500 psf	3000 psf	4000 psf
4 ft 0 in.	20	Frame	1400	1	1	1	1	1	1
		Perimeter Marriage	1900	2	1	1	1	1	1
		Frame	3200	2	2	1	1	1	1
	30	Perimeter Marriage	1400	1	1	1	1	1	1
		Perimeter Marriage	2300	2	1	1	—	—	1
		Frame	3800	3	2	2	1	1	1
	40	Frame	1400	1	1	1	1	1	1
		Perimeter Marriage	2600	2	2	1	1	1	1
		Frame	4400	3	2	2	1	1	1
6 ft 0 in.	20	Frame	1900	2	1	1	1	1	1
		Perimeter Marriage	2700	2	2	1	1	1	1
		Frame	4700	3	2	2	2	2	1
	30	Perimeter Marriage	1900	2	1	1	1	1	1
		Perimeter Marriage	3200	3	2	2	1	1	1
		Frame	5600	4	3	2	2	2	1
	40	Frame	1900	2	1	1	1	1	1
		Perimeter Marriage	3700	3	2	2	1	1	1
		Frame	6500	4	3	2	2	2	2

Table 6.2.3.1.3.1(b) *Continued*

Maximum Pier Spacing	Roof Live Loads (psf)	Location	Load(lb)	Typical 16 in. × 16 in. Concrete Footing Pyramids Soils Bearing Capacity					
				1000 psf	1500 psf	2000 psf	2500 psf	3000 psf	4000 psf
8 ft 0 in.	20	Frame	2400	2	1	1	1	1	1
		Perimeter	3500	2	2	1	1	1	1
		Marriage	6100	4	3	2	2	2	1
	30	Frame	2400	2	1	1	1	1	1
		Perimeter	4200	2	2	2	2	2	1
		Marriage	7300	6	5	3	2	2	2
	40	Frame	2400	2	1	1			1
		Perimeter	4800	3	2	2	2	2	1
		Marriage	8500	6	4	3	2	2	2
10 ft 0 in.	20	Frame	2900	2	2	1	1	1	1
		Perimeter	4300	3	2	2	1	1	1
		Marriage	7600	6	4	3	2	2	2
	30	Frame	2900	2	2	1	1	1	1
		Perimeter	5100	3	3	2	2	2	1
		Marriage	9100	6	5	3	3	3	2
	40	Frame	2900	2	2	1	1	1	1
		Perimeter	6000	4	3	2	2	2	1
		Marriage	10,600	6	4	3	2	2	2

Notes:

1. Frame plus perimeter blocking; perimeter blocking required.

2. Refer to Figure 6.3.3 for footing pyramids layout or to Table 6.3.3(a) for poured footing design.

**6.2.3.1.3.2** Manufactured piers shall be rated at least to the loads given in Table 6.2.3.1.3.1(a), Table 6.2.3.1.3.1(b), Table 6.2.3.1.3.1(c), and locally constructed piers shall be designed to transmit these loads safely as required by 6.2.3.2.

### 6.2.3.2 Configuration.

#### 6.2.3.2.1 Concrete Blocks.

**6.2.3.2.1.1** Concrete block piers shall be installed in accordance with Figure 6.2.3.2.1.1(a) and Figure 6.2.3.2.1.1(b).

**6.2.3.2.1.2** Load-bearing (not decorative) concrete blocks shall have nominal dimensions of at least 8 in. × 8 in. × 16 in. (205 mm × 205 mm × 410 mm).

**6.2.3.2.1.3** The concrete blocks shall be stacked with their hollow cells aligned vertically.

**6.2.3.2.1.4** When piers are constructed of blocks stacked side by side, each layer shall be at right angles to the preceding one, as shown in Figure 6.2.3.2.1.1(a) and Figure 6.2.3.2.1.1(b).

#### 6.2.3.2.2 Caps.

**6.2.3.2.2.1** Structural loads shall be evenly distributed across capped hollow block piers, as shown in Figure 6.2.3.2.1.1(a) and Figure 6.2.3.2.1.1(b).

**6.2.3.2.2.2** Caps shall be of solid masonry of at least 4 in. (100 mm) nominal thickness, or of dimensional lumber at least 2 in. (50 mm) nominal thickness, or of steel.

**6.2.3.2.2.3** All caps shall be of the same length and width as the piers on which they rest.

#### 6.2.3.2.3 Gaps.

**6.2.3.2.3.1** Nominal 4 in. × 6 in. (100 mm × 150 mm) shims shall be used to level the home and fill any gaps between the base of the I-beam and the top of the pier cap.

**6.2.3.2.3.2** Shims shall be used in pairs as shown in Figure 6.2.3.2.1.1(a) and Figure 6.2.3.2.1.1(b), and shims shall be driven in tightly so that they do not occupy more than 1 in. (25 mm) of vertical space.

**6.2.3.2.3.3** Wood plates no thicker than 2 in. (50 mm) shall be used to fill in any remaining vertical gaps.

**6.2.3.2.4 Pier Heights.** Manufactured pier heights shall be selected so that the adjustable risers do not extend more than 2 in. (50 mm) when finally positioned.

#### 6.2.3.3 Clearance under Homes.

**6.2.3.3.1** A minimum clearance of 12 in. (305 mm) shall be maintained beneath the lowest member of the main frame (I-beam or channel beam) in the area of utility connections.

**6.2.3.3.2** No more than 25 percent of the lowest member of the main frame of the home shall be less than 12 in. (305 mm) above grade.

Table 6.2.3.1.3.1(c) Ridge Beam Span Footing Capacity

Mating Wall Opening (ft)	Roof Live Load (psf)	Load	Typical 16 in. × 16 in. Concrete Footing Pyramids Soils Bearing Capacity					
			1000 psf	1500 psf	2000 psf	2500 psf	3000 psf	4000 psf
5	20	1200	1	1	1	1	1	1
	30	1600	1	1	1	1	1	1
	40	1900	2	1	1	1	1	1
10	20	2300	2	1	1	1	1	1
	30	3100	2	2	1	1	1	1
	40	3800	3	2	2	1	1	1
15	20	3500	2	2	1	1	1	1
	30	4700	3	2	2	2	1	1
	40	5800	4	3	2	2	1	1
20	20	4700	3	2	2	2	1	1
	30	6200	4	3	2	2	1	1
	40	7500	6	3	3	2	2	2
25	20	5800	4	3	2	2	1	1
	30	7800	6	4	3	2	2	2
	40	9700	6	4	3	3	2	2
30	20	7000	4	3	2	2	1	1
	30	9300	6	4	3	3	2	2
	40	11,600	8	6	4	3	2	2
35	20	8100	6	4	3	2	2	2
	30	10,900	8	6	4	3	2	2
	40	13,600	8	6	4	4	2	2

Note: Refer to Figure 6.3.3 for footing pyramids layout or to Table 6.3.3(a) for poured footing design.

## 6.2.4 Design Procedures.

### 6.2.4.1 Piers Less Than 36 in. (915 mm) High.

**6.2.4.1.1** Piers less than 36 in. (915 mm) high shall be permitted to be constructed of single, open, or closed-cell concrete blocks, 8 in. × 8 in. × 16 in. (205 mm × 205 mm × 410 mm).

**6.2.4.1.2** The piers shall be installed so that the long sides are at right angles to the supported I-beam, as shown in Figure 6.2.3.2.1.1(a) and Figure 6.2.3.2.1.1(b).

**6.2.4.1.3** Open cells shall be positioned at right angles to the footers.

**6.2.4.1.4** Horizontal offsets shall not exceed ½ in. (13 mm) top to bottom.

**6.2.4.1.5** Mortar shall not normally be required.

**6.2.4.1.6** Manufactured piers shall be listed and labeled.

**6.2.4.2 Piers 36 in. (915 mm) to 80 in. (2030 mm) High and Corner Piers.** All piers between 36 in. (915 mm) and 80 in. (2030 mm) high and all corner piers over three blocks high

shall be constructed out of double, interlocked concrete blocks as shown in Figure 6.2.3.2.1.1(a) and in Figure 6.2.3.2.1.1(b).

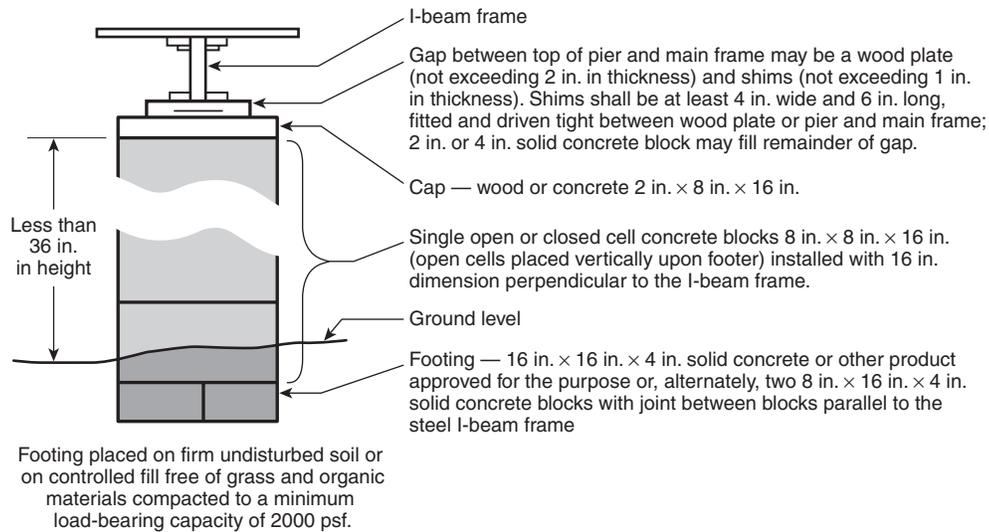
**6.2.4.3 Piers over 80 in. (2030 mm) High.** Piers over 80 in. (2030 mm) high shall be designed by a registered professional engineer.

**6.2.4.4 Elevated Homes.** When more than one-fourth of the area of a home is installed so that the bottom of the main frame members are more than 36 in. (915 mm) above ground level, the home stabilizing devices shall be designed by a qualified registered professional engineer.

### 6.2.5 Location and Spacing.

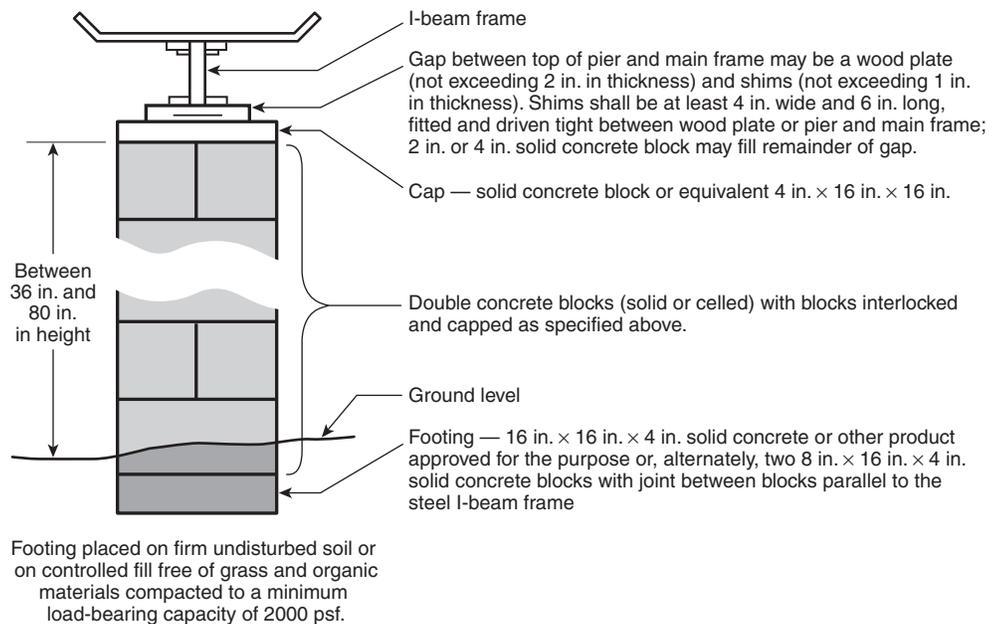
**6.2.5.1** The location and spacing of piers shall depend upon the dimensions and weight of the home, the roof load zone, the type of construction (single- or multisection), and such other factors as the location of doors or other openings.

**6.2.5.2** Pier supports shall be in accordance with Figure 6.2.5.2(a) or Figure 6.2.5.2(b).



Note: For SI units, 1 in. = 25.4 mm; 1 psf = 0.04788 kN/m<sup>2</sup>.

**FIGURE 6.2.3.2.1.1(a) Typical Footing and Pier Installation, Single Concrete Block.**



Note: For SI units, 1 in. = 25.4 mm; 1 psf = 0.04788 kN/m<sup>2</sup>.

**FIGURE 6.2.3.2.1.1(b) Typical Footing and Pier Installation, Double Concrete Block.**

**6.2.5.3** In general, piers shall be no more than 24 in. (610 mm) from either end and not more than 120 in. (3050 mm) center to center under the main rails.

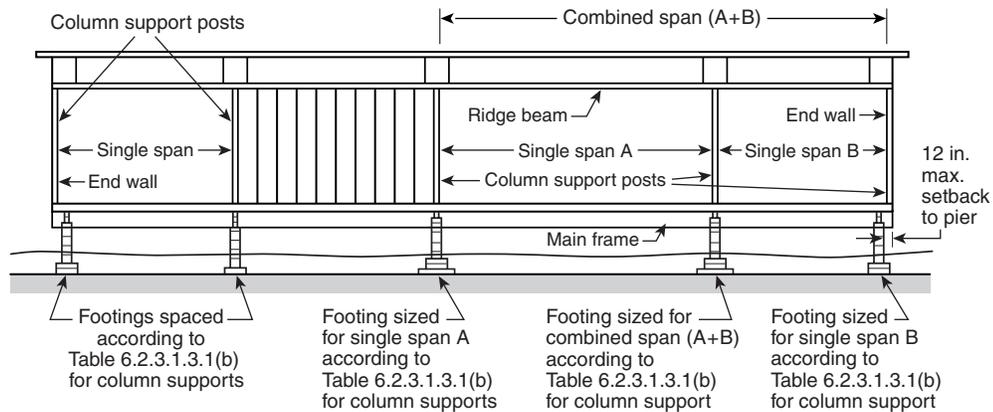
**6.2.5.4 Single-Section Homes.** The recommended location and spacing of piers for a single-section home shown in Figure 6.2.5.4 shall be used when the manufacturer's installation instructions are not available.

**6.2.5.5 Multisection Homes.** The recommended location and spacing of piers for a multisection home shown in Figure

6.2.5.5 shall be used when the manufacturer's installation instructions are not available.

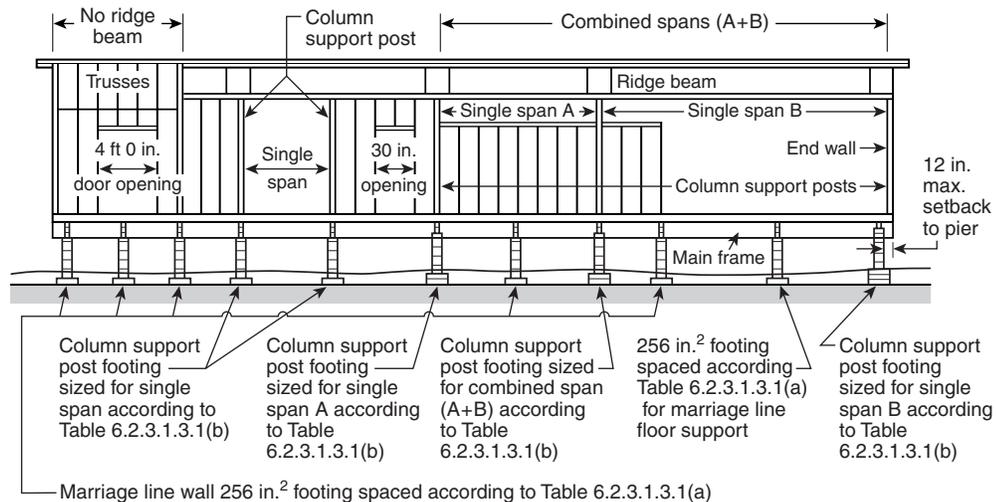
**6.2.5.6 Perimeter Blocking.** Supports shall be placed on both sides of side wall exterior doors and any other side wall openings greater than 48 in. (1220 mm) (such as entry and sliding glass doors), and under porch posts, factory installed fireplaces, and wood stoves.

**6.3 Footings.** Footing materials shall conform to Section 6.3 and other materials approved for footings shall be permitted



- Notes:
1. Piers may be offset up to 12 in. to allow for electrical, plumbing, and mechanical equipment or devices.
  2. Only single stack concrete blocks are required at column supports regardless of span or loading.
  3. Prefabricated piers shall not exceed their approved or listed minimum design loads.
  4. For SI units, 1 in. = 25.4 mm; 1 in.<sup>2</sup> = 645 mm<sup>2</sup>.

FIGURE 6.2.5.2(a) Typical Marriage Line Pier Support Layout A.



- Notes:
1. Marriage line column support piers are not required at each side of door opening in a marriage line wall.
  2. Only single stack concrete blocks are required at column supports regardless of span or loading.
  3. Piers may be offset up to 12 in. to allow for electrical, plumbing, and mechanical equipment or devices.
  4. Where a marriage line wall does not extend full height to support the bottom of the ridge beam, the ridge beam above that wall shall be treated as another span.
  5. Prefabricated piers shall not exceed their approved or listed maximum design loads.
  6. For SI units, 1 in. = 25.4 mm; 1 in.<sup>2</sup> = 645 mm<sup>2</sup>.

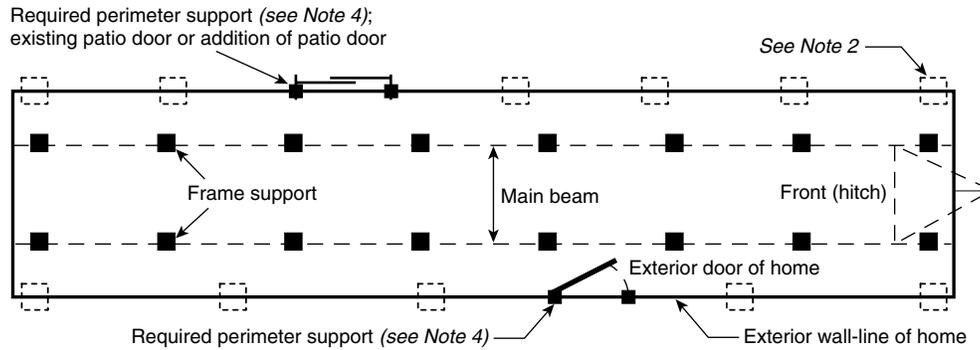
FIGURE 6.2.5.2(b) Typical Marriage Line Pier Support Layout B.

to be used when approved by the authority having jurisdiction if they provide equal load-bearing capacity and resistance to decay. Footings shall be placed on undisturbed soil or compacted fill. Every pier shall be supported by a footing.

### 6.3.1 Acceptable Types of Footings.

**6.3.1.1 Concrete.** Footings shall be permitted to consist of either of the following:

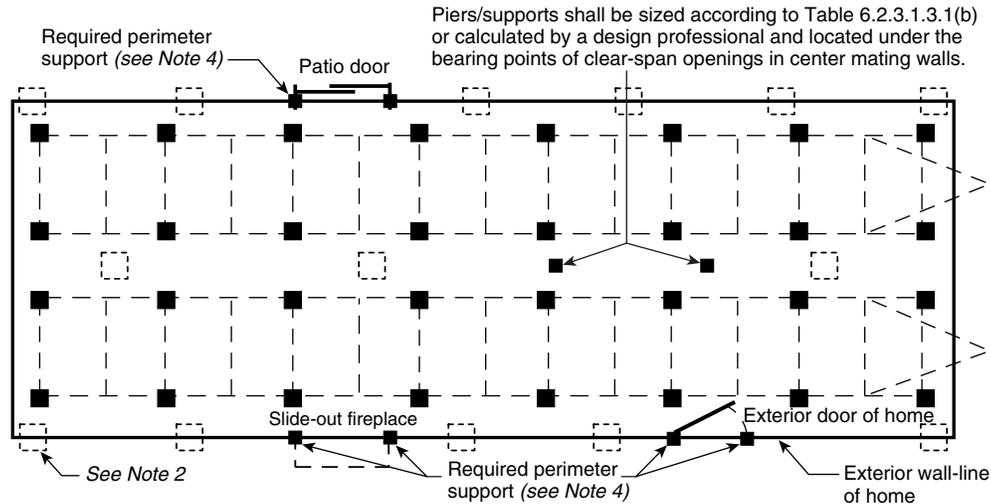
- (1) 4 in. (100 mm) nominal precast concrete pads meeting or exceeding ASTM C 90-02, *Standard Specification for Load Bearing Concrete Masonry Units*, without reinforcement, with at least a 28-day compressive strength of 4000 psi (27.9 MPa)
- (2) 6 in. (150 mm) (nominal minimum) poured-in-place concrete pads, slabs, or ribbons with at least a 28-day compressive strength of 3000 psi (20.7 MN/m<sup>2</sup>)



## Notes:

1. See Table 6.2.3.1.3.1(a) for required pier capacity and spacing.
2. See Table 6.2.3.1.3.1(b) and Section 6.3 for footing requirements when perimeter blocking option is used.
3. Locate piers a maximum of 12 in. (305 mm) from both ends.
4. Place piers on both sides of entry doors; at any other openings greater than 48 in. (1220 mm) width, such as patio or atrium doors; and under porch posts, factory-installed fireplaces, and wood stoves.

**FIGURE 6.2.5.4 Typical Blocking Diagram for Single-Section Home.**



## Notes:

1. See Table 6.2.3.1.3.1(a) for required pier capacity and spacing.
2. See Table 6.2.3.1.3.1(b) and Section 6.3 for footing requirements when perimeter blocking option is used.
3. Locate piers a maximum of 12 in. (305 mm) from both ends.
4. Place piers on both sides of entry doors; at any other openings greater than 48 in. (1220 mm) width, such as patio or atrium doors; and under porch posts, factory-installed fireplaces, and wood stoves.

**FIGURE 6.2.5.5 Typical Blocking Diagram for Multisection Homes.**

### 6.3.1.2 Pressure-Treated Permanent Wood.

**6.3.1.2.1** A minimum of two layers of nominal 2 in. (50 mm) thick pressure-treated wood having 0.60 pcf (94 N/m<sup>3</sup>) retention in accordance with AWPA C2-02, *Standard for the Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties, by Pressure Processes*, or AWPA C9-00, *Plywood — Preservative Treatment by Pressure Processes*, with the long dimensions of the second layer placed under the pier and perpendicular to that of the first layer, shall be used.

**6.3.1.2.2** Pressure-treated footings shall be permitted to consist of nominal 2 in. (50 mm) thick pressure-treated wood in accordance with AWPA C2-02, or a single layer of a minimum

thickness of  $\frac{3}{4}$  in. (19 mm) and a maximum size of 16 in.  $\times$  16 in. (410 mm  $\times$  410 mm), or, for larger sizes, two pieces of nominal  $\frac{3}{4}$  in. thick ( $\frac{2\frac{3}{8}$  actual) (19 mm) plywood (APA-rated sheathing, exposure 1, PS1) pressure-treated for soil contact in accordance with AWPA C9-00.

### 6.3.1.3 ABS Footing Pads.

**6.3.1.3.1** ABS footing pads shall be permitted in accordance with pad manufacturer installation instructions.

**6.3.1.3.2** ABS footing pads shall be listed or labeled for the required load capacity.

**6.3.2 Placement in Freezing Climates.**

**6.3.2.1 Conventional Footings.** Footings placed in freezing climates shall comply with 6.3.2.1.1, 6.3.2.1.2, or 6.3.2.1.3.

**6.3.2.1.1** In areas subject to ground frost heave, footings shall be placed below the frost line.

**6.3.2.1.2** Local authorities shall be consulted to determine the depth of the frost line.

**6.3.2.1.3** In the absence of a local code, the frost penetration map provided in Figure 6.3.2.1.3 shall be used as a guide.

**6.3.2.2 Floating Slab Systems.**

**6.3.2.2.1** When properly designed by a registered professional engineer, a “floating slab system” shall be permitted to be used above the frost line.

**6.3.2.2.2** The design shall accommodate the anchorage requirements identified in Section 7.5.

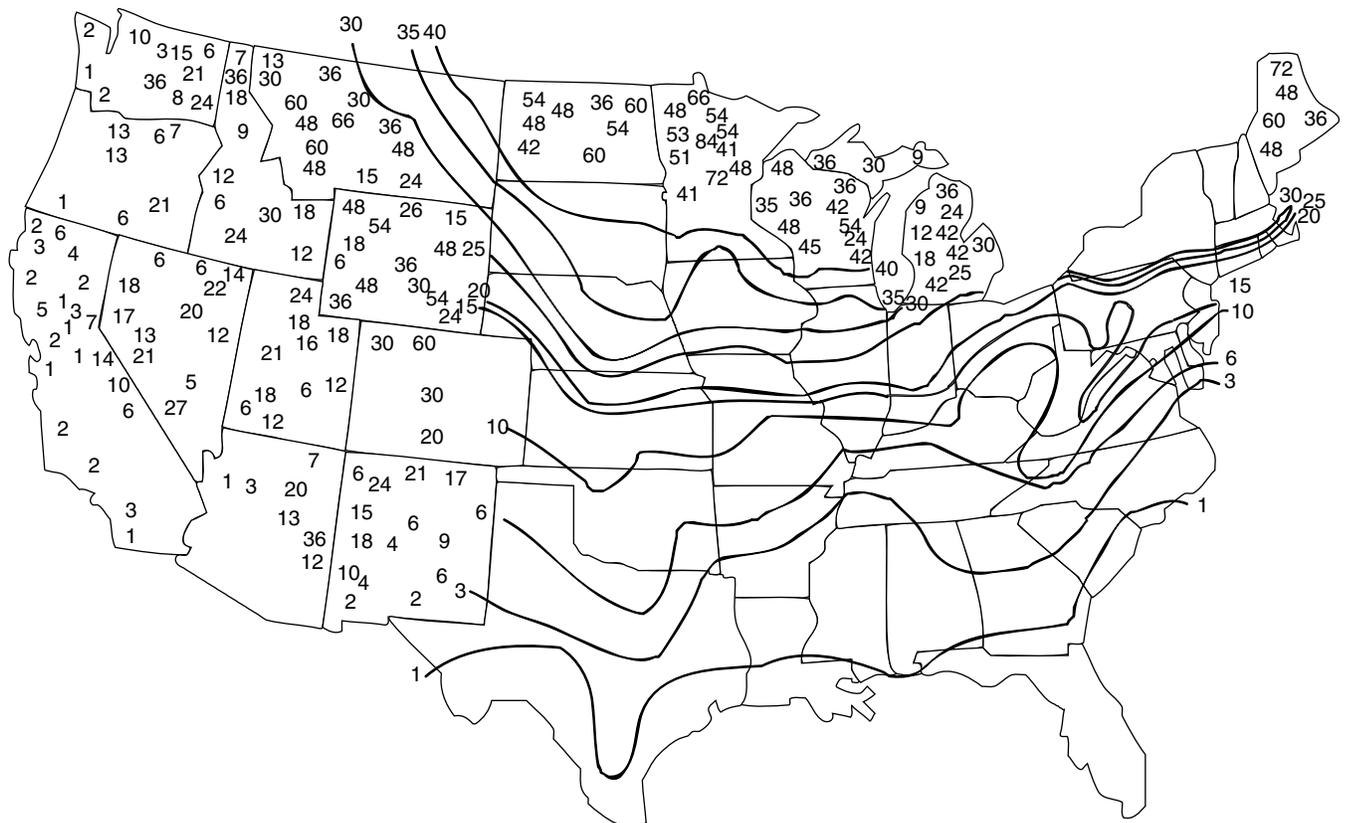
**6.3.2.3 Insulated Foundations.**

**6.3.2.3.1** Footings shall be permitted to be placed above the frost line when the home is provided with a perimeter foundation or skirting having insulation properties sufficient to prevent freezing of the soil under or adjacent to every load-bearing component of the foundation and acceptable for this purpose to the authority having jurisdiction.

**6.3.2.3.2** Insulation systems shall be compatible with the requirement to cross-ventilate the entire space under the home.

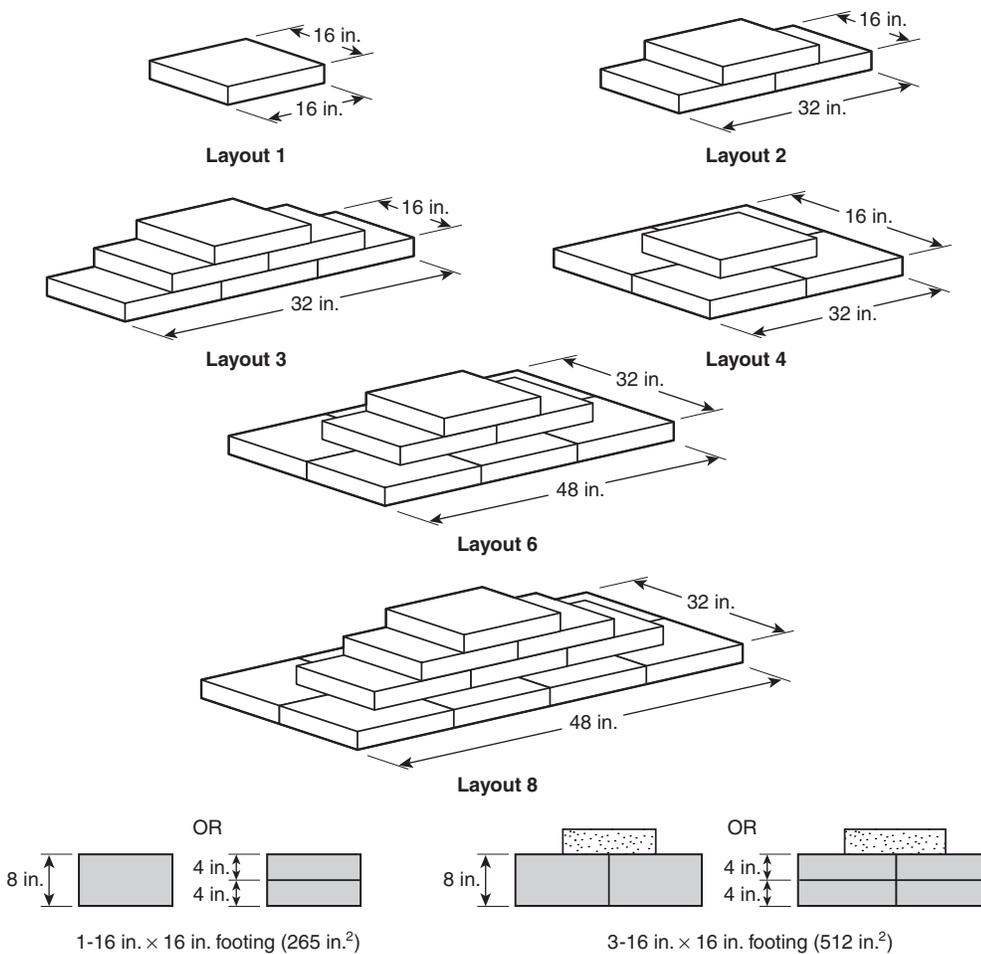
**6.3.3 Sizing of Footings.** The sizing of footings depends on the load-bearing capacity of both the piers and the soil. See Table 6.3.3 and Figure 6.3.3 for recommended footing sizes.

**6.3.4 Combination Systems.** Support systems that combine both load-bearing capacity and uplift resistance shall also be sized for the applicable design loads.



Note: Numbers are inches below ground level (for SI units, 1 in. = 25.4 mm).

**FIGURE 6.3.2.1.3 Frost Penetration Map.** (Numbers are inches below ground level; for SI units, 1 in. = 25.4 mm.)



**Notes:**

1. Typical pier pad: 16 in. x 16 in. x 4 in. thick precast concrete.
2. For shaded area, the thickness of the pad shall be minimum 8 in. or place two pads one on top of the other.
3.  $F_c = 4000$  psi min.
4. For SI units, 1 in. = 25.4 mm.

**FIGURE 6.3.3** Title to come.

**6.4 Permanent Foundations.**

**6.4.1** Designs for permanent foundations (such as basements, crawl spaces, or load-bearing perimeter foundations) shall be permitted to be obtained from the home manufacturer, or designed by a registered professional engineer, and constructed in accordance with local codes.

**6.4.2** When no such design is available from the home manufacturer or covered in the state building code, a registered professional engineer shall be consulted in order to obtain a design to satisfy the house support requirements.

**6.5 Special Considerations.** The provisions of 7.5.4 shall be required when the conditions in 7.5.4 exist at the home installation site.

**6.5.1 Areas Prone to Flooding.**

**6.5.1.1** Special elevations and anchoring techniques shall be required when locating a home in flood hazard area.

**6.5.1.2** A registered professional engineer and the authority having jurisdiction shall be consulted to assure that the home installation conforms to applicable federal, state, and local codes and regulations.

**6.5.2 Special Snow Load Conditions.** Homes designed for and located in areas with roof live loads greater than 40 psf (1.9 kPa) shall be installed according to the home manufacturer's installation instructions or designed by a registered professional engineer.

Table 6.3.3 Footing Size

Soil Capacity (psf)	Minimum Footing Size (in.)	Single Stack Pier (8 in. × 16 in.)		Double Stack Pier (16 in. × 16 in.)	
		Maximum Footing Capacity (lb)	Unreinforced Cast-in-Place Minimum Thickness (in.)	Maximum Footing Capacity (lb)	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	10,100	12	10,700	10
	48 × 48	13,000	15	13,600	12
1,500	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	8,600	10	8,900	6
	36 × 36	12,200	12	12,600	8
	42 × 42	16,100	15	16,500	12
	48 × 48	20,400	18	21,000	15
2,000	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	11,600	10	11,900	8
	36 × 36	16,300	15	16,900	10
	42 × 42	21,700	18	22,700	12
2,500	16 × 16	4,300	6	4,300	6
	20 × 20	6,700	6	6,700	6
	24 × 24	9,600	8	9,700	6
	30 × 30	14,700	12	15,000	8
	36 × 36	20,800	15	21,400	10
3,000	16 × 16	5,200	6	5,200	6
	20 × 20	8,100	8	8,100	6
	24 × 24	11,500	10	11,700	6
	30 × 30	17,800	12	18,100	8
	36 × 36	25,000	18	25,700	12
4,000	16 × 16	7,000	6	7,000	6
	20 × 20	10,800	8	10,900	6
	24 × 24	15,500	10	15,600	8
	30 × 30	23,800	15	24,200	10

## Notes:

1. The footing sizes shown are for square pads and are based on the area (in.<sup>2</sup>), shear, and bending required for the loads shown. Other configurations, such as rectangular configurations, can be used, provided the area is equal to or greater than the area 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 exceeded.
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. For SI units, 1 psf = 0.04788 kN/m<sup>2</sup>; 1 in. = 25.4 mm; 1 lb = 4.448 N.

## Chapter 7 Installation Procedures

**7.1 Moving Manufactured Home to Location.** The manufactured home shall be permitted to be moved to the site when the site is prepared in accordance with Chapter 5 and when the utilities are available as required by the authority having jurisdiction.

**7.2 Positioning of Home.** The home shall be installed and leveled by qualified installation personnel who are acceptable to the authority having jurisdiction.

**7.3 Interconnection of Multisection Homes.** The interconnection of multisection homes shall be completed in accordance with the manufacturer's installation instructions; when the manufacturer's installation instructions are not available, the interconnection shall be in accordance with the AHJ.

### 7.4 Crossover Connections for Multisection Manufactured Homes.

**7.4.1 Utility Crossovers.** Water, drainage, gas, electricity, and telephone utility crossovers shall be connected as outlined in Chapter 10.

#### 7.4.2 Ductwork Crossovers.

**7.4.2.1** Metal plumber's tape, galvanized metal straps, or plastic tape shall be used around the duct collar and secured tightly.

**7.4.2.2** If metal straps are used, they shall be secured with sheet metal screws.

**7.4.2.3** The duct shall be fastened to the collar with a minimum of three sheet metal screws equally spaced around the collar.

**7.4.2.4** The flexible air conditioning or heating ducts shall be installed in accordance with duct manufacturer's instructions.

**7.4.2.5** The duct shall be suspended or supported above the ground and arranged under the floor to minimize compression or kinking in any location, as shown in Figure 7.4.2.5(a) and Figure 7.4.2.5(b). In-floor crossover ducts shall be permitted to be in accordance with 7.4.2.7.

**7.4.2.6** Exposed crossover ducts shall be insulated with materials having a minimum R-8 value.

**7.4.2.7** The in-floor crossover duct connection shall be permitted to be installed per the manufacturer's installation instructions or sealed with foam tape prior to joining sections of the home. (See Figure 7.4.2.5(a) and Figure 7.4.2.5(b).)

### 7.5 Anchoring Instructions.

#### 7.5.1 Security against the Wind.

**7.5.1.1** After blocking and leveling, the installer shall secure the manufactured home against the wind; the AHJ shall be permitted to specify acceptable methods and materials.

**7.5.1.2** The type of installation shall be the determining factor in deciding how the manufactured home shall be secured against the wind as described in 7.5.2 and 7.5.3.

#### 7.5.2 Normal Installations.

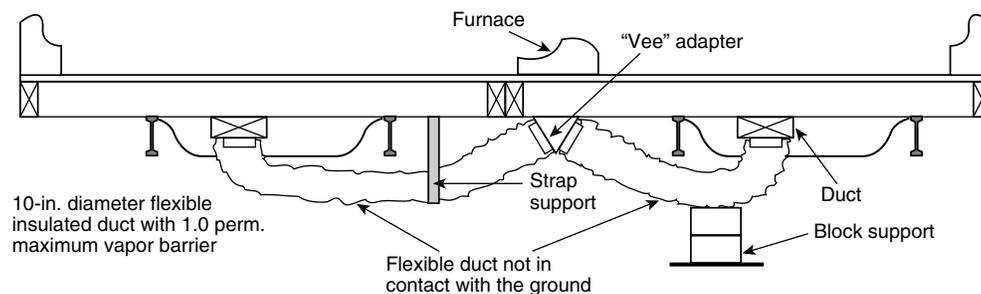
**7.5.2.1** The anchoring or foundation system shall be capable of meeting the loads required by Subpart D, 24 CFR 3280, *Federal Manufactured Home Construction and Safety Standards*.

**7.5.2.2** When using another type of installation, a registered professional engineer shall be consulted.

#### 7.5.2.3 Specifications for Tie-Down Straps and Anchors.

**7.5.2.3.1 Anchors.** Anchors shall be capable of resisting a minimum total load capacity of 4725 lb (21.0 kN) and a working capacity of 3150 lb (14.0 kN). The resistance capability of anchors and anchoring equipment shall be certified by a registered professional engineer, architect, or nationally recognized testing laboratory.

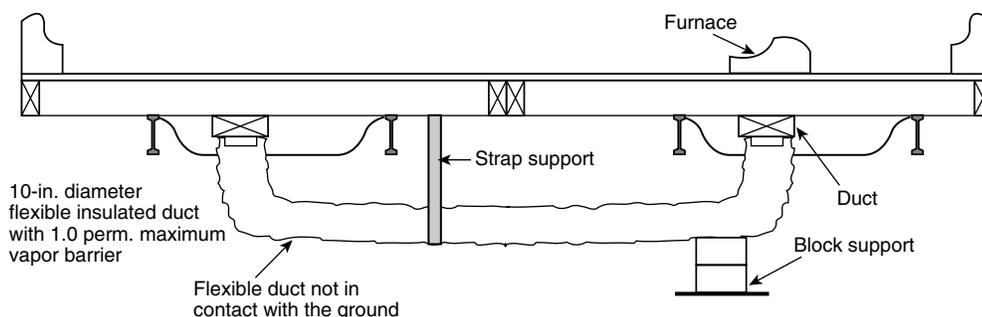
**7.5.2.3.2 Tie-Down Straps.** A 1¼ in. × 0.035 in. (32 mm × 0.9 mm) or larger zinc-coated (0.30 oz/ft<sup>2</sup> of surface area) steel strapping conforming to ASTM D 3953-97, *Standard Specification for Strapping, Flat Steel and Seals, Type 1, Grade 1, Finish B* with a minimum total capacity of 4725 lb (21.0 kN) and a working capacity of 3150 lb (14.0 kN) shall be used. Slit or cut edges of coated strapping shall not be required to be zinc coated.



#### Notes:

1. This system is utilized when a crossover duct has not been built into the floor and the furnace is outside the I-beam. With this type of installation, it is necessary for two flexible ducts to be installed.
2. For SI units, 1 in. = 25.4 mm.

**FIGURE 7.4.2.5(a) Crossover Duct Installation (Option 1).**



## Notes:

1. This system is used when a crossover duct has not been built into the floor and the furnace is situated directly over the main duct in one section of the home. A single flexible duct is then used to connect the two sections to each other.
2. For SI units, 1 in. = 25.4 mm.

**FIGURE 7.4.2.5(b) Crossover Duct Installation (Option 2).**

#### 7.5.2.4 Number and Location of Anchors.

**7.5.2.4.1** The number and location of anchors and anchor straps for installation of single-section and multisection manufactured homes shall conform to Table 7.5.2.4.1(a) through Table 7.5.2.4.1(c), Figure 7.5.2.4.1(a), Figure 7.5.2.4.1(b), and Figure 7.5.2.4.1(c).

**7.5.2.4.2 Anchor Installation.** Manufactured homes located in wind zones II and III shall have longitudinal anchors installed on the ends of the manufactured home transportable section(s), in accordance with the manufacturer's installation instructions. Alternative longitudinal anchoring methods approved by the authority having jurisdiction shall be permitted to be used.

**7.5.2.4.2.1** The requirements in 7.5.2.4.1 shall be used to determine the spacing of anchors and their accompanying anchor straps based on the soil classification determined in accordance with Section 5.5, and if soil testing was performed using either a soil torque probe or locally accepted values approved by the authority having jurisdiction.

**7.5.2.4.2.2** The installed anchor size (length) shall be for the soil class for which it is listed and approved by the authority having jurisdiction.

**7.5.2.4.2.3** All anchors shall be installed with the stabilizer plates in accordance with their listing and the anchor manufacturer's installation instructions.

**7.5.2.4.3** Each anchor shall be manufactured and installed in accordance with its listing by a nationally recognized testing agency, with its testing by a registered professional engineer, or as accepted by an AHJ, which shall list the anchor for use in a classified soil (Table 5.5.2.2) based on a nationally recognized testing protocol.

**7.5.3 Sidewall or Over-the-Roof Straps.** If sidewall or over-the-roof straps are installed on the home, they shall be connected to an anchoring device, or an alternate method shall be provided that enables the home to meet this requirement.

#### 7.5.4 Severe Climatic Conditions.

**7.5.4.1 Freezing Climates.** In frost-susceptible soils or high water table locations, anchor augers shall be installed below the frost line, or frost protected as designed by a registered professional engineer.

#### 7.5.4.2 Severe Wind Zones.

**7.5.4.2.1** Before a home is installed within 1500 ft (457 m) of a coastline in Wind Zones II or III, the manufacturer's installation instructions shall be used.

**7.5.4.2.2** When the manufacturer's installation instructions are not available, the design shall be by a registered professional engineer.

**7.5.4.3 Flood Hazard Areas.** See 1.3.6.

#### 7.6 Installation of On-Site Structures.

**7.6.1** All buildings and structures shall be designed to support all of their own live and dead loads.

**7.6.2** Fire separation distance shall be provided, as the authority having jurisdiction requires, for occupancy.

#### 7.6.3 Expanding Rooms.

**7.6.3.1** Expanding rooms shall be installed in accordance with the manufacturer's instructions.

**7.6.3.2** When the manufacturer's instructions are not available, perimeter blocking shall be installed in accordance with Table 6.2.3.1.3.1(a) and anchors shall be installed in accordance with 7.5.2.4, or other acceptable methods or materials approved by the AHJ may be used.

#### 7.6.4 Garages and Carports.

**7.6.4.1** A garage or carport shall be installed according to the manufacturer's instructions, or as designed by a registered professional engineer, or by the requirements of the authority having jurisdiction.

**7.6.4.2** The garage or carport shall be supported independently of the factory-built portion of the manufactured home, or according to the manufacturer's instructions.

**7.6.4.3** Electrical circuits in a garage shall be provided with ground-fault circuit protection.

**7.6.5 Porches.** Site-constructed porches shall be constructed and inspected according to applicable building codes.

**7.6.6 Steps, Stairways, and Landings.** Steps, stairways, and landings shall be constructed and inspected according to AHJ.

**Table 7.5.2.4.1(a) Maximum Diagonal Tiedown Strap Spacing, Wind Zone I**

Nominal Floor Width, Single Section/ Multisection (ft)	Max. Height from Ground to Diagonal Strap Attachment	I-Beam Spacing (82.5 in. max.)	I-Beam Spacing (99.5 in. max.)
12/24 132 in. to 155 in. box(es)	25 in. 33 in. 46 in. 67 in.	14 ft 2 in. 11 ft 9 in. 9 ft 1 in. 6 ft 6 in.	9 ft 9 in. 7 ft 8 in. 5 ft 8 in. 4 ft 0 in.
14/28 156 in. to 179 in. box(es)	25 in. 33 in. 46 in. 67 in.	18 ft 2 in. 16 ft 1 in. 13 ft 3 in. 10 ft 0 in.	15 ft 11 in. 13 ft 6 in. 10 ft 8 in. 7 ft 9 in.
16/32 180 in. to 204 in. box(es)	25 in. 33 in. 46 in. 67 in.	20 ft 7 in. 19 ft 0 in. 16 ft 5 in. 13 ft 1 in.	19 ft 5 in. 17 ft 5 in. 14 ft 7 in. 11 ft 3 in.
18 204 in. to 216 in. box(es)	25 in. 33 in. 46 in. 67 in.	22 ft 4 in. 21 ft 1 in. 19 ft 0 in. 15 ft 9 in.	21 ft 8 in. 20 ft 2 in. 17 ft 8 in. 14 ft 3 in.

## Notes:

- Sidewall heights not to exceed 90 in.
- Maximum inset for ground anchor head from edge of floor or wall is 4 in.
- Main rail (I-beam) spacing is the maximum spacing per given column (maximum I-beam spacing is 99.5 in.).
- Maximum eave width is 4 in. for single-section homes and 12 in. for multisection homes.
- Maximum roof pitch is 20 degrees (4.3/12).
- The minimum height from the ground to the bottom of the floor joist shall be 18 in.
- Additional tiedowns may be required per manufacturer's instructions.
- Anchors shall be certified for these conditions by a professional engineer, architect, or nationally recognized testing laboratory.
- Ground anchors should be installed to their full depth, and stabilizer devices shall be installed per manufacturer's instructions.
- Strapping and strapping equipment should be certified by a registered professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM D 3953-97, *Standard Specification for Strapping, Flat Steel and Seals*.
- Alternative methods capable of sustaining the design load requirements of the manufactured home construction and safety standards, approved by the authority having jurisdiction, shall be permitted to be used.
- Table is based on a 3150 lb working load, and straps shall be placed within 2 ft of the ends of the home.

**7.7 Installation Close-Up/Finishing.****7.7.1 Single and Multisection Exterior and Interior Close-Up.**

**7.7.1.1** Prior to installing the siding, the polyethylene sheeting covering exterior walls for transit shall be completely removed.

**7.7.1.2** Holes in the roof made in transit or setup shall be sealed with exterior sealant.

**7.7.1.3** Mating line gaskets shall be installed according to Figure 7.7.1.3.

**7.7.2 Exterior Siding Close-Up.**

**7.7.2.1** Exterior siding shall be installed according to the siding manufacturer's installation instructions.

**7.7.2.2** Exterior close-up strips/trim shall be fastened securely and sealed with exterior sealant.

**7.7.3 Interior Close-Up.**

**7.7.3.1** All shipping blocking, strapping, or bracing shall be removed from appliances, windows, and doors.

**7.7.3.2** All loose items packaged or shipped with the home shall be installed.

**7.7.3.3** All shipped-loose wall paneling shall be installed using a ¼ in. (6.3 mm) bead of polyvinyl acetate (PVA) adhesive on all framing members.

**7.7.3.4** Panels shall be fastened with minimum 1 in. (25 mm) long staples or nails at 6 in. (150 mm) on center panel edges and 12 in. (305 mm) on center in the field.

**7.7.4 Unfinished Gypsum Wallboard.**

**7.7.4.1** Homes shipped with unfinished gypsum wallboard and/or ceiling shall be finished on site.

**Table 7.5.2.4.1(b) Maximum Diagonal Tiedown Strap Spacing, Wind Zone II**

Tiedown and Anchor: Maximum On-Center spacing (ft)					
Nominal Floor Width, Single Section/Multisection (ft)	Max. Height from Ground to Diagonal Strap Attachment	Near Beam Method I-Beam Spacing		Far Beam Method I-Beam Spacing	
		82.5 in.	99.5 in.	82.5 in.	99.5 in.
12 ft/24 ft 132 in. to 155 in. box(es)	25 in.	6 ft 2 in.	4 ft 3 in.	7 ft 6 in.	7 ft 7 in.
	33 in.	5 ft 2 in.	N/A	7 ft 2 in.	7 ft 4 in.
	46 in.	4 ft 0 in.	N/A	6 ft 9 in.	6 ft 11 in.
	67 in.	N/A	N/A	6 ft 1 in.	6 ft 3 in.
14 ft/28 ft 156 in. to 179 in. box(es)	25 in.	7 ft 7 in.	6 ft 9 in.	7 ft 8 in.	7 ft 9 in.
	33 in.	6 ft 10 in.	5 ft 9 in.	7 ft 5 in.	7 ft 6 in.
	46 in.	5 ft 7 in.	4 ft 6 in.	7 ft 0 in.	7 ft 2 in.
	67 in.	4 ft 3 in.	N/A	6 ft 5 in.	6 ft 7 in.
16 ft/32 ft 180 in. to 204 in. box(es)	25 in.	7 ft 9 in.	7 ft 10 in.	7 ft 10 in.	7 ft 10 in.
	33 in.	7 ft 6 in.	7 ft 2 in.	7 ft 7 in.	7 ft 8 in.
	46 in.	6 ft 9 in.	6 ft 0 in.	7 ft 2 in.	7 ft 3 in.
	67 in.	5 ft 4 in.	4 ft 7 in.	6 ft 8 in.	6 ft 9 in.
18 ft 204 in. to 216 in. box(es)	25 in.	7 ft 10 in.	7 ft 9 in.	7 ft 11 in.	8 ft 0 in.
	33 in.	7 ft 8 in.	7 ft 8 in.	7 ft 9 in.	7 ft 9 in.
	46 in.	7 ft 4 in.	7 ft 0 in.	7 ft 4 in.	7 ft 5 in.
	67 in.	6 ft 3 in.	5 ft 8 in.	6 ft 10 in.	6 ft 11 in.

Notes:

1. Sidewall heights not to exceed 90 in.
2. Maximum inset for ground anchor head from edge of floor or wall is 4 in.
3. Main rail (I-beam) spacing is the maximum spacing per given column (maximum I-beam spacing is 99.5 in.).
4. Maximum eave width is 4 in. for single-section homes and 12 in. for multisection homes.
5. Maximum roof pitch is 20 degrees (4.3/12).
6. Vertical and diagonal tiedown straps are required at each anchor location in wind zones II and III.
7. The minimum height from the ground to the bottom of the floor joist shall be 18 in.
8. Additional tiedowns may be required per manufacturer's instructions.
9. Anchors shall be certified for these conditions by a professional engineer, architect, or nationally recognized testing laboratory.
10. Ground anchors should be installed to their full depth, and stabilizer devices shall be installed per manufacturer's instructions.
11. Strapping and strapping equipment should be certified by a registered professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM D 3953-97, *Standard Specification for Strapping, Flat Steel and Seals*.
12. Alternative methods capable of sustaining the design load requirements of the manufactured home construction and safety standards, approved by the authority having jurisdiction, shall be permitted to be used.
13. Table is based on a 3150 lb working load, and straps shall be placed within 2 ft of the ends of the home.

**7.7.4.2** The interior finishes shall have the following maximum flame spread ratings measured in accordance with NFPA 255-00, *Standard Method of Test of Surface Burning Characteristics of Building Materials*:

- (1) Ceilings — 75
- (2) Walls — 75
- (3) General — 200
- (4) Adjacent to cooking range — 50
- (5) Adjacent to or enclosing a furnace or water heater — 25

**7.7.5 Bottom Board Repair.**

**7.7.5.1** The bottom board covering shall be inspected for any loosening or areas that might have been damaged or torn during installation or transportation.

**7.7.5.2** Any splits or tears shall be resealed with approved tape or patches specifically designed for repairs of the bottom covering.

**7.7.5.3** Plumbing P-traps shall be checked to be sure they are well insulated and covered.

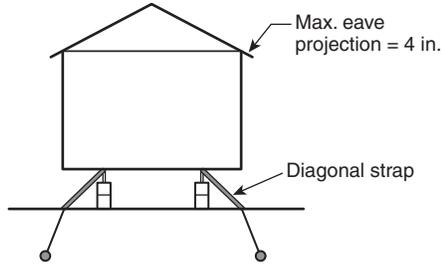
**7.7.5.4** All edges of patches shall be taped.

**Table 7.5.2.4.1(c) Maximum Diagonal Tiedown Strap Spacing, Wind Zone III**

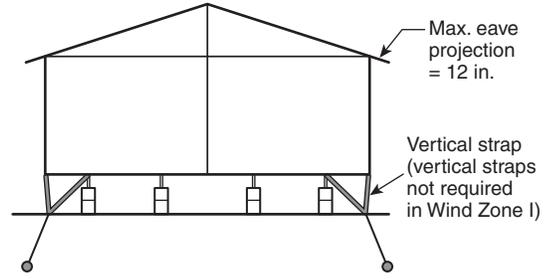
<b>Tiedown and anchor: Maximum On-Center Spacing (ft)</b>					
<b>Nominal Floor Width Single Section/Multisection (ft)</b>	<b>Max. Height from Ground to Diagonal Strap Attachment</b>	<b>Near Beam Method I-Beam Spacing</b>		<b>Far Beam Method I-Beam Spacing</b>	
		<b>82.5 in.</b>	<b>99.5 in.</b>	<b>82.5 in.</b>	<b>99.5 in.</b>
12 ft/24 ft 132 in. to 155 in. box(es)	25 in. 33 in. 46 in. 67 in.	5 ft 1 in. 4 ft 3 in. N/A N/A	N/A N/A N/A N/A	6 ft 1 in. 5 ft 10 in. 5 ft 6 in. 5 ft 0 in.	6 ft 2 in. 6 ft 0 in. 5 ft 8 in. 5 ft 1 in.
14 ft/28 ft 156 in. to 179 in. box(es)	25 in. 33 in. 46 in. 67 in.	6 ft 2 in. 5 ft 8 in. 4 ft 8 in. N/A	5 ft 7 in. 4 ft 9 in. N/A N/A	6 ft 3 in. 6 ft 0 in. 5 ft 8 in. 5 ft 2 in.	6 ft 4 in. 6 ft 1 in. 5 ft 9 in. 5 ft 4 in.
16 ft/32 ft 180 in. to 204 in. box(es)	25 in. 33 in. 46 in. 67 in.	6 ft 4 in. 6 ft 1 in. 5 ft 7 in. 4 ft 5 in.	6 ft 3 in. 5 ft 11 in. 5 ft 0 in. N/A	6 ft 4 in. 6 ft 2 in. 5 ft 10 in. 5 ft 5 in.	6 ft 3 in. 6 ft 2 in. 5 ft 11 in. 5 ft 6 in.
18 ft 204 in. to 216 in. box(es)	25 in. 33 in. 46 in. 67 in.	6 ft 2 in. 6 ft 1 in. 5 ft 11 in. 5 ft 2 in.	6 ft 1 in. 6 ft 0 in. 5 ft 10 in. 4 ft 8 in.	6 ft 2 in. 6 ft 1 in. 6 ft 0 in. 5 ft 7 in.	6 ft 1 in. 6 ft 0 in. 5 ft 11 in. 5 ft 7 in.

**Notes:**

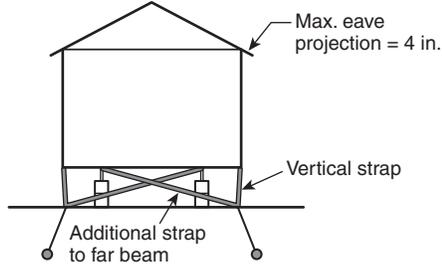
1. Sidewall heights not to exceed 90 in.
2. Maximum inset for ground anchor head from edge of floor or wall is 4 in.
3. Main rail (I-beam) spacing is the maximum spacing per given column (maximum I-beam spacing is 99.5 in.).
4. Maximum eave width is 4 in. for single-section homes and 12 in. for multisection homes.
5. Maximum roof pitch is 20 degrees (4.3/12).
6. Vertical and diagonal tiedown straps are required at each anchor location in wind zones II and III.
7. The minimum height from the ground to the bottom of the floor joist shall be 18 in.
8. Additional tiedowns may be required per manufacturer's instructions.
9. Anchors shall be certified for these conditions by a professional engineer, architect, or nationally recognized testing laboratory.
10. Ground anchors should be installed to their full depth, and stabilizer devices shall be installed per manufacturer's instructions.
11. Strapping and strapping equipment should be certified by a registered professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM D 3953-97, *Standard Specification for Strapping, Flat Steel and Seals*.
12. Alternative methods capable of sustaining the design load requirements of the manufactured home construction and safety standards, approved by the authority having jurisdiction, shall be permitted to be used.
13. Table is based on a 3150 lb working load, and straps shall be placed within 2 ft of the ends of the home.



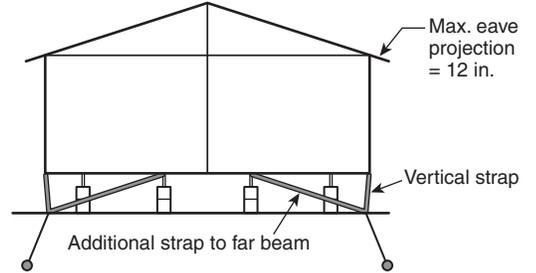
**Near Beam Method — Wind Zone I**  
(Vertical tiedown straps not required)



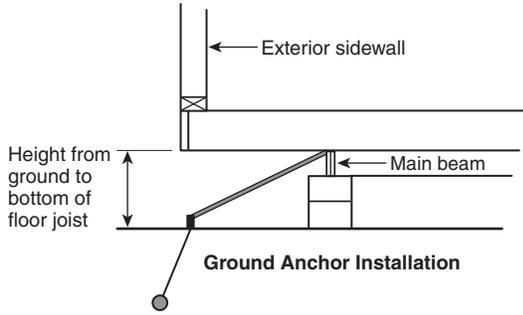
**Near Beam Method — Wind Zones II and III**  
(Marriage line piers and anchors omitted for clarity)



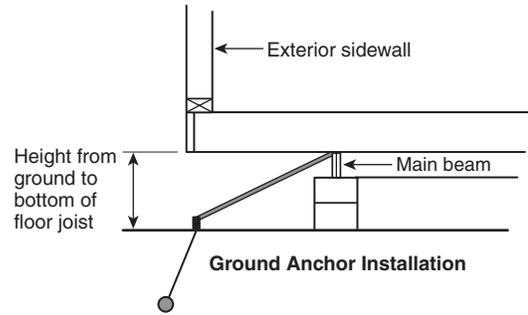
**Second Beam Method — Wind Zones II and III**  
(Vertical tiedown straps required)



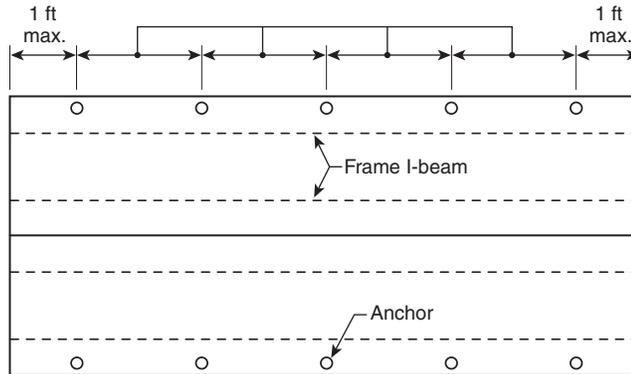
**Second Beam Method — Wind Zones II and III**  
(Marriage line piers and anchors omitted for clarity)



**FIGURE 7.5.2.4.1(a) Title to come.**



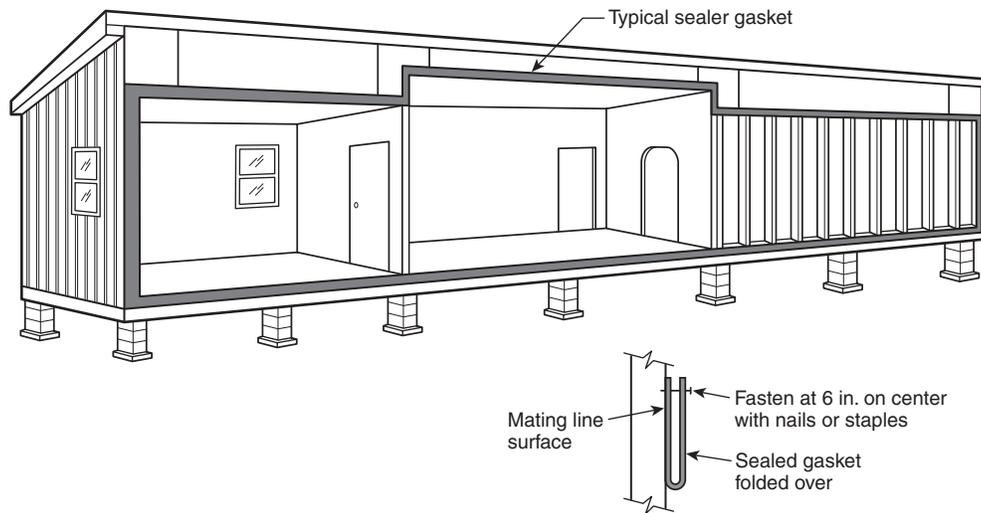
**FIGURE 7.5.2.4.1(b) Title to come.**



**Notes:**

- 1. See Table 7.5.2.4.1 for maximum anchor spacing.
- 2. For SI units, 1 ft = 0.3048 m.

**FIGURE 7.5.2.4.1(c) Anchor Locations and Spacings.**



Note: On multisection manufactured dwelling, install sealer gasket on the ceiling, endwalls, and floor mating line prior to joining the sections together

FIGURE 7.7.1.3

## Chapter 8 Optional Features

### 8.1 Installation of Optional Features.

8.1.1 Where applicable and specific to the manufacturer's product, optional features shall be permitted to be installed.

8.1.2 All shipped-loose items shall be installed in accordance with the manufacturer's installation instructions.

### 8.2 Hinged Roofs and Eaves.

8.2.1 The manufacturer's installation instructions shall be consulted when erecting and securing in place hinged roofs or hinged eaves.

8.2.2 Site installations of vent stacks, including furnaces, water heaters, plumbing stacks, fireplaces, and powered exhaust fans, shall conform with the manufacturer's installation instructions.

8.3 Garden and Bay Windows. Shipped-loose items, such as garden or bay windows, shall be installed in accordance with the manufacturer's installation instructions.

8.4 Awnings and Ramadas. Only freestanding products with support columns shall be chosen.

### 8.5 Miscellaneous Lights and Fixtures.

8.5.1 Exterior lighting fixtures, ceiling-suspended (paddle) fans, and chain-hung lighting fixtures shall be permitted to be installed, in accordance with their listings, when the home is delivered.

#### 8.5.2 Grounding.

8.5.2.1 All the installed exterior lighting fixtures and ceiling fans per 8.5.1 shall be grounded by a fixture-grounding screw or by a fixture-grounding wire.

8.5.2.2 For chain-hung lighting fixtures, as shown in Figure 8.5.2.2, both a fixture-grounding screw and a fixture-grounding wire shall be used.

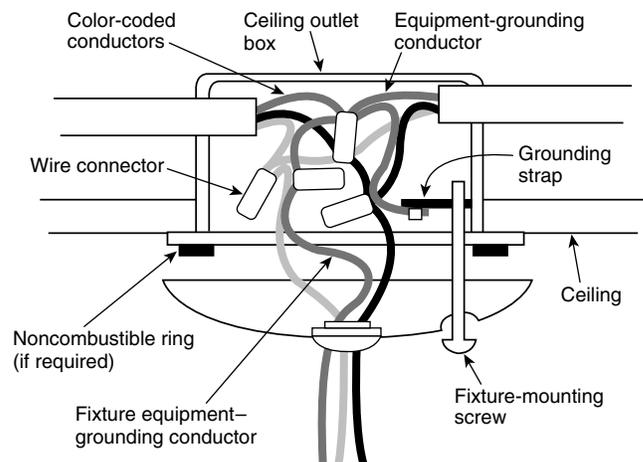


FIGURE 8.5.2.2 Installation of Chain-Hung Lighting Fixture.

8.5.3 Where lighting fixtures are mounted on combustible surfaces such as hardboard, a noncombustible ring, as shown in Figure 8.5.3, shall be installed to completely cover the combustible surface exposed between the fixture canopy and the wiring outlet box.

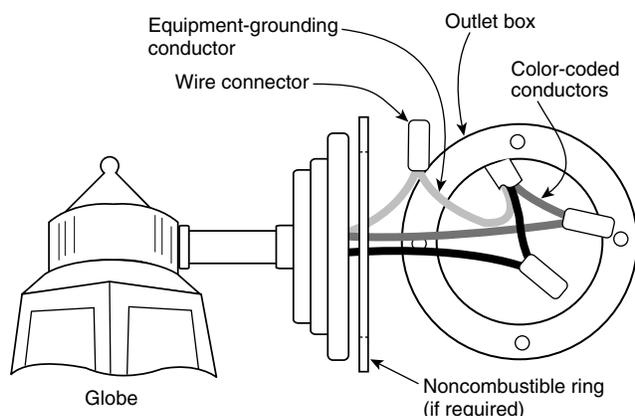
#### 8.5.4 Siding.

8.5.4.1 If siding has not been installed at a lighting fixture location, the outlet box cover shall be removed, and the siding shall be installed with a hole for the outlet box.

8.5.4.2 The outlet box shall be reinstalled and the same process followed as for other lighting fixtures, which shall be installed according to their listings.

#### 8.5.5 Exterior Lights.

8.5.5.1 The junction box covers shall be removed and wire-to-wire connections shall be made using wire connectors.



**FIGURE 8.5.3 Installation of Surface-Mounted Exterior Lighting Fixture.**

**8.5.5.2** General practice shall be to connect wires black-to-black, white-to-white, and equipment ground-to-equipment ground.

**8.5.5.3** The wires shall be pushed into the box, and the lighting fixture shall be secured to the junction box.

**8.5.5.4** The lighting fixture shall be caulked around its base to ensure a watertight seal to the side wall.

**8.5.5.5** The light bulb shall be installed and the globe shall be attached.

**8.5.6 Ceiling Fans.**

**8.5.6.1** To reduce the risk of injury, ceiling-suspended (paddle) fans shall be installed with the trailing edges of the blades at least 6 ft 4 in. (1930 mm) above the floor.

**8.5.6.2** The wiring shall be connected as shown in Figure 8.5.6.2(a) and Figure 8.5.6.2(b), and the manufacturer's instructions shall be followed.

**8.6 Ventilation Options.** The component manufacturer's instructions shall be followed.

**8.7 Optional Panels, Siding, and Molding.** If the home is equipped with optional panels, siding, or molding, Figure 8.7(a), Figure 8.7(b), and Figure 8.7(c) shall be referred to for the proper installation procedures.

**8.8 Skirting.**

**8.8.1 Construction.**

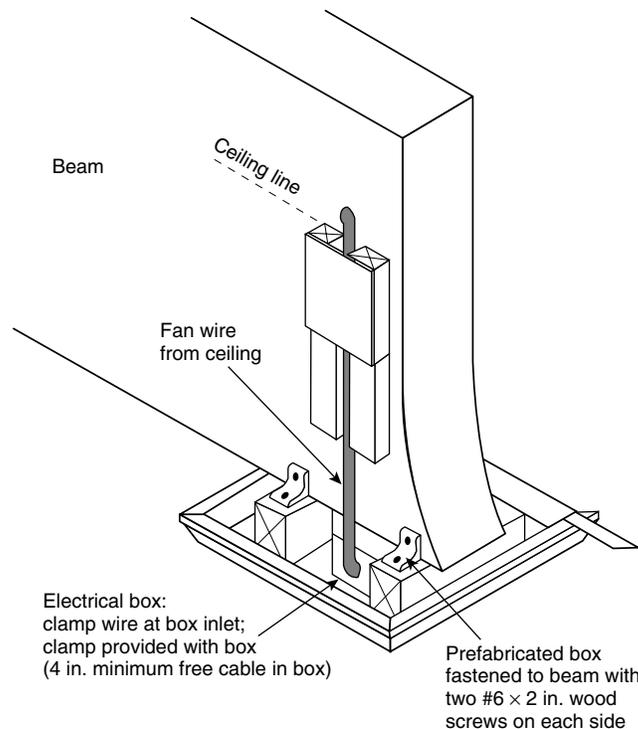
**8.8.1.1** Skirting, if used, shall be of weather-resistant materials.

**8.8.1.2** Skirting shall not be attached in a manner that can cause water to be trapped between the siding and trim or forced up into the wall cavities trim to which it is attached.

**8.8.1.3** All wood skirting within 6 in. (152.4 mm) of the ground shall be pressure treated or naturally resistant to decay and termite infestations.

**8.8.2 Ventilation.**

**8.8.2.1** Ventilation shall be provided for the crawl space with skirting as follows:



Note: For SI units, 1 in. = 25.4 mm.

**FIGURE 8.5.6.2(a) Electrical Outlet Box and Support Structure for Ceiling-Suspended (Paddle) Fan.**

- (1) At a minimum of 1 ft<sup>2</sup> (0.1 m<sup>2</sup>) of free area for every 150 ft<sup>2</sup> (14 m<sup>2</sup>) of the home's floor area
- (2) Except in arid regions with dry soil conditions, the following shall be permitted:
  - (a) A uniform 6-mil (0.15 mm) polyethylene sheet material or other acceptable vapor barrier material shall be permitted to be installed on the ground surface beneath the home to further reduce moisture.
  - (b) Where an acceptable ground vapor barrier is installed and one such ventilation opening is within 3 ft (914.4 mm) of each corner of the home, the total area of ventilation openings shall be permitted to be reduced to 1 ft<sup>2</sup> (0.1 m<sup>2</sup>) for every 1500 ft<sup>2</sup> (140 m<sup>2</sup>) of the home's floor area.

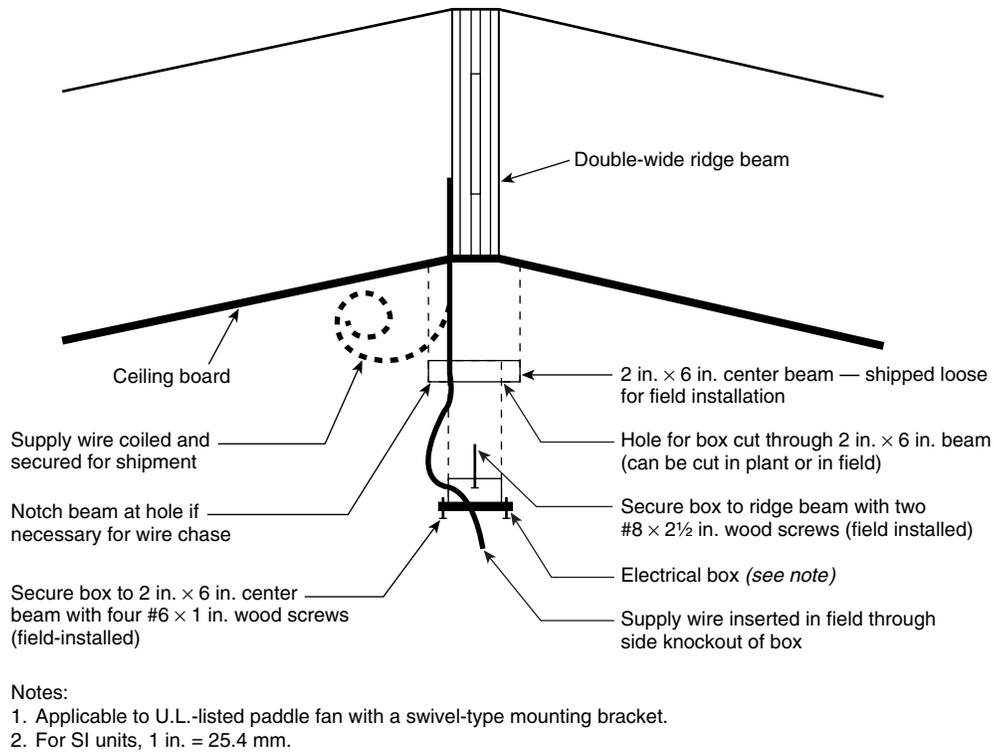
**8.8.2.2** Ventilation openings shall be placed at or near each corner of the home and as high as practicable.

**8.8.2.3** Openings shall be located on at least two opposite sides to provide cross-ventilation.

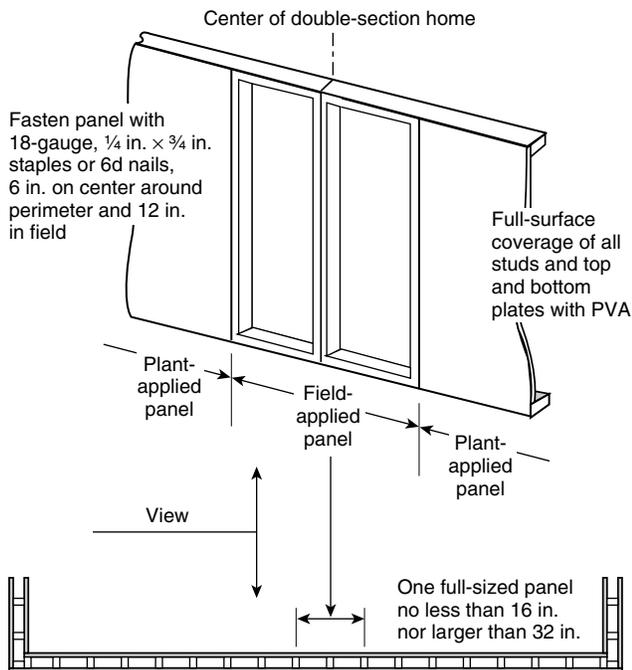
**8.8.3** Access opening(s) not less than 18 in. (455 mm) in any dimension and not less than 3 ft<sup>2</sup> (0.28 m<sup>2</sup>) in area shall be provided and shall be located so that any water supply and sewer drain connections located under the home are accessible for inspections.

**8.8.4** Dryer vents, air conditioning condensation drains, and combustion air inlets shall pass through the skirting to the outside.

**8.9 Telephone and Cable TV.** Telephone and cable TV wiring shall be installed in accordance with acceptable wiring practices.

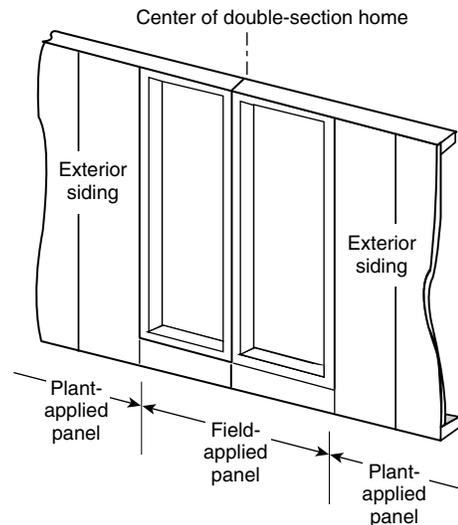


**FIGURE 8.5.6.2(b) Ceiling-Suspended (Paddle) Fan Installation).**



- Notes:
1. Specific designs must be approved by a Design Approval Primary Inspection Agency (DAPIA).
  2. For SI units, 1 in. = 25.4 mm.

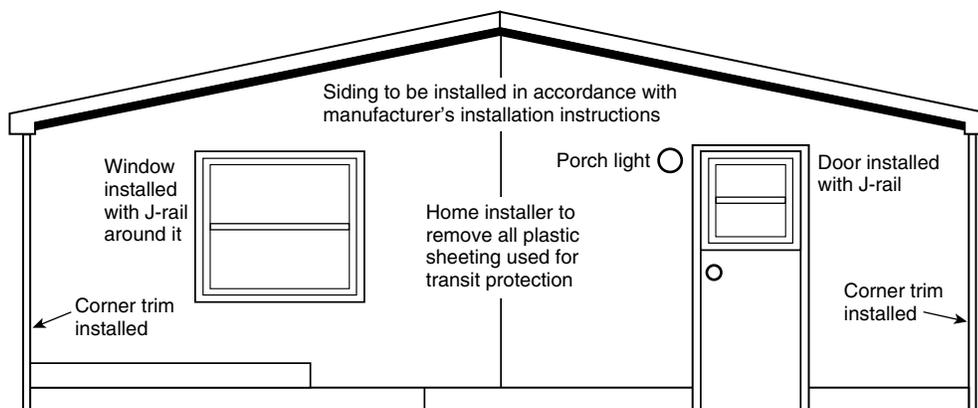
**FIGURE 8.7(a) Installation of Field-Applied Interior End-Wall Panel.**



- Notes:
1. One full-sized panel no less than 16 in. (406.4 mm) nor larger than 32 in. (812.8 mm)
  2. Fasten exterior panel to the studs in accordance with the siding manufacturer's installation instructions.

**FIGURE 8.7(b) Installation of Field-Applied Wood Siding at End Wall.**

**8.10 Joints and Seams.** Where appropriate, all joints and seams that were disturbed during relocation of the home shall be made weatherproof.

**Notes:**

1. Double-section homes with horizontal-lap siding can be shipped with no siding on the front and rear end walls.
2. The manufacturer will install doors/windows trimmed with J-rail and corner trim and will cover with plastic sheeting for transit. All siding, starter trim, fasteners, and vents will be shipped loose in the home for installation on setup.
3. Home installer to complete installation after home is set up, including the installation of roof vents if required.

**FIGURE 8.7(c) Installation of Field-Applied Horizontal Lap Siding.**

## Chapter 9 Preparation of Appliances

**9.1 Clothes Dryer Vent.** When installed, the clothes dryer vent shall exhaust to the exterior of the home, beyond any perimeter skirting installed around it, as shown in Figure 9.1.

**9.2 Comfort Cooling Systems.** Comfort cooling systems shall be installed according to the manufacturer's installation instructions and applicable regulations of the authority having jurisdiction.

### 9.2.1 Air Conditioners.

#### 9.2.1.1 Energy Efficiency.

**9.2.1.1.1** For proper operation and energy efficiency, site-installed central air conditioning equipment shall be sized to closely match the home's heat gain, following Chapter 27 of the 1997 *ASHRAE Handbook of Fundamentals* or other nationally recognized methods. Information necessary to calculate the home's sensible heat gain can be found on the home's compliance certificate.

**9.2.1.1.2** The BTU/hr rated capacity of the site-installed air conditioning equipment shall not exceed the air distribution system's rated BTU/hr capacity as shown on the home's compliance certificate.

**9.2.1.1.2 Circuit Rating.** If a manufactured home is factory provided with an exterior outlet to energize heating and/or air-conditioning equipment, the branch circuit rating on the tag adjacent to this outlet shall be equal to or greater than the minimum circuit amperage identified on the equipment rating plate.

#### 9.2.1.3 A-Coil Units.

**9.2.1.3.1** A-coil air conditioning units shall be compatible and listed for use with the furnace in the home.

**9.2.1.3.2** The air conditioner manufacturer's instructions shall be followed.

**9.2.1.3.3** All condensation shall be directed beyond the perimeter of the home by means specified by the equipment manufacturer.

**9.2.2 Heat Pumps.** Heat pumps shall be installed according to the heat pump manufacturer's instructions.

### 9.2.3 Evaporative Coolers.

**9.2.3.1** A roof-mounted cooler shall be installed in accordance with the appliance manufacturer's instructions. The discharge grill shall not be closer than 3 ft (915 mm) from a smoke alarm.

**9.2.3.2** Before installing a roof-mounted cooler, the person installing the cooler shall ensure that the roof will support the weight of the cooler.

**9.2.3.3** A rigid base shall be provided to evenly distribute the cooler's weight over several rafters.

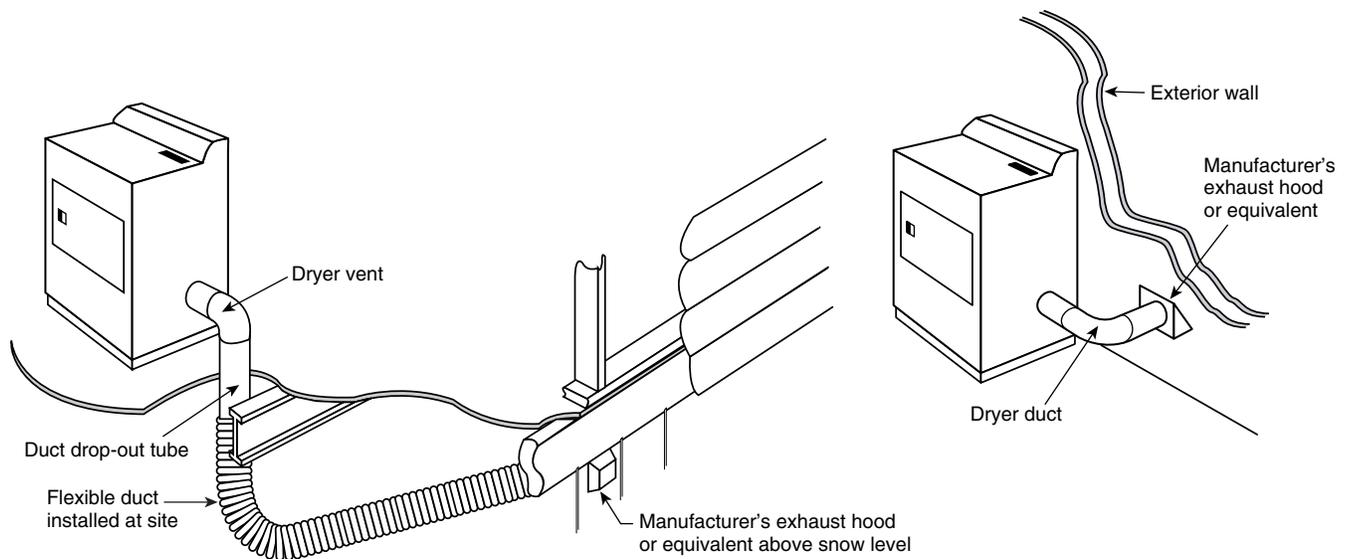
## 9.3 Fireplace and Wood-Stove Chimneys and Air Inlets.

**9.3.1** Fireplaces and wood stoves shall be permitted to require on-site installation of additional section(s) of approved, listed chimney pipe, a spark arrestor, and a rain-cap assembly.

**9.3.2** Fireplace and wood-stove chimneys and air inlets shall be installed in accordance with their listings and Figure 9.3.2.

**9.3.3** All fireplaces and wood stoves installed shall be listed for use in manufactured housing.

**9.3.4** For field installation, approval from the manufacturer and the authority having jurisdiction shall be required to ensure compliance with the required standards.



**Notes:**

1. Installation of the exhaust system must be in accordance with the dryer manufacturer's instructions.
2. Dryer exhaust system must not terminate under the home.

**FIGURE 9.1 Dryer Exhaust System.**

**9.3.5 Minimum Extensions Above Roof.** The finished chimney shall extend at least 3 ft (915 mm) above the highest point at which it penetrates the roof and at least 2 ft (610 mm) higher than any building or other obstruction located within a horizontal distance of 10 ft (3050 mm).

**9.3.6 Required Components.** The required components of a correctly installed chimney shall be as shown in Figure 9.3.2.

**9.3.7 Combustion Air Duct Inlets.**

**9.3.7.1** Combustion air intake ducts shall end just below the bottom covering of the floor.

**9.3.7.2** The ducts shall be extended to the outside when the home has a basement or crawl space.

**9.3.7.3** The air intake ducts shall not be installed in a garage.

**9.3.7.4** The combustion air inlet shall not be allowed to drop material from the hearth to the area beneath the home.

**9.3.7.5** The inlet damper shall be located above the expected snow level, as shown in Figure 9.3.2.

**9.4 Range, Cooktop, and Oven Venting.**

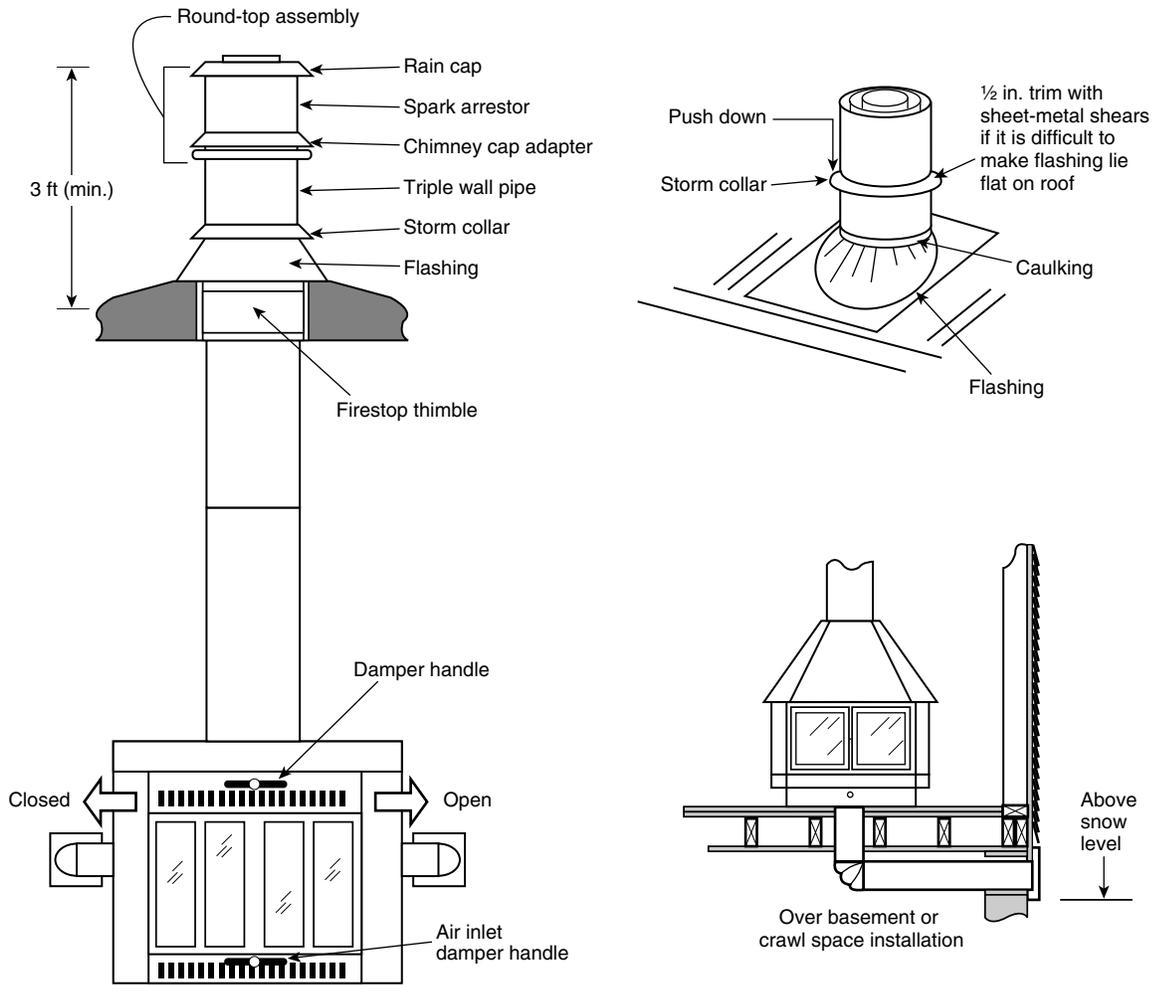
**9.4.1** If the home is equipped with a combination range (cooktop)/grill or oven that contains its own exhaust system, the vent shall exhaust to the exterior of the home.

**9.4.2** When the vent exhausts through the floor and if perimeter skirting is installed, the vent shall extend through the exterior perimeter of the home.

**9.5 Flood Hazard Areas.**

**9.5.1 Outside Appliances.** Appliances installed on the manufactured home site shall be anchored and elevated to or above the same elevation as the lowest elevation as the lowest floor of the home.

**9.5.2 Air Inlets.** Air inlets shall be located at or above the same elevation as the lowest elevation as the lowest floor of the home.



Note: For SI units, 1 in. = 25.4 mm; 1 ft = 0.3048 m.

FIGURE 9.3.2 Installation of Fireplace or Wood Stove Chimney.

**Chapter 10 Utility System Connection and Testing**

**10.1 Proper Procedures.**

**10.1.1** The authority having jurisdiction shall be consulted before connecting the manufactured home to any utilities.

**10.1.2** Where required, only qualified personnel familiar with local codes shall be permitted to make utility site connections and conduct tests.

**10.2 Water Supply.**

**10.2.1 Maximum Supply Pressure and Reduction.** When the local water supply pressure exceeds 80 psi (0.6 MPa) to the manufactured home, a pressure-reducing valve acceptable to the authority having jurisdiction of a bypass type shall be installed.

**10.2.2 Connection Procedures.**

**10.2.2.1 Mandatory Shutoff Valve.**

**10.2.2.1.1** An accessible shutoff valve shall be installed between the water supply and the inlet in a manner acceptable to

the authority having jurisdiction, as shown in Figure 10.2.2.1.1.

**10.2.2.1.2** The water riser for the shutoff valve connection shall be permitted to be located underneath or adjacent to the home.

**10.2.2.1.3** The shutoff valve shall be a full-flow gate or ball valve, or valve acceptable to the authority having jurisdiction.

**10.2.2.2 Crossovers.**

**10.2.2.2.1** Multisection homes with plumbing in both sections shall require water-line crossover connections, as shown in Figure 10.2.2.2.1.

**10.2.2.2.2** The shipping caps shall be removed from the water lines, and the crossover connectors provided with the home shall be installed.

**10.2.2.2.3** If freezing could occur, the water connectors shall be wrapped with insulation.

**10.2.3 Freezing Protection.**

**10.2.3.1 Necessity.** In areas subjected to subfreezing temperatures, exposed sections of water supply piping, shutoff valves,

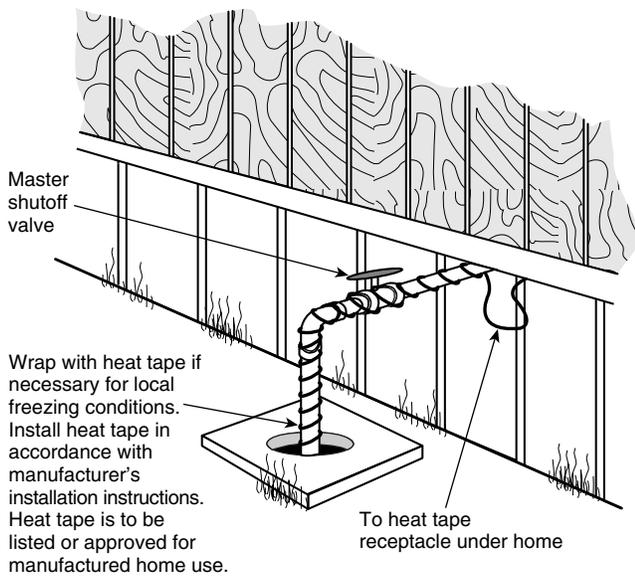
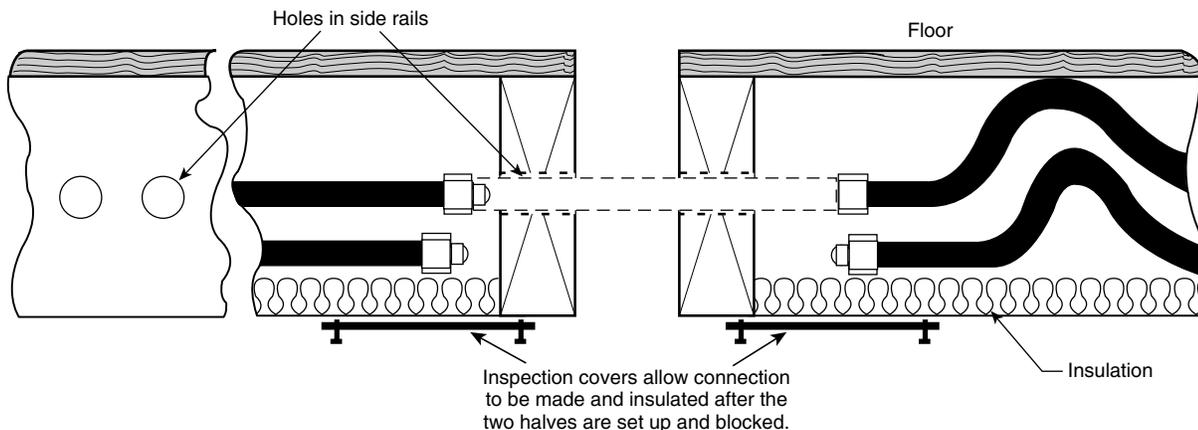


FIGURE 10.2.2.1.1 Typical Water Connection.



Note: If freezing conditions exist, wrap water connector with insulation. Use water connectors supplied by manufacturer, where applicable.

FIGURE 10.2.2.2.1 Typical Water-Line Crossover Connection.

pressure reducers, and pipes in water heater compartments with uninsulated doors shall be protected from freezing using a method acceptable to the authority having jurisdiction.

**10.2.3.2 Use of Pipe Heating Cable.** Only pipe heating cable listed for manufactured home use shall be permitted to be used and shall be installed in accordance with the manufacturer's installation instructions.

#### 10.2.4 Testing Procedures.

**10.2.4.1** The water system shall be rechecked for leaks at the installation site.

**10.2.4.2** The test shall be made by subjecting the system to air or water at 100 psi (0.7 MPa) for 15 minutes without loss of pressure.

### 10.3 Drainage System.

**10.3.1 Assembly and Support.** If portions of the drainage system were shipped loose, they shall be installed in accordance with the manufacturer's instructions.

**10.3.2 Proper Slopes.** Drains shall be installed in accordance with 10.3.2.1 or 10.3.2.2.

**10.3.2.1** Drain lines shall slope at least  $\frac{1}{4}$  in./ft (19.7 mm/m) unless otherwise noted on the schematic diagram, as shown in Figure 10.3.2.1, or in a manner acceptable to the authority having jurisdiction.

**10.3.2.2** A slope of  $\frac{1}{8}$  in./ft (9.8 mm/m) shall be permitted when a clean-out is installed at the upper end of the run.

**10.3.3 Connector Sizes.** The main drain line shall be connected to the site's sewer hookup, using an approved elastomer coupler, as shown in Figure 10.3.3, or in a manner acceptable to the authority having jurisdiction.

**10.3.4 Crossovers.** Drainage line crossovers in multisection homes shall be connected in accordance with the manufacturer's instructions.

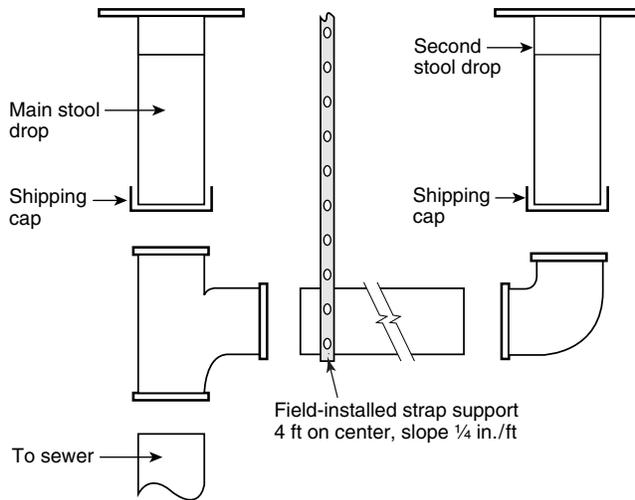
#### 10.3.5 Testing Procedures.

**10.3.5.1** The drainage system shall be rechecked for leaks after installation at the site.

**10.3.5.2** This test shall be accomplished by capping the drain line, filling it with water, and holding it 15 minutes or by running a 2 in. air pressure manometer test.

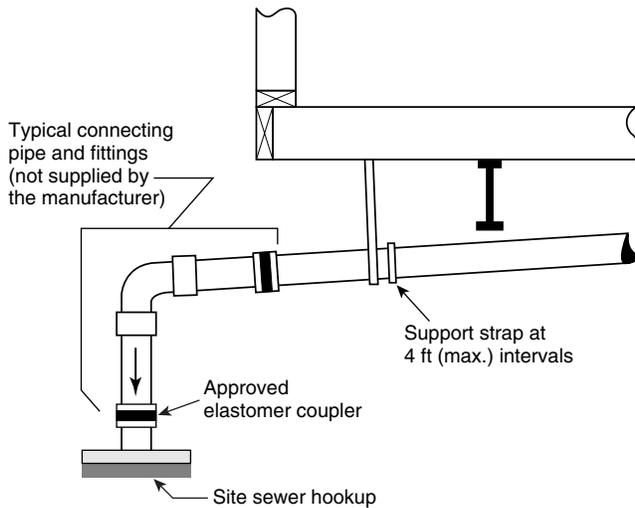
### 10.4 Gas Supply.

**10.4.1 Conversion of Gas Appliances.** A service person acceptable to the authority having jurisdiction shall convert the appliance from one type of gas to another, following the instructions provided by the manufacturer of each appliance.



Note: For SI units, 1 ft = 0.3048 m; 1 in. = 25.4 mm.

FIGURE 10.3.2.1 Drain Pipe Slope and Connections.



Notes:

1. Fittings in the drainage system that are subject to freezing, such as P-traps in the floor, are protected with insulation by the manufacturer. Insulation must be replaced if it is removed for access to the P-trap.
2. For SI units, 1 ft = 0.3048 m.

FIGURE 10.3.3 Connection to Site Sewer.

**10.4.2 Orifices and Regulators.** Before making any connections to the site supply, the inlet orifices of all gas-burning appliances shall be checked to ensure they are correctly set up for the type of gas to be supplied.

**10.4.3 Proper Supply Pressure.** The gas piping system in the home shall be designed for a pressure that is at least 10 in. of water column [5.8 oz or 0.36 psi (2.54 kPa)] and not more than 14 in. of water column [8 oz or 0.5 psi (3.5 kPa)]. If gas from any supply source exceeds, or could exceed, this pressure, a regulator shall be required to be installed.

**10.4.4 Crossovers.**

**10.4.4.1** All crossovers and fittings shall be listed for exterior use and be of the same size as the main unit pipe.

**10.4.4.2** Tools shall not be used to connect or remove the flexible connector quick-disconnect.

**10.4.5 Testing Procedures.** The gas system shall be retested for leaks at the installation site by personnel acceptable to the authority having jurisdiction (see 10.4.3).

**10.4.6 Connection Procedures.** Gas burning-appliance vents shall be inspected to ensure that they are connected to the appliance and that roof jacks are installed and have not come loose during transit.

**10.4.7 Gas Appliance Startup Procedures.**

**10.4.7.1** One at a time, equipment shutoff valves shall be opened, pilot lights shall be lit, and burners shall be adjusted in accordance with each appliance manufacturer's instructions.

**10.4.7.2** The operation of the furnace and water heater thermostats shall be checked and then set to the desired temperatures.

**10.5 Heating Oil Systems.**

**10.5.1** Homes equipped with oil burning furnaces shall have their oil supply tankage and piping installed on site.

**10.5.2** The oil burning furnace manufacturer's instructions shall be consulted for pipe size and installation procedures.

**10.5.3** All oil storage tanks and pipe installations shall meet all applicable local regulations and shall be required to be made only by experienced personnel acceptable to the authority having jurisdiction.

**10.5.4 Tank Installation Requirements.**

**10.5.4.1** Unless the home is installed in a community with a centralized oil distribution system, an oil storage tank shall be installed outside the home.

**10.5.4.2** The tank shall be located where it is accessible to service and supply and safe from fire and other hazards.

**10.5.4.3** In flood hazard areas, the oil storage tank shall be anchored and elevated to or above the design flood elevation, or anchored and designed to prevent flotation, collapse, or permanent lateral movement during the design flood.

**10.5.5 Leak Test Procedure.**

**10.5.5.1** Before the system is operated, it shall be checked for leaks in the tank and supply piping.

**10.5.5.2** The tank shall be filled to capacity with fuel, and all joints in the system shall be examined for leakage.

**10.6 Electricity.** A power supply shall be available at the site.

**10.6.1 Description and Rating of House Wiring.** The home shall be designed for connection to an electrical wiring system rated at 120/240 volts ac.

**10.6.2 Electrical Equipment/Installations.** All electrical equipment and installations shall be designed, constructed, and maintained in accordance with the applicable Manufactured Home Construction Safety Standards or the authority having jurisdiction, or both.

**10.6.3 Testing.** Each manufactured home shall be subjected to the following tests:

- (1) An electrical continuity test to ensure that metallic parts are effectively bonded.

- (2) Operational tests of all devices and utilization equipment except water heaters, electric ranges, electric furnaces, dishwashers, clothes washers/dryers, and portable appliances to demonstrate that they are connected and in working order.
- (3) Electrical polarity checks to determine that connections have been made in accordance with applicable provisions of the Manufactured Home Construction Safety Standards, or the authority having jurisdiction, or both. Visual

verification shall be an acceptable electrical polarity check.

## **Chapter 11 Life Safety Features**

**11.1 Smoke Alarms.** Smoke alarms shall be functionally tested in accordance with the home manufacturer's instructions.

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