

## **Manufactured Housing Consensus Committee**

NFPA 1 Batterymarch Park Quincy, MA 02269

Phone: +1(617) 984-7404 Fax: +1 (617) 984-7110 [www.nfpa.org](http://www.nfpa.org)

**TO:** Manufactured Housing Consensus Committee Members  
**FROM:** Robert E. Solomon  
**DATE:** October 9, 2003  
**SUBJECT:** **Ballots for MHCC – Installation Final Proposal Accepted by MHCC**

---

The ballot and ballot material for the subject document is enclosed. Your vote on this document is to be based upon the Committee action for the proposal as shown.

If you wish to vote negative or if you abstain, please indicate your reason for doing so. Do not cast a negative vote for items that are editorial in nature, but do bring any such items to my attention.

The final date for **return of this ballot is 24 October 2003**. Feel free to call or email me if you have any questions.

By way of a brief explanation, you have 4 voting options on this ballot. If you agree with this proposal as is, you simply vote affirmative. If you agree with the proposal, but have a minor concern with one or two items, or if you see some editorial glitch, you may want to vote affirmative with comment. If you disagree with a substantial part of the proposal, you would vote in the negative. Abstain votes are normally only reserved if you believe there is some conflict of interest, or if you do not feel qualified to pass judgment on an issue.

Once the **24 October 2003 date has passed** we will tabulate the results, recirculate any affirmative with comment, negative, or abstain votes with the requisite reasons, and give you a chance to review those and change your vote. Between now and that date, you will receive one or two reminders on the impending ballot due date.

When you vote, you need only return the ballot page. Please feel free to attach additional pages if you need to provide more information on your reasons.

# LETTER BALLOT

## PROPOSED MODEL INSTALLATION STANDARDS

Complete the ballot as indicated. If you vote affirmative with comment, negative, or if you abstain on any section, please indicate the reason(s) for doing so. Once you have reviewed the material, and completed this ballot, return to:

Jill McGovern  
NFPA  
1 Batterymarch Park  
Quincy, MA 02269  
FAX: (617) 984-7110  
EMAIL: [jmcgovern@nfpa.org](mailto:jmcgovern@nfpa.org)

The due date for receipt of this ballot is: **24 October 2003**

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

With respect to the proposed model installation standards, record my vote as:

AFFIRMATIVE ON ALL ITEMS

AFFIRMATIVE ON ALL ITEMS EXCEPT AS NOTED BELOW

### MODEL INSTALLATION STANDARDS

SECTION	*AFFIRMATIVE WITH COMMENT	*NEGATIVE	*ABSTAIN
PREAMBLE			
CHAPTER 1			
CHAPTER 2			
CHAPTER 3			
CHAPTER 4			
CHAPTER 5			
CHAPTER 6			
CHAPTER 7			
CHAPTER 8			



**BALLOT CHANGES  
9 OCTOBER 2003**

The changes shown in the following table were developed from three different events. These included: a conference call of the editorial sub-group on 10 September 2003; a conference call of the Installation SC on 19 September 2003 and finally a conference call involving the entire MHCSS on 8 October 2003. The table reflects the final set of changes that are being considered for the final letter ballot for the model installation standards. The Item number in the table is simply to aid your cross reference to Draft 3 of the installation standard to readily locate the change. A clean copy of draft 3 is attached with the ITEM numbers indicated.

ITEM	PAGE	CHANGE	NOTES
<b>1</b>	<b>1</b>	<p>Replace O&amp;D Statement with the following preamble statement:</p> <p align="center"><b>PREAMBLE</b></p> <p align="center">(This would be inserted on P. 1 in place of the ‘Origin and Development’ Statement)</p> <p>The Manufactured Housing Improvement Act (MHIA) of 2000 requires the U.S. Department of Housing and Urban Development (HUD) to establish model manufactured home installation standards which:</p> <ol style="list-style-type: none"> <li>1. Serves as model installation standards that a State installation standard must equal or exceed.</li> <li>2. Serves as model installation standards that a manufacturer’s installation instructions for each home must equal or exceed.</li> <li>3. Serves as installation standards for installing homes in States where HUD is responsible for operating the installation program because the State has elected not to.</li> </ol>	

ITEM	PAGE	CHANGE	NOTES
		<p>The MHIA of 2000 placed responsibility with the Manufactured Housing Consensus Committee (MHCC) for the development of proposed model manufactured home installation standards not later than 18 months after completion of the initial appointment of committee members.</p> <p>The MHCC utilized the NCSBCS / ANSI standard A 225.1 1994 edition with draft NFPA updates through September, 2002 as the baseline document for the development of the first edition of the national model manufactured home installation standards.</p> <p>In preparing this edition, the MHCC utilized the following principles in drafting the model:</p> <ul style="list-style-type: none"> <li>✓ The model would provide all the requirements necessary to support one method of installing the home and provide direction for utilizing other methods when they equal or exceed the model’s method that were developed through engineering and national listing approvals.</li> <li>✓ The model utilizes the design of the house and the condition of the installation site to describe the conditions, loads and design features the installation must support.</li> <li>✓ The model provides the manufacturer with the opportunity to utilize specific manufacturer designs and instructions based on engineering and national listings when they meet or exceed the model’s standards.</li> <li>✓ The model does not contain the requirements for administering the installation program. The MHCC’s recommendations for program administration will be developed separately.</li> <li>✓ The model establishes the concept of “authority having jurisdiction” (AHJ) for HUD’s responsibility in the model installation standard. The committee is recommending this concept due to the committee’s belief that HUD needs the flexibility to designate different entities to act on</li> </ul>	

ITEM	PAGE	CHANGE	NOTES
		<p>their behalf in carrying out their new installation program responsibilities under the MHIA of 2000. Who they designate, if anyone, for different elements of the model is best defined in the installation program’s administrative requirements.</p> <ul style="list-style-type: none"> <li>✓ The model may have requirements relating to installation that are best contained in the manufactured housing construction standards. The MHCC included these requirements to ensure all requirements affecting the home’s installation have been considered.</li> <li>✓ The model has information about issues affecting the installation that is the responsibility of other jurisdictions such as set backs, site built garages etc. The information is included to ensure the installer and homeowner are aware they must receive appropriate approvals from the other jurisdictions before the home is installed. The model utilizes the definition of local authority having jurisdiction (LAHJ) to identify these requirements.</li> <li>✓ The MHCC understands there are gray areas and potential overlap between the home’s construction and installation standards. Recommendations were made and included in the model installation standard when the MHCC believes adopting the committee’s recommendation would improve the home’s installation.</li> </ul> <p>The MHCC has drafted the installation model with the intent that a State that currently does not have an installation standard could use the model as the foundation for establishing their own State’s installation standard.</p>	
<b>2</b>	2	<p>Revise Brenton Category from U to GI Delete Lagano and Walsh Rogers from Roster</p>	<p>Job change Job change and resignation</p>
<b>3</b>	4	<p><b>1.1</b> Make 3 changes to this section as follows: <b>A.</b> Revise second sentence to read: ‘...shall apply under <u>any</u> of the following conditions <u>where they do not take the home out of compliance</u></p>	<p>Permits more stringent criteria to be used when it is in excess of the federal minimum</p>

ITEM	PAGE	CHANGE	NOTES
		<p><u>with the federal Manufactured Housing Construction and Safety Standards.</u>  <b>B.</b> Change ‘either’ to ‘any’;  <b>C.</b> Add new item ‘(3) <u>Where the manufacturers approved installation instructions exceed this standard.</u>’</p>	<p>standard, while helping to insure that the installation does not decrease the level of performance intended by the MHCSS.</p>
<b>4</b>	4	<p><b>1.3.5</b> Delete in its entirety.</p>	<p>MHIA of 2000 establishes the need for installation standards and programs. HUD mandates that the program has to be established and they will have oversight of the program. A combination of HUD, state and local AHJ’s will have to work in concert to see to it that the installation program is set up and properly functional.</p>
<b>5</b>	5	<p><b>3.2.2</b> Revise AHJ definition to read: “<u>The Secretary or his designee such as the state, organization office, or individual recognized by the Secretary as applicable, as authorized to approve specific equipment, materials or procedures related to manufactured home installations.</u>”</p>	<p>Clarifies the situation in which HUD can delegate its authority to allow an entity to act on HUD’s behalf.</p>
<b>6</b>	5	<p><b>Add new definition as follows:</b>  <b>3.2.5 (NEW). Local authority having jurisdiction (LAHJ):</b> The state, city, county, city and county, municipality, utility or organization that has local responsibilities that must be complied with during the installation of a manufactured home and those local responsibilities are not preempted by the MHCSS or these installation standards.  <b>Renumber other sections accordingly.</b></p>	<p>The term LAHJ has been suggested and introduced by the subgroup. This definition helps to distinguish the difference between AHJ (HUD or its designee) and the non-federal entity that has responsibility for those unique on site issues that can best be</p>

ITEM	PAGE	CHANGE	NOTES
			managed by a the local official.
<b>7</b>	<b>5</b>	<b>3.3.6</b> Revise to read: ‘...specified on a <del>jurisdictions</del> <u>local authorities</u> ’ flood hazard map.’	Clarifies that it is the flood map of the local entity. These are established and approved on a local basis.
<b>8</b>	<b>6</b>	<b>Add new definition as follows:</b> <b>3.3.23 (New) <u>Stand, Manufactured home.</u></b> That area of a manufactured home site which has been reserved for the placement of a manufactured home.	
<b>9</b>	<b>6</b>	<b>4.1.1</b> Revise to ‘..., the <u>local</u> authority having...’	This is a responsibility of the LAHJ.
<b>10</b>	<b>6</b>	<b>4.3.1</b> Revise to read ‘...shall be approved <u>by the authority having jurisdiction</u> and shall include...’	This is a responsibility of HUD and it may or may not be delegated.
<b>11</b>	<b>6</b>	<b>5.3</b> Revise to <u>LAHJ</u> from AHJ.	This is a responsibility of the LAHJ.
<b>12</b>	<b>6</b>	<b>5.5.2.2 and 5.5.2.3.</b> Delete the first half of 5.5.2.3; relocate second part of the text to 5.5.2.2. The result is 5.5.2.3 is deleted. <del>5.5.2.3 If the soil bearing capacity of the soil cannot be identified, 7.5.2.4.2 and Table 5.5.2.2 shall be used</del> (the following text is added to the end of 5.5.2.2) unless the soil appears to be composed of peat, organic clays, or uncompacted fill or appears to have unusual conditions.	
<b>13</b>	<b>7</b>	<b>5.5.2.4:</b> Revise the end of the sentence to read: “...professional engineer, or <del>an a</del> <u>registered</u> architect shall be...”	
<b>14</b>	<b>8</b>	<b>6.1.1</b> Revise to read: ‘...with Chapter 6 and will be based upon <u>installation site conditions, home design features and the loads the home was designed to withstand which are shown on the homes’ data plate.</u> ’	The AHJ (HUD) regulates these items and the added text will insure that these elements are considered during

ITEM	PAGE	CHANGE	NOTES
			installation of the unit.
<b>15</b>	8	<b>6.1.3</b> Add new text to the end of the sentence: ‘...for approval <u>and they shall not take the home out of compliance with the MHCSS.</u> ’	Clarifies that the installation plans and details cannot result in changes that would result in non-compliance with MHCSS (CFR 3280).
<b>16</b>	8	<b>6.1.4.2:</b> Revise to read : “...professional engineer, or a <u>registered</u> architect.”	
<b>17</b>	8	<b>6.2.3.1.2:</b> Revise to read: “...in accordance with <del>Table 6.2.3.1.3.1(a)</del> ; Table 6.2.3.1.3.1(b)...”	
<b>18</b>	8	<b>Table 6.2.3.1.3.1(a)</b> 1. Revise shading as indicated on marked up copy of draft. Change is: At 10 ft 0 in. spacing, 30 psf roof load, Frame Row, unshade numerical value 3 under 2000 psf column.	
<b>19</b>	9	<b>Table 6.2.3.1.3.1(b)</b> 1. Redo shading as indicated on marked up copy of draft. Change is: At 4 ft 0 in, 20 psf roof load, Marriage Row, show shading for numerical value 1 under 2000, 2500, 3000 and 4000 psf columns. 2. Redo shading as indicated on marked up copy of draft. Change is: At 4 ft 0 in, 30 psf roof load, Marriage Row, show shading for numerical value 1 under 2500, 3000 and 4000 psf columns. 3. Correct values as shown on marked up copy of draft. Change is: At 6 ft 0 in, 30 psf roof load, Marriage Row, change numerical values 12 to numerical values 2 under 2000, 2500, and 3000 psf columns. Change numerical value of 11 in this row to 1	
<b>20</b>	10	<b>Table 6.2.3.1.3.1(c)</b> <b>Revise shading on Table as follows:</b> 1. 10 ft opening: 30 and 40 psf roof loads, shade all numerical values of 1	

ITEM	PAGE	CHANGE	NOTES
		<p>for 2000, 2500, 3000 and 4000 psf.</p> <p><b>2.</b> 15 ft opening: 20, 30 and 40 psf roof loads, shade all numerical values of 1 for 2000, 2500, 3000 and 4000 psf plus shade numerical value of 2 for 2000 and 2500 psf.</p> <p><b>3.</b> 20 ft opening: 20, 30 and 40 psf roof loads, shade all numerical values of 1 for 3000 and 4000 psf plus shade numerical values of 2 for 2000, 2500, 3000 and 4000 psf for 6200 and 7500 lbs load.</p> <p><b>4.</b> 25 ft opening: 20, 30 and 40 psf roof loads, shade all numerical values of 1 and 2 for 2000, 2500, 3000 and 4000 psf plus shade numerical values of 3 for 2000, and 2500 psf for 9700 lbs load.</p> <p><b>5.</b> 30 ft opening: 20, 30 and 40 psf roof loads, shade all numerical values of 1, 2, 3 and 4 for 2000, 2500, 3000 and 4000 psf.</p> <p><b>6.</b> 35 ft opening: 20, 30 and 40 psf roof loads, shade all numerical values of 2, 3 and 4 for 2000, 2500, 3000 and 4000 psf EXCEPT for numerical value 3 under the 2000 psf column.</p>	
<b>21</b>	10	<b>6.2.3.2.1.4.</b> Revise to read: "...as shown in <del>Figure 6.2.3.2.1.1(a) and</del> Figure 6.2.3.2.1.1(b)."	
<b>22</b>	11	<b>Figure 6.2.3.2.1.1(a).</b> Revise third callout to read: "...and shims <u>or other approved materials</u> not exceeding...."	
<b>23</b>	11	<b>Figure 6.2.3.2.1.1(b).</b> Revise third callout to read: "...and shims <u>or other approved materials</u> not exceeding...."	
<b>24</b>	11	<b>6.2.4.1.2.</b> Revise to read: "...as shown in Figure 6.2.3.2.1.1(a). <del>and Figure 6.2.3.2.1.1(b).</del> "	
<b>25</b>	11	<b>6.2.4.2 .</b> Revise to read: "...as shown in <del>Figure 6.2.3.2.1.1(a) and</del> Figure 6.2.3.2.1.1(b)."	
<b>26</b>	11	<b>6.2.4.4.</b> Revise to read: "...maximum height of 54 in (1372mm) <u>as shown in Figure 6.2.3.2.1.1(a).</u> "	

ITEM	PAGE	CHANGE	NOTES
<b>27</b>	12	<b>Figures 6.2.5.2(a) and 6.2.5.2(b).</b> Change Note 2 in both figures as follows: 2. <del>Front/rear pier may be inset up to 6 in to allow for crawl space enclosure.</del> <del>All other p</del> Piers may be offset up to 6 in. in either direction, to allow for plumbing, electrical, mechanical equipment, <u>crawl spaces</u> , or other devices.	
<b>28</b>	12	<b>Figure 6.2.5.2(a)</b> Revise as follows: In second box from the left, change to read: “Footing sized for span B <u>or C</u> per Table ...”	
<b>29</b>	12	<b>Figure 6.2.5.2( b)</b> Add to figure Title: “... <b>Wall Support Layout When Perimeter Support is Required</b> ”	
<b>30</b>	13	<b>6.3</b> Revise to read: ‘...shall be permitted to be used <del>when approved by the authority having jurisdiction</del> if they provide equal...’	Section 6.3 establishes the performance criteria for the footings. As long as the performance criteria is met, the other footing designs are acceptable without particular approvals from the AHJ.
<b>31</b>	13	<b>6.3.1.2.2.</b> Revise to read: “Pressure-treated <u>wood</u> footings shall be...”	
<b>32</b>	14	<b>6.3.2.1</b> Revise to read: ‘...shall comply with <u>the requirements of the LAHJ</u> , 6.3.2.1.1 <u>and</u> 6.3.2.1.2, <del>or 6.3.2.3.1.</del> <b>6.3.2.1.2</b> Revise to read: ‘The <u>LAHJ local authorities</u> shall be...’ <b>6.3.2.3.1</b> Delete section.	This is a responsibility of the LAHJ.  See related comment and change for P. 14 and 15 concerning the frost penetration map.
<b>33</b>	14	<b>6.3.2.1.3 (p.14) and Figure 6.3.2.1.3 Frost Penetration Map (p.15).</b> Delete the charging paragraph as well as this map.	HUD does not have a standardized map for this

ITEM	PAGE	CHANGE	NOTES
			subject. In order to provide a map that would be legitimately used by the AHJ or the LAHJ, it would have to show a break down to the county level. This would be necessary so that those members of the public who may want to comment on this map would need to have something showing greater detail. In addition, it is also very difficult to try and enforce any of the provisions without a greater detail in the map.
<b>34</b>	<b>14</b>	<b>6.5.1.2</b> Revise to read: ‘...and the <u>local</u> authority having...’	This is a responsibility of the LAHJ.
<b>35</b>	<b>17</b>	<b>Figure 6.33:</b> Change dimensions as follows: Layout 3: 32 in to 48 in. Layout 4: 16 in to 32 in. Layout 8: 48 in to 64 in.	
<b>36</b>	<b>20</b>	<b>Table 7.5.2.4.1(b)</b> Revise as follows: 1. Change column heading from “ <del>Far</del> Beam...” to “ <u>Second</u> Beam...” 2. Change Note 6 to read: Vertical <del>and diagonal</del> tie down straps are required at each <u>diagonal tie down strap anchor location</u> in wind zones II and III.	NOTE TO NFPA STAFF: Change any other occurrence or “Far” beam to “Second” beam.
<b>37</b>	<b>21</b>	<b>Table 7.5.2.4.1 (c)</b> Revise as follows: 1. Change column heading from “ <del>Far</del> Beam...” to “ <u>Second</u> Beam...” 2. Change Note 6 to read: Vertical <del>and diagonal</del> tie down straps are required at each <u>diagonal tie down strap anchor location</u> in wind zones II and	

ITEM	PAGE	CHANGE	NOTES
		III.	
<b>38</b>	22	<b>Figure 7.5.2.4.1(a)</b> Revise as follows: 1. Near beam method-single unit: Delete the parenthetical note. 2. Near and second beam methods two unit and detail for ground anchor-reverse the angle of the ground anchors.	
<b>39</b>	23	<b>7.6.2</b> Revise to read: ‘...as the <u>local</u> authority having...’	This is a responsibility of the LAHJ.
<b>40</b>	23	<b>7.6.4 (NEW)</b> Add new section to read: “ <u>Any attached garage, carport, deck, or porch shall be installed according to the manufactures instructions or be designed by a registered professional engineer and approved by the LAHJ.</u> ”	
<b>41</b>	23	<b>7.7.1.3</b> Revise end of sentence to read: “...to Figure 7.7.1.3 <u>or other methods per the manufacturers instructions.</u> ”	
<b>42</b>	23	<b>Add 7.7.1.4 (NEW)</b> “ <u>For multi-section homes, interior and exterior walls at the marriage lines shall be attached together in accordance with the manufacturers instructions that meet or exceed the design loads of this standard.</u> ”	
<b>43</b>	24	<b>8.2.2:</b> Revise to read: “...fire places, <del>and</del> powered exhaust fans, <u>and other shipped loose items shall conform....</u> ”	
<b>44</b>	24	<b>8.4:</b> Revise text to read: Only <del>freestanding</del> <u>self-supporting</u> products with support columns shall be chosen. <u>Any connection to the home shall be for weatherproofing only.</u>	
<b>45</b>	24	<b>8.5.4.</b> Delete 8.5.4, 8.5.4.1, 8.5.4.2.	
<b>46</b>	25	<b>Figure 8.7(c)</b> 1. Revise Note 3 to read: “...complete installation <u>according to the manufacturers instructions</u> after home is...”  2. Add new Note 4 to read: “ <u>All home installers shall ensure that all field installed trim, windows, doors and other openings are properly sealed</u> ”	

<b>ITEM</b>	<b>PAGE</b>	<b>CHANGE</b>	<b>NOTES</b>
		<u>according to the manufacturers installation instructions.”</u>	
<b>47</b>	27	<b>10.1.1, 10.2.1, 10.2.2.1.1, 10.2.2.1.3.</b> Revise the occurrence of AHJ to LAHJ in four places.	This is a responsibility of the LAHJ.
<b>48</b>	27	<b>10.2.3.1, 10.3.2.1 (P.28), 10.3.3, (P.28) 10.4.1(P.28).</b> Revise the occurrence of AHJ to LAHJ in four places.	This is a responsibility of the LAHJ.
<b>49</b>	28	<b>10.4.5.</b> Revise to read: ‘...gas system <u>for the home</u> shall be retested...’	Clarifies that the AHJ needs to test the system in the home, rather than just the outside system.
<b>50</b>	29	<b>10.5.3.</b> Revise the occurrence of AHJ to LAHJ in one place.	This is a responsibility of the LAHJ.
<b>51</b>	29	<b>10.6.2.</b> Revise to read: ‘...with the applicable <u>Federal</u> Manufactured Home Construction and Safety Standards and the <u>local</u> authority having jurisdiction, or both.	Clarifies the proper title of the MHCSS. This is a responsibility of the LAHJ.
<b>52</b>	29	<b>10.6.3(3)</b> Revise end of section to read: “...in accordance with applicable provisions of the Federal MHCSS.”	

10.9.03

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.~~

1

BALLOT VERSION 10.9.03

NUMBERS INDICATE CHANGE ITEM NUMBER ON SUMMARY PAGES

Federal Manufactured Housing Consensus Committee

Dana Roberts, *Chair*  
Salem, OR [PO]

Charles Leven, *Vice Chair*  
Millbrook, NY [U]

Jack Berger, Camp Hill, PA [U]  
Karl Braun, Las Vegas, NV [U]  
Susan Brenton, Tempe, AZ [U]  
C. Edgar Bryant, Auburn Hills, MI [P]  
William Farish, Riverside, CA [P]  
Danny Ghorbani, Washington, DC [P]  
Earl Gilson, Port Angeles, WA [U]  
Douglas Gorman, Tulsa, OK [P]  
William Lagano, Clearwater, FL [GI]  
Ronald LaMont, Grand Prairie, TX [P]



Jerome McHale, Port Charlotte, FL [U]  
Bryan Portz, Cleveland, OH [GI]  
Nader Tomasbi, Goshen, IN [P]  
Randy Vogt, St. Paul, MN [PO]  
Christine Walsh Rogers, Seattle, WA [GI]  
Frank Walter, Arlington, VA [P]  
Richard Weinert, Sacramento, CA [PO]  
Alan Youse, Salem, OR [U]  
Michael Zieman, Long Beach, CA [GI]

William Matchneer, Washington, DC, Nonvoting Designated Federal Official

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

**Contents**

<b>Chapter 1 Administration</b> .....	4	7.2 Positioning of Home .....	17
1.1 Scope .....	4	7.3 Interconnection of Multisection Homes .....	17
1.2 Purpose. (Reserved) .....	4	7.4 Crossover Connections for Multisection	
1.3 Application .....	4	Manufactured Homes .....	17
1.4 Term Use .....	4	7.5 Anchoring Instructions .....	18
<b>Chapter 2 Referenced Publications</b> .....	4	7.6 Installation of On-Site Structures .....	22
2.1 General .....	4	7.7 Installation Close-Up/Finishing .....	23
2.2 NFPA Publications .....	4	<b>Chapter 8 Optional Features</b> .....	23
2.3 Other Publications .....	4	8.1 Installation of Optional Features .....	23
<b>Chapter 3 Definitions</b> .....	5	8.2 Hinged Roofs and Eaves .....	23
3.1 General .....	5	8.3 Garden and Bay Windows .....	24
3.2 Official Definitions .....	5	8.4 Awnings and Ramadas .....	24
3.3 General Definitions .....	5	8.5 Miscellaneous Lights and Fixtures .....	24
<b>Chapter 4 General</b> .....	6	8.6 Ventilation Options .....	24
4.1 Preinstallation Considerations .....	6	8.7 Optional Panels, Siding, and Molding .....	24
4.2 Alterations .....	6	8.8 Skirting .....	24
4.3 Installation Considerations .....	6	8.9 Telephone and Cable TV .....	26
<b>Chapter 5 Site Preparation</b> .....	6	8.10 Joints and Seams .....	26
5.1 Access for Transporter .....	6	<b>Chapter 9 Preparation of Appliances</b> .....	26
5.2 Encroachments and Setback Distances .....	6	9.1 Clothes Dryer Vent .....	26
5.3 Fire Separation Distance .....	6	9.2 Comfort Cooling Systems .....	26
5.4 Issuance of Permits .....	6	9.3 Fireplace and Wood-Stove Chimneys	
5.5 Soil Conditions .....	6	and Air Inlets .....	27
5.6 Removal of Organic Material .....	7	9.4 Range, Cooktop, and Oven Venting .....	27
5.7 Drainage .....	7	9.5 Flood Hazard Areas .....	27
5.8 Ground Moisture Control .....	8	<b>Chapter 10 Utility System Connection and</b>	
<b>Chapter 6 Foundations</b> .....	8	<b>Testing</b> .....	27
6.1 General .....	8	10.1 Proper Procedures .....	27
6.2 Piers .....	8	10.2 Water Supply .....	27
6.3 Footings .....	13	10.3 Drainage System .....	28
6.4 Permanent Foundations .....	14	10.4 Gas Supply .....	28
6.5 Special Considerations .....	14	10.5 Heating Oil Systems .....	29
<b>Chapter 7 Installation Procedures</b> .....	17	10.6 Electricity .....	29
7.1 Moving Manufactured Home to		<b>Chapter 11 Life Safety Features</b> .....	29
Location .....	17	11.1 Smoke Alarms .....	29
		<b>Index</b> .....	30

Any changes needed as a result  
of re-numbering will be handled  
by AO

## Model Manufactured Home Installation Standards

2003 Edition

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

### Chapter 1 Administration

3

**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*.

4

**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 elevation 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 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 ASHRAE Publication.** Society of Heating, Refrigeration and Air-Conditioning Engineers, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305.

ASHRAE *Handbook of Fundamentals*, 2001.

**2.3.3 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.

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

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

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

**2.3.5 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 or other means 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 Arid Region.** An area subject to 15 in. (381 mm) or less of annual rainfall.

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

**3.3.6 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.

**3.3.7 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.

**3.3.8 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.

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

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

**3.3.11 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.

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

**3.3.13 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.

**3.3.14 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.

**3.3.15 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.

**3.3.16 Manufactured Home Accessory Building or Structure.** A building or structure that is an addition to a manufactured home or that supplements the facilities provided in a manufactured home; it is not a self-contained, separate, habitable

building or structure. Examples include awnings, cabanas, garages, ramadas, storage structures, carports, fences, wind-breaks, porches, and decks.

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

**3.3.18 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.

**3.3.19 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.

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

**3.3.21 Skirting.** A weather-resistant material used to enclose the perimeter of the conditioned living area of the home from the bottom of the manufactured home to grade.

**3.3.22 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.

**3.3.23 Stand.**

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

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

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

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

**3.3.27 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 piercing), pertinent electrical information, and detailed structural requirements required by 24 CFR Part 3280.

### 4.3.2 Utility Schematics.

**4.3.2.1** A water, gas, or drain schematic shall indicate any portion of the drain system that requires site installation for final assembly.

**4.3.2.2** 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. All compacted fill needs to be tested for bearing capacity.

**5.5.2.2** If the soil bearing 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.

**5.5.2.3** If the soil 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.

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

Notes:

1. For SI units, 1 psf = 0.04788 kN/m<sup>2</sup>.
  2. This table is to be used only when none of the following is available:
    - a. Soil testing investigation and analysis of the site
    - b. Compliance with the local building code
    - c. Competent opinion by a local engineer or building official
- \*No allowances made for overburden pressure, embedment depth, water table height, or settlement problems.

13

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.

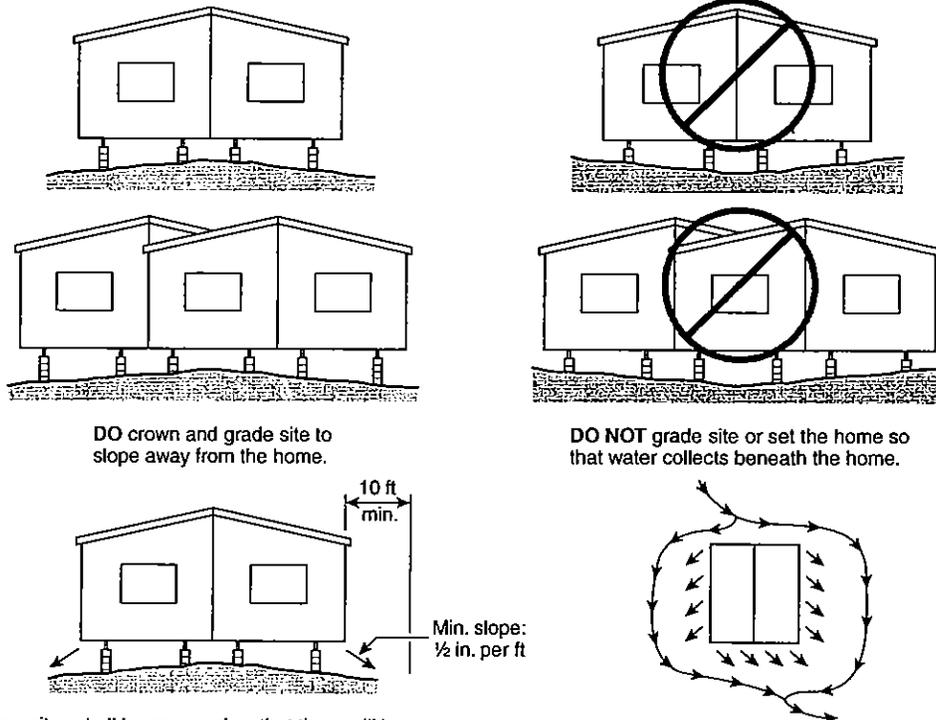
5.7.1 Purpose. Drainage shall be provided that prevents water build-up under the home, shifting or settling of the foundation, dampness in the home, damage to siding and bottom board, buckling of walls and floors, and problems with the operation of doors and windows.

5.7.1.1 The home site shall be graded to permit water to drain from under the home. (See Figure 5.7.1.1.)

5.7.1.2 All drainage shall be diverted away from the home.

5.7.2 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.



Home sites shall be prepared so that there will be no depressions in which surface water shall accumulate beneath the home. The area of the site covered by the manufactured home shall be graded, sloped, or mechanically designed so as to provide drainage from beneath the home or to property line.

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

FIGURE 5.7.1.1 Grading & Drainage.

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.

Chapter 6 Foundations

6.1 General.

**14** 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.

**15** 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.

**16** 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.

6.2 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 (9.6 kg/m<sup>3</sup>) retention in accordance with AWWA C9-00, *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.

**17** 6.2.3.1.2 Center beam/marriage wall blocking shall be required for multisection homes in accordance with 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).

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) Frame Blocking Only/Perimeter Support Not Required Except at Openings

Pier Spacing	Roof Live Load (psf)	Location	Load (lb)	Typical 16 in. x 16 in. Concrete Footing Pyramids Soils Bearing Capacity (a, b, c)					
				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	3	2	2	1	1	1
6 ft 0 in.	20	Frame	4200	3	2	2	1	1	1
	30	Frame	4700	3	2	2	2	1	1
	40	Frame	5200	3	3	2	2	1	1
8 ft 0 in.	20	Frame	5500	4	3	2	2	2	1
	30	Frame	6200	4	3	2	2	2	1
	40	Frame	6900	4	3	2	2	2	1
10 ft 0 in.	20	Frame	6800	4	3	2	2	2	1
	30	Frame	7600	6	3	3	2	2	2
	40	Frame	8500	6	4	3	3	2	2

Notes:

1. Refer to Table 6.3.3 for poured footing design by using the noted loads.
2. Refer to Figure 6.3.3 for 16 in. x 16 in. footing pyramids layout designs. Shaded areas indicate 8 in. thickness.
3. For SI units, 1 psf = 0.04788 kN/m<sup>2</sup>; 1 lb = 4.448 N; 1 in. = 25.4 mm; 1 ft = 0.3048 m.

**NO SHADE**

FOUNDATIONS

19

Table 6.2.3.1.3.1(b) Frame plus Perimeter Blocking/Perimeter Blocking Required

Maximum Pier Spacing	Roof Live Load (psf)	Location	Load (lb)	Typical 16 in. x 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	1,400	1	1	1	1	1	1
		Perimeter	1,900	2	1	1	1	1	
		Marriage	3,200	2	2	1	1	1	
	30	Frame	1,400	1	1	1	1	1	1
		Perimeter	2,300	2	1	1	1	1	
		Marriage	3,800	3	2	2	1	1	
	40	Frame	1,400	1	1	1	1	1	1
		Perimeter	2,600	2	1	1	1	1	
		Marriage	4,400	3	2	2	1	1	
6 ft 0 in.	20	Frame	1,900	2	1	1	1	1	1
		Perimeter	2,700	2	2	1	1	1	
		Marriage	4,700	3	2	2	2	1	
	30	Frame	1,900	2	1	1	1	1	1
		Perimeter	3,200	3	2	1	1	1	
		Marriage	5,600	4	3	2	2	2	
	40	Frame	1,900	2	1	1	1	1	1
		Perimeter	3,700	3	2	2	1	1	
		Marriage	6,500	4	3	2	2	2	
8 ft 0 in.	20	Frame	2,400	2	1	1	1	1	1
		Perimeter	3,500	2	2	1	1	1	
		Marriage	6,100	4	3	2	2	2	
	30	Frame	2,400	2	1	1	1	1	1
		Perimeter	4,200	3	2	2	1	1	
		Marriage	7,300	6	3	3	2	2	
	40	Frame	2,400	2	1	1	1	1	1
		Perimeter	4,800	3	2	2	2	1	
		Marriage	8,500	6	4	3	3	2	
10 ft 0 in.	20	Frame	2,900	2	2	1	1	1	1
		Perimeter	4,300	3	2	2	1	1	
		Marriage	7,600	6	3	3	2	2	
	30	Frame	2,900	2	2	1	1	1	1
		Perimeter	5,100	4	3	2	2	1	
		Marriage	9,100	6	4	3	3	2	
	40	Frame	2,900	2	2	1	1	1	1
		Perimeter	6,000	4	3	2	2	2	
		Marriage	10,600	8	6	4	3	3	

SHADE

Notes:

1. Refer to Table 6.3.3 for poured footing design by using the noted loads.
2. Refer to Figure 6.3.3 for 16 in. x 16 in. footing pyramids layout designs. Shaded areas indicate 8 in. thickness.
3. For SI units, 1 psf = 0.04788 kN/m<sup>2</sup>; 1 lb = 0.453 kg; 1 in. = 25.4 mm; 1 ft = 0.3048 m.

Table 6.2.3.1.3.1(c) Ridge Beam Span Footing Capacity

20

Mating Wall Opening (ft)	Roof Live Load (psf)	Load (lb)	Typical 16 in. x 16 in. Concrete Footing Pyramids Soils Bearing Capacity					
			1000 psf	1500 psf	2000 psf	2500 psf	3000 psf	4000 psf
5	20	1,200	1	1	1	1	1	1
	30	1,600	1	1	1	1	1	1
	40	1,900	2	1	1	1	1	1
10	20	2,300	2	1	1	1	1	1
	30	3,100	2	2	1	1	1	1
	40	3,800	3	2	2	1	1	1
15	20	3,500	2	2	1	1	1	1
	30	4,700	3	2	2	1	1	1
	40	5,800	4	3	2	1	1	1
20	20	4,700	3	2	2	1	1	1
	30	6,200	4	3	2	2	1	1
	40	7,500	6	3	3	2	2	2
25	20	5,800	4	3	2	2	1	1
	30	7,800	6	3	3	2	2	2
	40	9,700	6	4	3	3	2	2
30	20	7,000	4	3	2	2	1	1
	30	9,300	6	4	3	3	2	2
	40	11,600	8	6	4	3	3	2
35	20	8,100	6	4	3	2	2	2
	30	10,900	8	6	4	3	3	2
	40	13,600	8	6	4	4	3	2

SHADE THESE AREAS

Notes:

1. Refer to Table 6.3.3 for poured footing design by using the noted loads.
2. Refer to Figure 6.3.3 for 16 in. x 16 in. footing pyramids layout designs. Shaded areas indicate 8 in. thickness.
3. For SI units, 1 ft = 0.3048 m; 1 psf = 0.04788 kN/m<sup>2</sup>; 1 lb = 4.448 N; 1 in. = 25.4 mm.

**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. x 8 in. x 16 in. (205 mm x 205 mm x 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** When gaps occur during installation, any combination of the following shall apply.

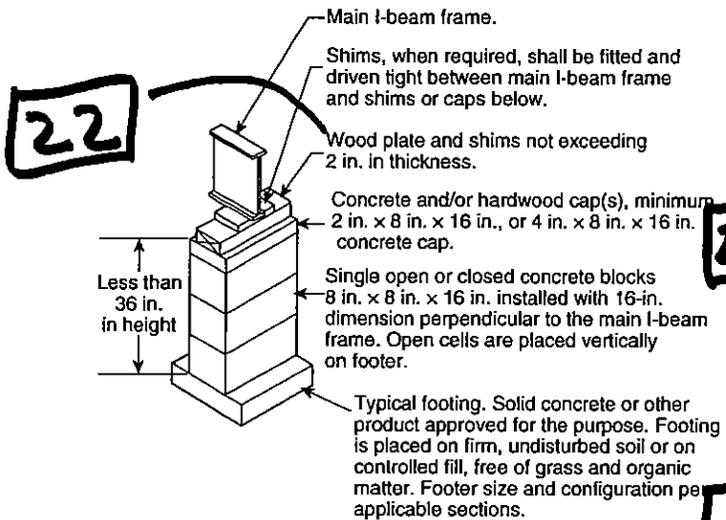
**6.2.3.2.3.2** Nominal 4 in. x 6 in. (100 mm x 150 mm) shims shall be permitted to be used to level the home and fill any gaps between the base of the I-beam and the top of the pier cap; or

**6.2.3.2.3.3** 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; or

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

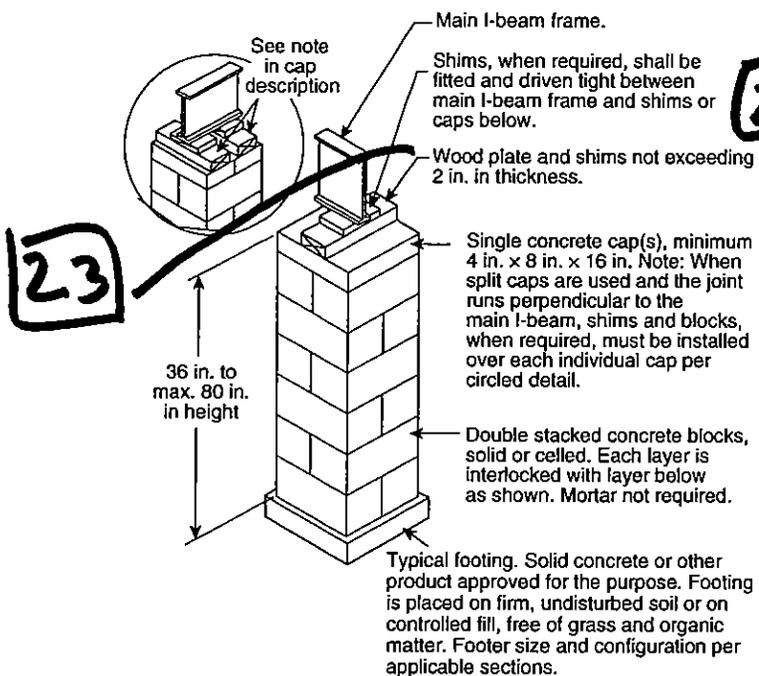
**6.2.3.2.4 Pier Heights.** Manufactured pier heights shall be selected so that the adjustable risers do not extend more than 2 in. (50 mm) when finally positioned.

21



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

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.

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

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.

6.2.4 Design Procedures for Concrete Block Piers.

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

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

6.2.4.1.2 The frame 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 1/2 in. (13 mm) top to bottom.

6.2.4.1.5 Mortar shall not normally be required.

24

6.2.4.2 Frame Piers 36 in. (915 mm) to 80 in. (2030 mm) High and Corner Piers. All frame 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 All Piers over 80 in. (2030 mm) High. Piers over 80 in. (2030 mm) high shall be designed by a registered professional engineer.

25

6.2.4.4 Piers required at marriage line supports, perimeter piers, and piers at exterior wall openings shall be permitted to be constructed of single open- or closed-cell concrete blocks, 8 in. x 8 in. x 16 in. (205 mm x 205 mm x 410 mm), to a maximum height of 54 in. (1372 mm).

6.2.4.4.1 Piers used for perimeter support shall be installed with the long dimension parallel to the perimeter rail.

6.2.4.5 Manufactured piers shall be listed and labeled and installed to the manufacturer's installation instructions.

6.2.4.6 Elevated Homes. When more than one-fourth of the area of a home is installed so that the bottoms of the main frame members are more than 67 in. (1702 mm) above the top of the footing, the home stabilizing devices shall be designed by a qualified registered professional engineer.

6.2.5 Location and Spacing.

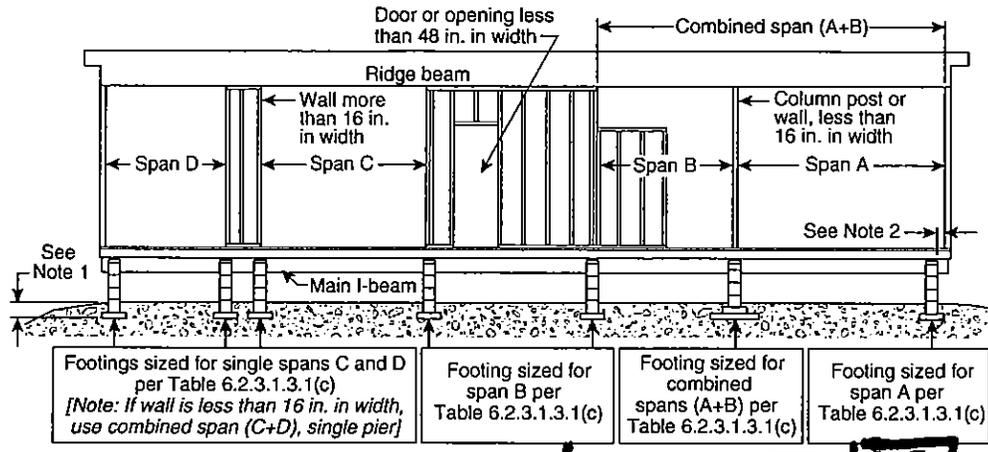
6.2.5.1 The location and spacing of piers shall depend upon the dimensions and weight of the home, the roof load zone, the type of construction (single- or multisection), and such other factors as the location of doors or other openings.

6.2.5.2 Pier supports shall be in accordance with this chapter and Figure 6.2.5.2(a) through Figure 6.2.5.2(c).

6.2.5.3 In general, piers supporting the frame 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.

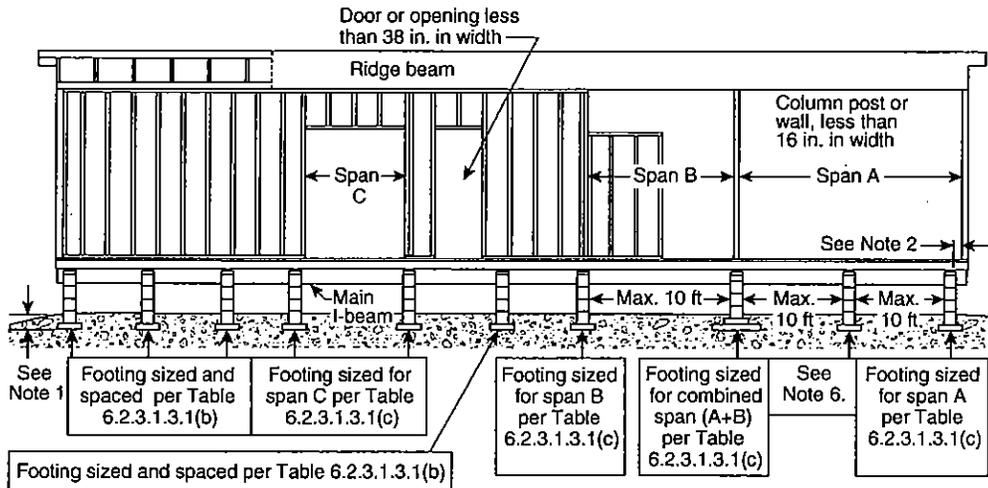
6.2.5.5 Multisection Homes. The recommended location and spacing of piers for a multisection home shown in Figure 6.2.5.5 shall be used when the manufacturer's installation instructions are not available.



Notes:

1. Bottom of footers below grade to frost depth. See Figure 6.3.2.1.3, Frost Penetration Map.
2. Front/rear pier may be inset up to 6 in. to allow for crawl space enclosure. All other piers may be offset up to 6 in. in either direction, to allow for plumbing, electrical, mechanical equipment, or other devices.
3. Single stack concrete block piers up to 10,000 lb load, regardless of spacing.
4. Prefabricated piers shall not exceed their approved or listed maximum design loads.
5. For SI units, 1 in. = 25.4 mm; 1 in.<sup>2</sup> = 645 mm<sup>2</sup>; 1 lb = 0.4535 kg.

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



Notes:

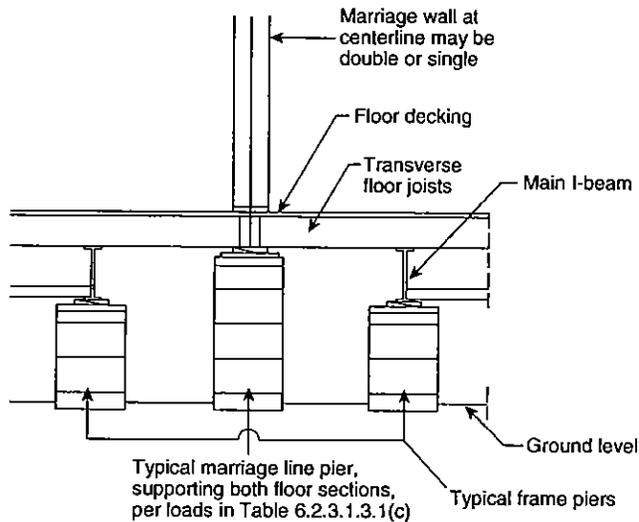
1. Bottom of footers below grade to frost depth. See Figure 6.3.2.1.3, Frost Penetration Map.
2. Front/rear pier may be inset up to 6 in. to allow for crawl space enclosure. All other piers may be offset up to 6 in. in either direction, to allow for plumbing, electrical, mechanical equipment, or other devices.
3. Single stack concrete block piers up to 10,000 lb load, regardless of spacing.
4. Piers are not required at openings in marriage wall less than 38 in.
5. Where a marriage wall does not extend full height to support ridge beam, that area is considered another span.
6. Footing (1-16x16x4) and pier in span area only required when span is greater than 10 ft.
7. Prefabricated piers shall not exceed their approved or listed maximum design loads.
8. For SI units, 1 in. = 25.4 mm; 1 in.<sup>2</sup> = 645 mm<sup>2</sup>; 1 ft = 0.3048 m; 1 lb = 0.4535 kg.

FIGURE 6.2.5.2(b) Typical Marriage Line Column Pier and Wall Support Layout.

27

28

29



Notes:

1. Marriage line and marriage line column support piers are installed with the long dimension of the concrete block perpendicular to the rim joists.
2. Pier and footer designed to support both floor sections. Loads as listed in Table 6.2.3.1.3.1(c) are total loads for both sections.

FIGURE 6.2.5.2(c) Typical Marriage Line and Column Piers.

31

**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.

30

**6.3 Footings.** Footing materials shall conform to Section 6.3 and other materials approved for footings shall be permitted 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 (27.6 MN/m<sup>2</sup>)
- (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>)

**6.3.1.2 Pressure-Treated Permanent Wood.**

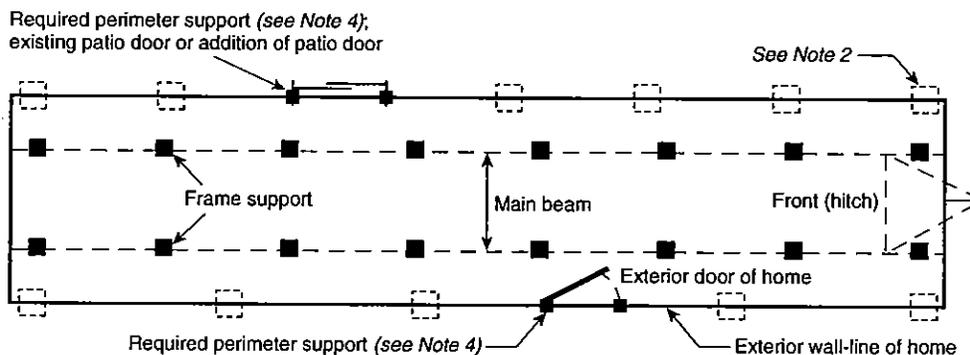
**6.3.1.2.1** A minimum of two layers of nominal 2 in. (50 mm) thick pressure-treated wood having 0.60 pcf (9.6 kg/m<sup>3</sup>) retention in accordance with AWWA C2-02, *Standard for the Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties, by Pressure Processes*, or AWWA C9-00, *Plywood — 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 pressure treated on all six sides and shall be permitted to consist of nominal 2 in. (50 mm) thick pressure-treated wood in accordance with AWWA C2-02, or a single layer of a minimum thickness of 3/4 in. (19 mm) and a maximum size of 16 in. x 16 in. (410 mm x 410 mm), or, for larger sizes, two pieces of nominal 3/4 in. thick (2 2/3 actual) (19 mm) plywood (APA-rated sheathing, exposure 1, PS1) pressure-treated for soil contact in accordance with AWWA 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.

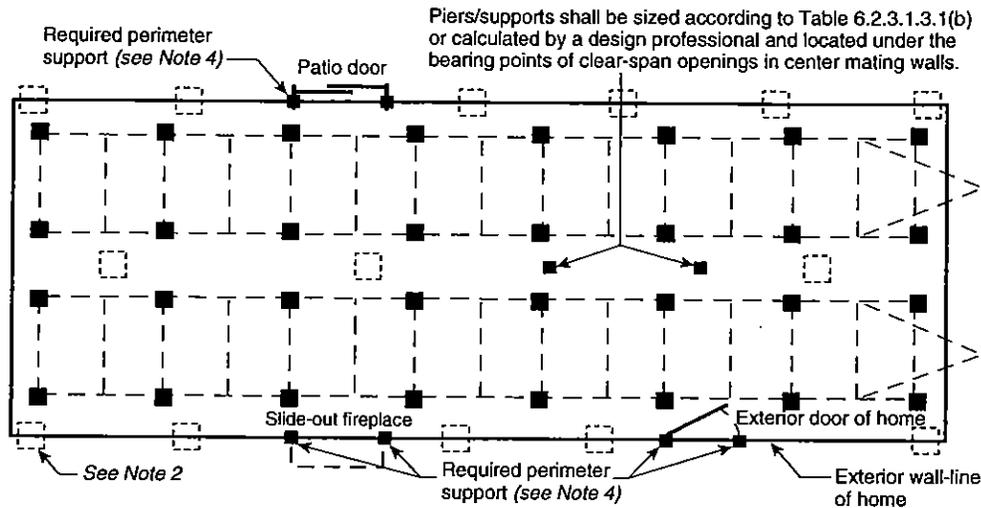
**6.3.1.3.2** ABS footing pads shall be listed or labeled for the required load capacity.



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. End piers may be set back a maximum of 6 in. (152 mm) from inside edge of end walls.
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. End piers may be set back a maximum of 6 in. (152 mm) from inside edge of end walls.
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.

6.3.2 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.

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.

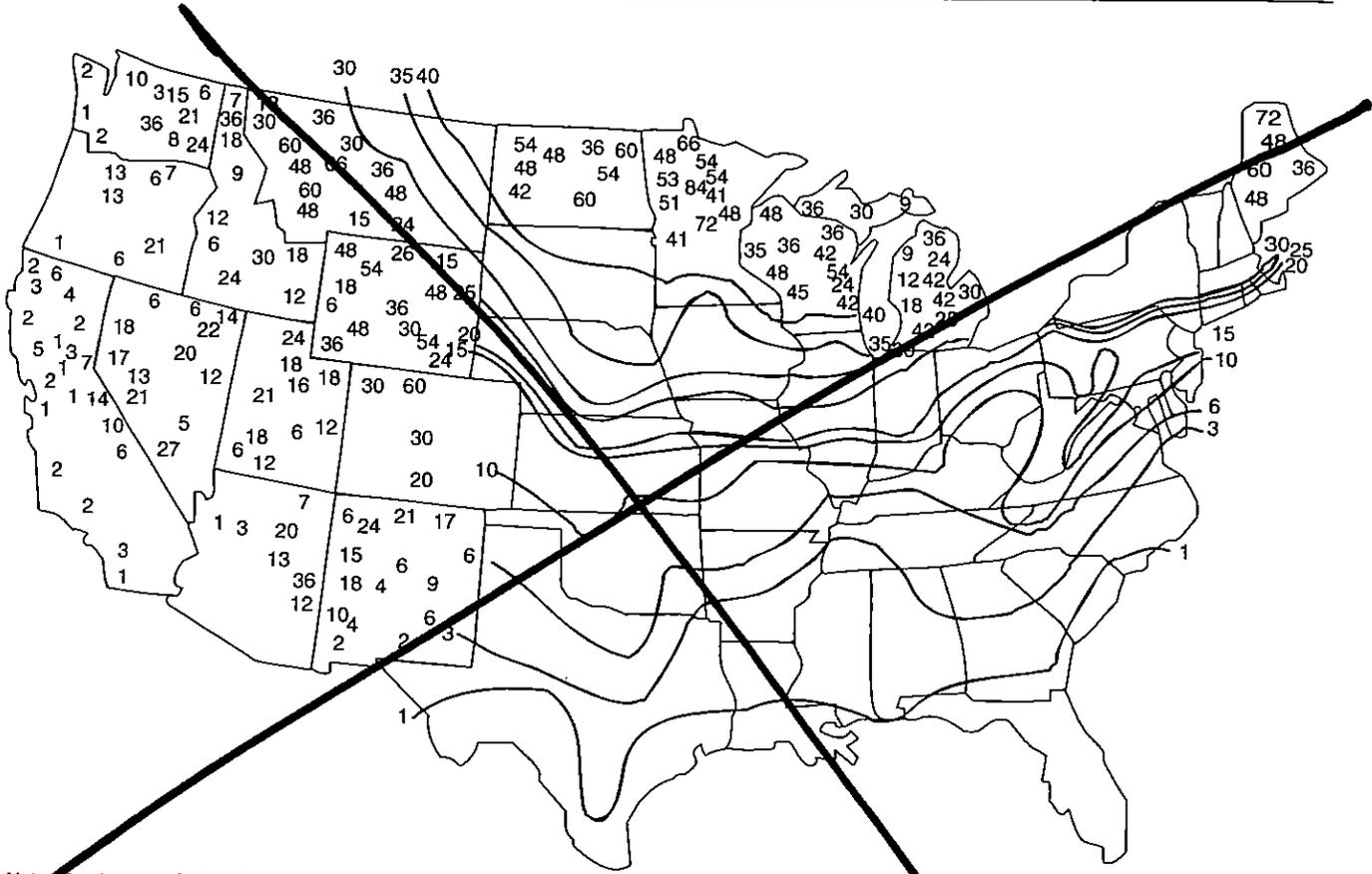
6.5.1.2 A registered professional engineer and the authority having jurisdiction shall be consulted to assure that the home installation conforms to applicable federal, state, and local codes and regulations.

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.

32

33

34



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

FIGURE 6.3.2.1.3 Frost Penetration Map.

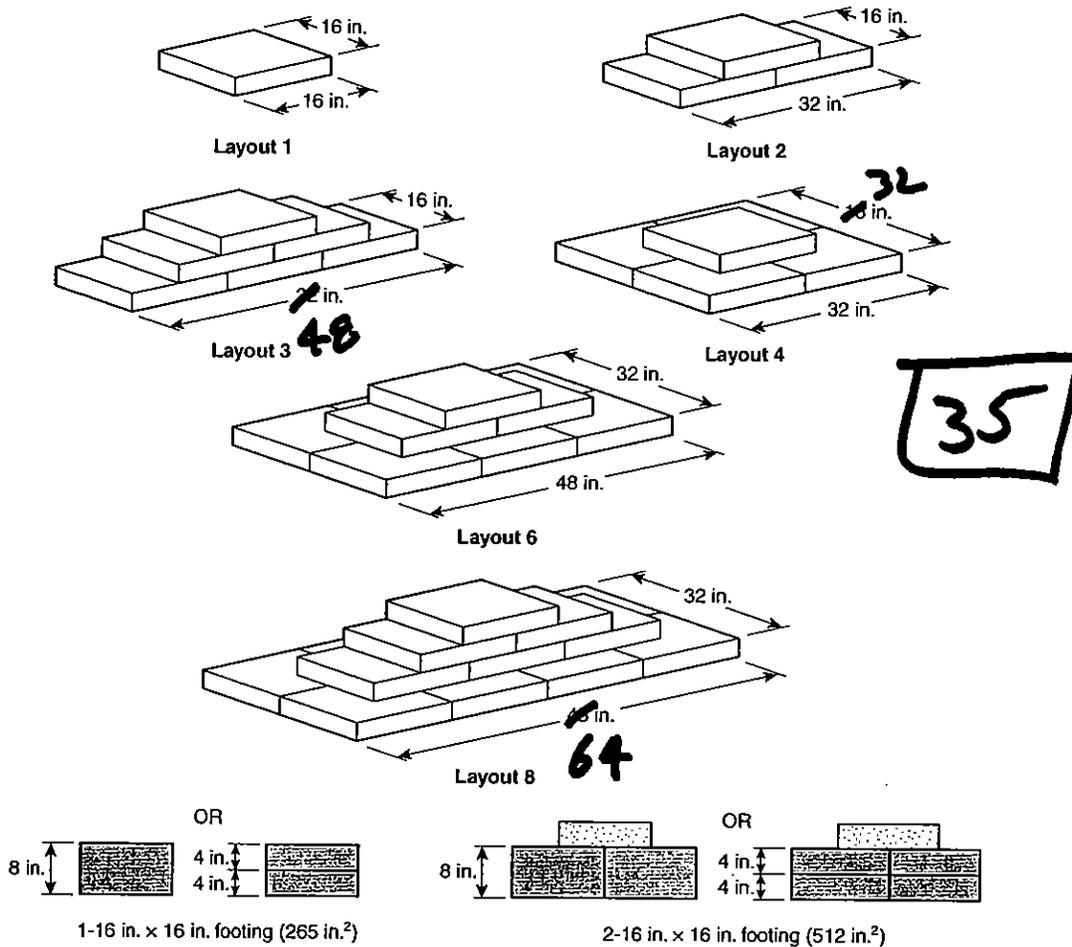
33

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 = 0.4535 kg.



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; 1 in.<sup>2</sup> = 645 mm<sup>2</sup>.

FIGURE 6.3.3 Footing Pyramid Layout Designs.

Chapter 7 Installation Procedures

**7.1 Moving Manufactured Home to Location.** The manufactured home shall be permitted to be moved to the site and placed on the installation stand when the stand 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 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.**

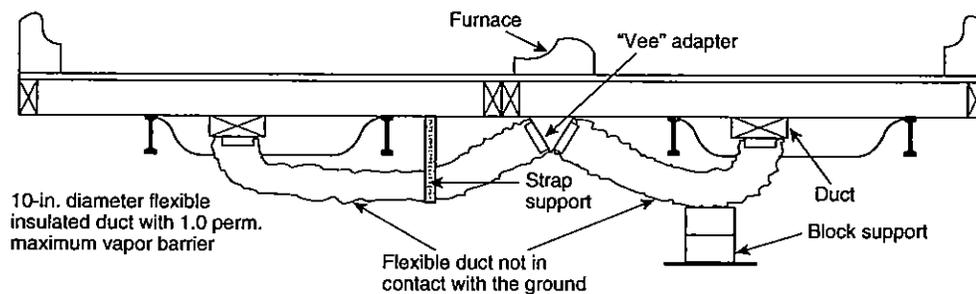
**7.5.2.1** The anchoring or foundation system shall be capable of meeting the loads required by Subpart D, 24 CFR 3280, *Federal Manufactured Home Construction and Safety Standards*.

**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 (2142 kg) and a working capacity of 3150 lb (1428 kg). The resistance capability of anchors and anchoring equipment shall be certified by a registered professional engineer or architect or tested to a nationally recognized testing protocol.

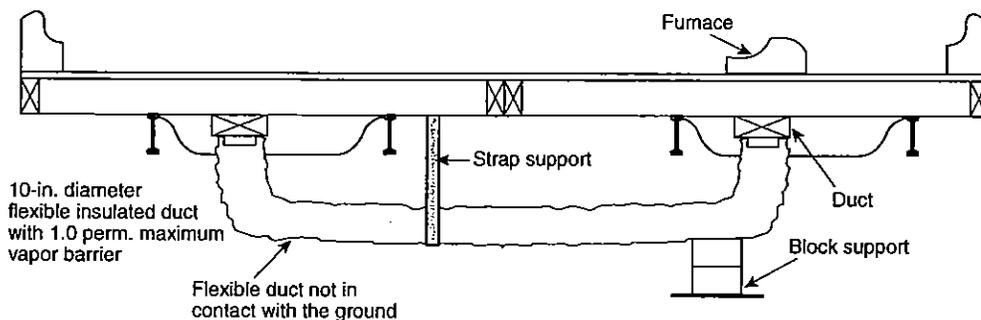
**7.5.2.3.2 Tie-Down Straps.** A 1¼ in. × 0.035 in. (32 mm × 0.9 mm) or larger zinc-coated (0.30 oz/ft<sup>2</sup> [0.30 kg/m<sup>2</sup>] of surface area) steel strapping conforming to ASTM D 3953-97, *Standard Specification for Strapping, Flat Steel and Seals*, Type 1, Grade 1, Finish B with a minimum total capacity of 4725 lb (2142 kg) and a working capacity of 3150 lb (1428 kg) 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), and Figure 7.5.2.4.1(b).

**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.

**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.
- For SI units, 1 ft = 0.3048 m; 1 in. = 25.4 mm; 1 lb = 0.4535 kg.

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

Tiedown and Anchor: Maximum On-Center spacing (ft)

36

Nominal Floor Width, Single Section/Multisection (ft)	Max. Height from Ground to Diagonal Strap Attachment	Near Beam Method I-Beam Spacing		<del>Near</del> 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. 33 in. 46 in. 67 in.	6 ft 2 in. 5 ft 2 in. 4 ft 0 in. N/A	4 ft 3 in. N/A N/A N/A	7 ft 6 in. 7 ft 2 in. 6 ft 9 in. 6 ft 1 in.	7 ft 7 in. 7 ft 4 in. 6 ft 11 in. 6 ft 3 in.
14 ft/28 ft 156 in. to 179 in. box(es)	25 in. 33 in. 46 in. 67 in.	7 ft 7 in. 6 ft 10 in. 5 ft 7 in. 4 ft 3 in.	6 ft 9 in. 5 ft 9 in. 4 ft 6 in. N/A	7 ft 8 in. 7 ft 5 in. 7 ft 0 in. 6 ft 5 in.	7 ft 9 in. 7 ft 6 in. 7 ft 2 in. 6 ft 7 in.
16 ft/32 ft 180 in. to 204 in. box(es)	25 in. 33 in. 46 in. 67 in.	7 ft 9 in. 7 ft 6 in. 6 ft 9 in. 5 ft 4 in.	7 ft 10 in. 7 ft 2 in. 6 ft 0 in. 4 ft 7 in.	7 ft 10 in. 7 ft 7 in. 7 ft 2 in. 6 ft 8 in.	7 ft 10 in. 7 ft 8 in. 7 ft 3 in. 6 ft 9 in.
18 ft 204 in. to 216 in. box(es)	25 in. 33 in. 46 in. 67 in.	7 ft 10 in. 7 ft 8 in. 7 ft 4 in. 6 ft 3 in.	7 ft 9 in. 7 ft 8 in. 7 ft 0 in. 5 ft 8 in.	7 ft 11 in. 7 ft 9 in. 7 ft 4 in. 6 ft 10 in.	8 ft 0 in. 7 ft 9 in. 7 ft 5 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.
14. For SI units, 1 ft = 0.3048 m; 1 in. = 25.4 mm; 1 lb = 0.4535 kg.

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

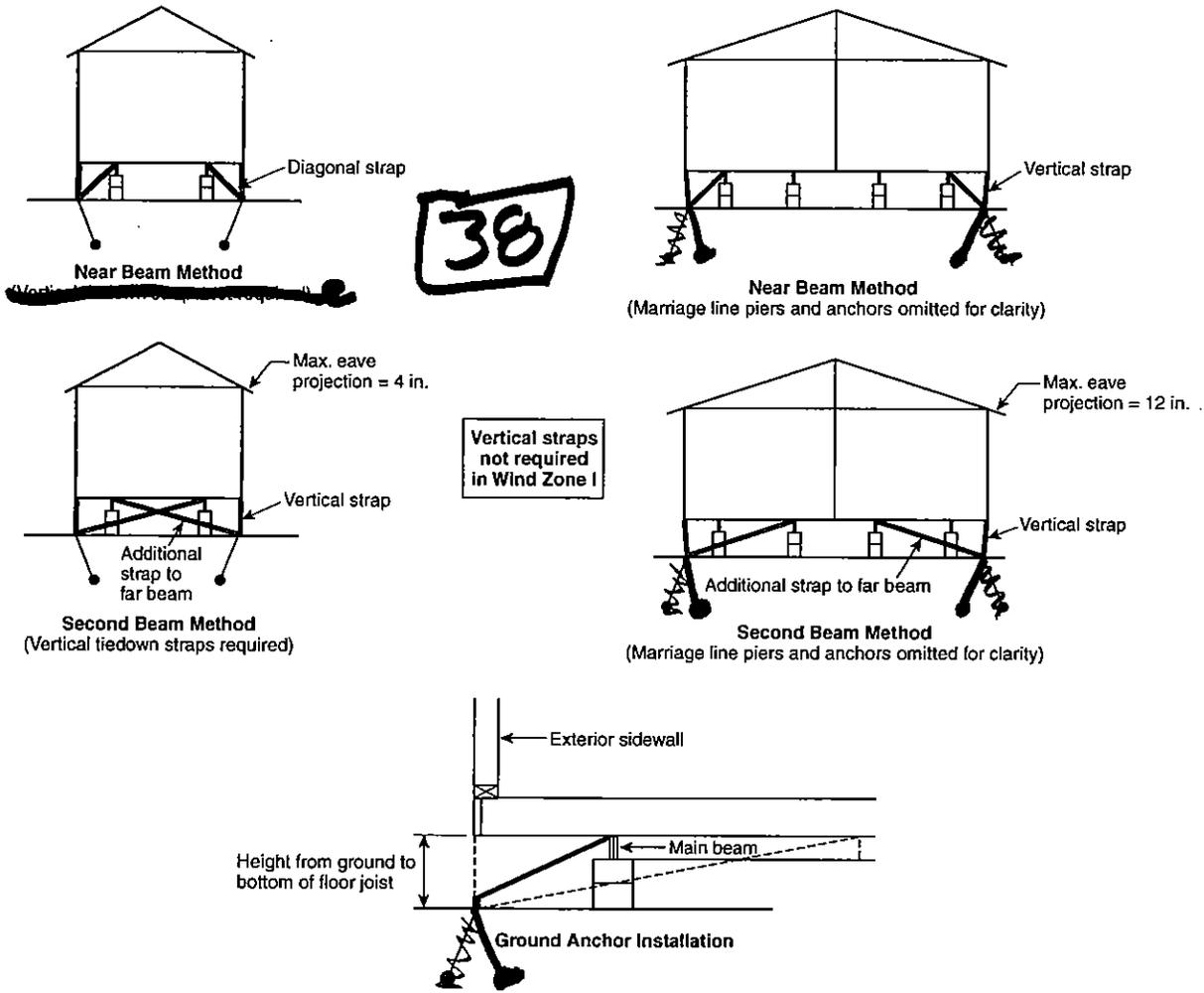
Tiedown and anchor: Maximum On-Center Spacing (ft)

37

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. 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.

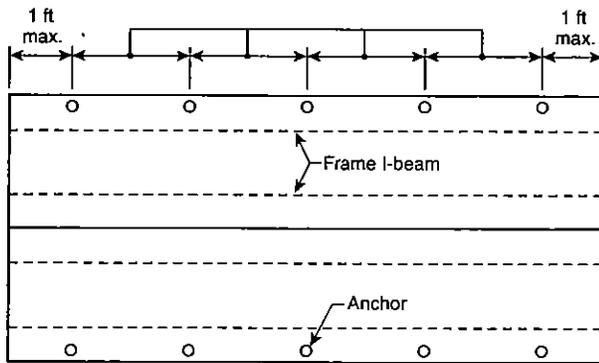
Notes:

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 Seats*.
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.
14. For SI units, 1 ft = 0.3048 m; 1 in. = 25.4 mm; 1 lb = 0.4535 kg.



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

FIGURE 7.5.2.4.1(a) Anchor Strap and Pier Relationship.



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(b) Anchor Locations and Spacings — Plan View.

**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.**

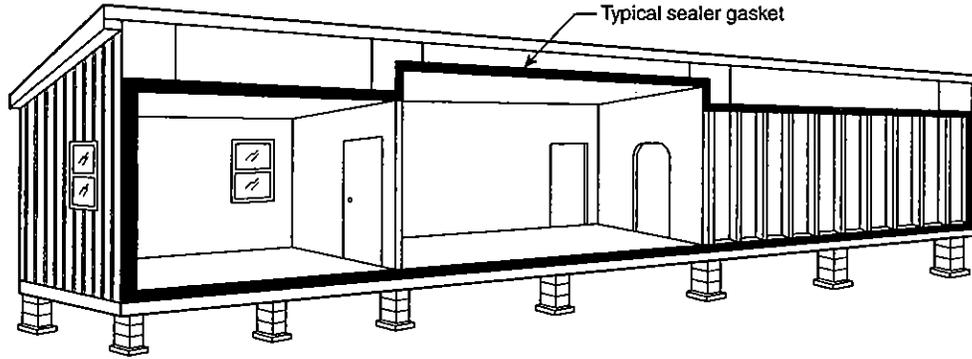
**7.5.4.2.1** When a home is installed within 1500 ft (457 m) of a coastline in Wind Zones II or III, the manufacturer's installation instructions shall be used.

**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, structures, and accessory structures shall be designed to support all of their own live and dead loads.



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 Mating Line Gasket Installation.

39

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.

40

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 1/4 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.

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.

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.

**43** 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.

**44** 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.

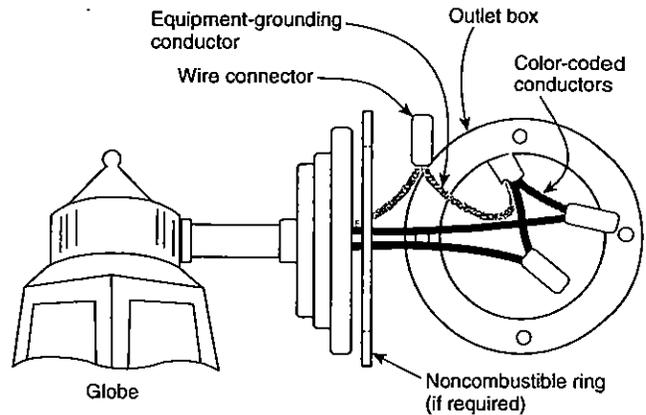


FIGURE 8.5.3 Installation of Surface-Mounted Exterior Lighting Fixture.

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.

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 in accordance with the manufacturer's installation instructions.

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) through 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.

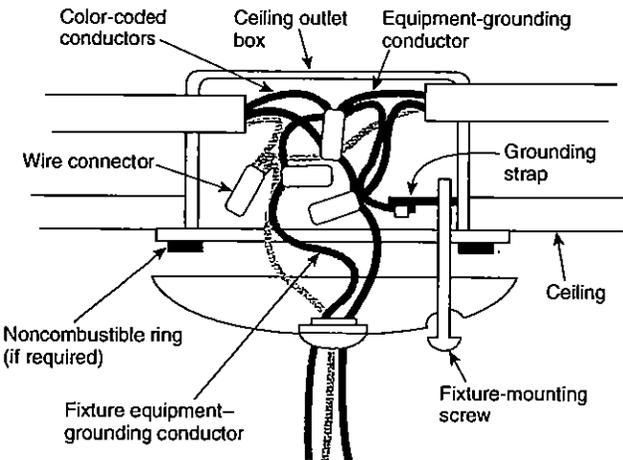


FIGURE 8.5.2.2 Installation of Chain-Hung Lighting Fixture.

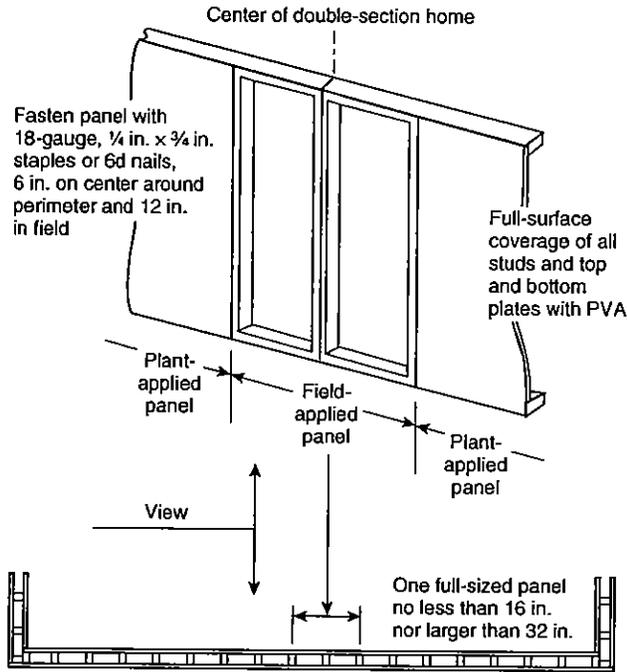
8.5.3 Where lighting fixtures are mounted on combustible surfaces such as hardboard, a noncombustible ring, as shown in Figure 8.5.3, shall be installed to completely cover the combustible surface exposed between the fixture canopy and the wiring outlet box.

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.

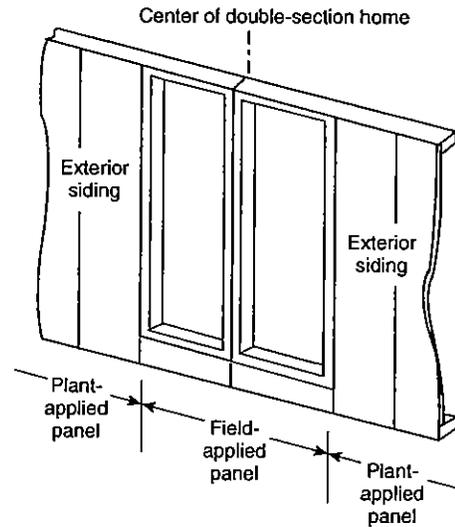
8.5.4.2 The outlet box shall be reinstalled and the same process followed as for other lighting fixtures, which shall be installed according to their listings.

**45**



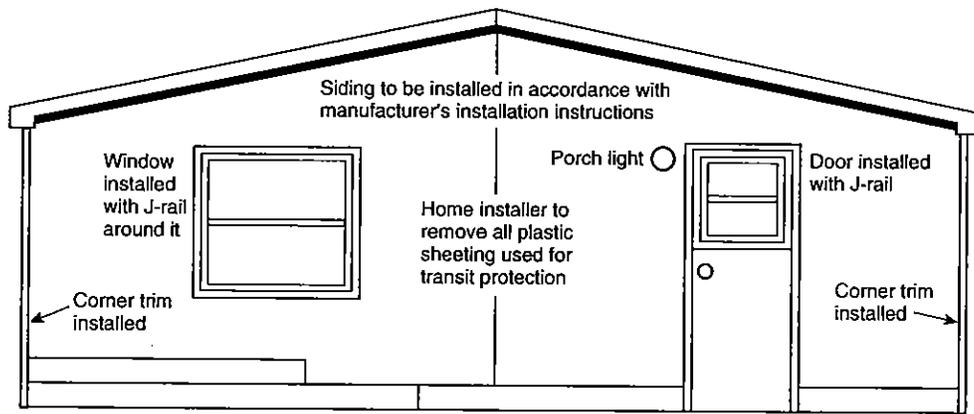
- Notes:
1. Specific designs must be approved by a Design Approval Primary Inspection Agency (DAPIA).
  2. For SI units, 1 in. = 25.4 mm.

**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.**



- 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.

**46**

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

**8.8.2 Ventilation.**

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

- (1) At a minimum of 1 ft<sup>2</sup> (0.09 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> (0.09 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.

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

**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.

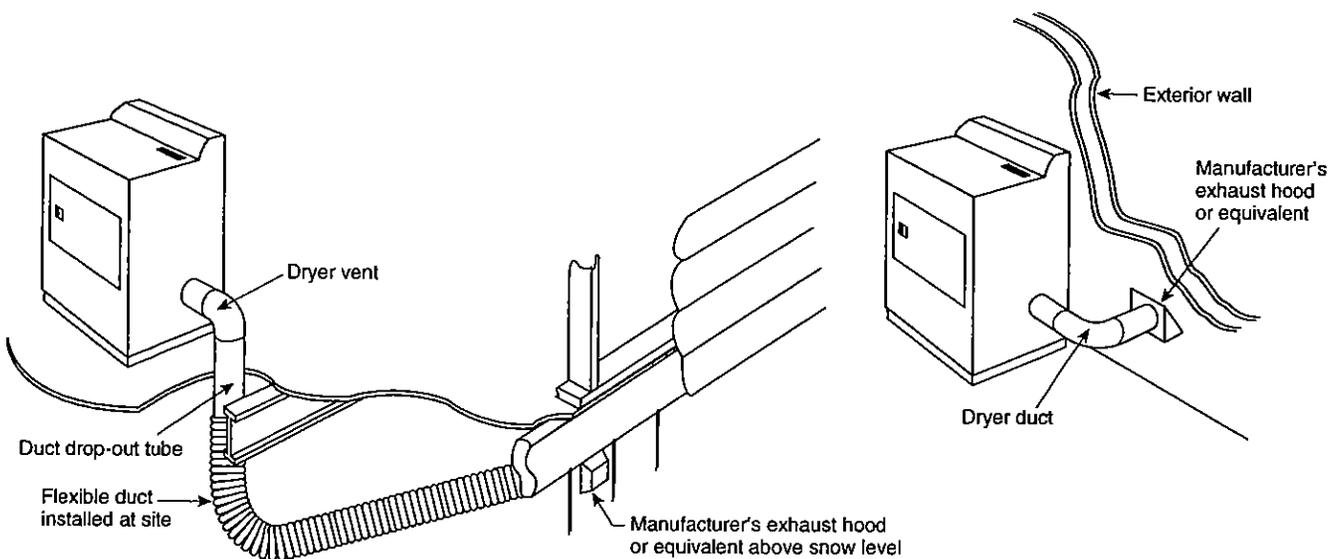
**9.2 Comfort Cooling Systems.** Comfort cooling systems shall be installed according to the manufacturer's installation instructions and applicable regulations of the authority having jurisdiction.

**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 28 of the 2001 *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.

**9.2.1.2 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.

**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.**

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

**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.

**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.

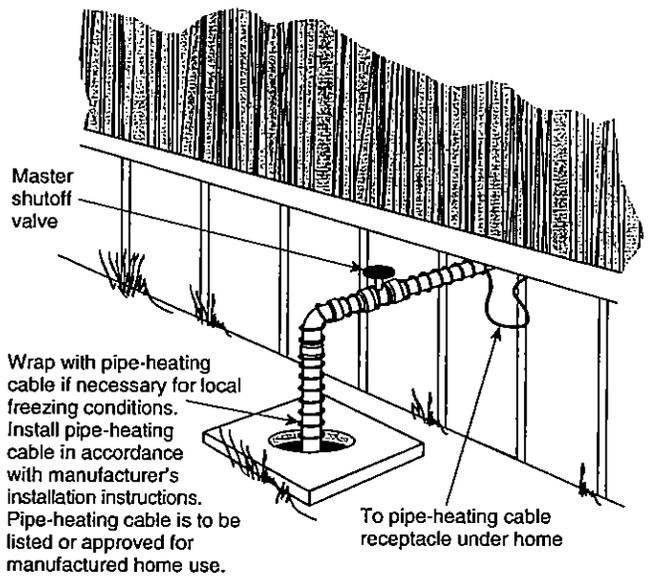
**10.2 Water Supply.**

**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.



**FIGURE 10.2.2.1.1 Typical Water Connection.**

**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 in accordance with the manufacturer's instructions.

**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, 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.

47

48

**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.

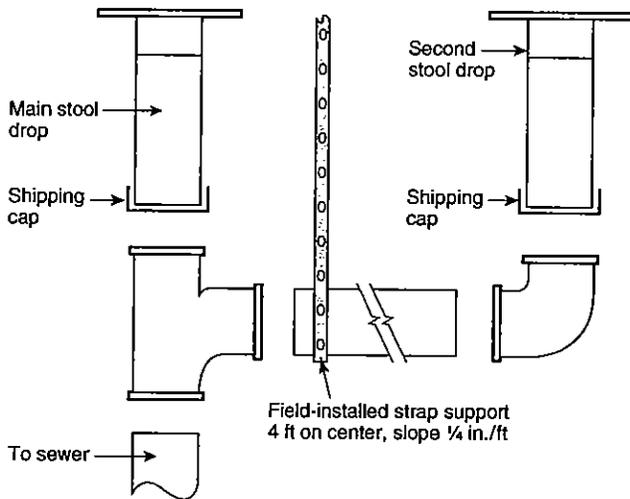
**10.3 Drainage System.**

**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.

**48**  
CONT.

**10.3.2.1** Drain lines shall slope at least 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.



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

**FIGURE 10.3.2.1 Drain Pipe Slope and Connections.**

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

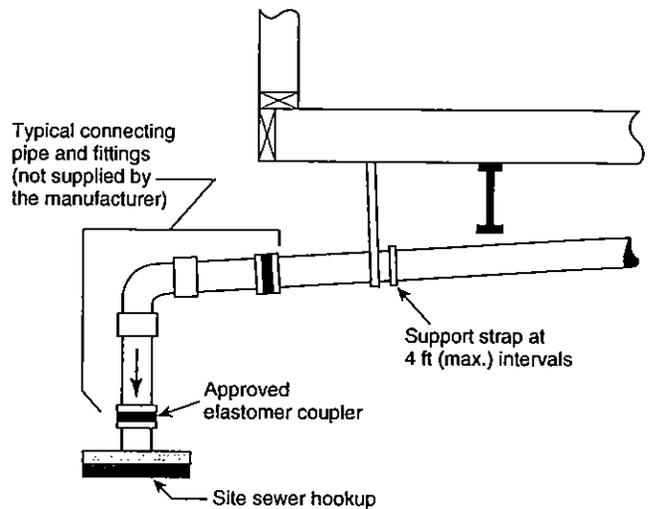
**10.3.3 Connector Sizes.** The main drain line shall be connected to the site's sewer hookup, using an approved elastomer coupler, as shown in Figure 10.3.3, or in a manner acceptable to the authority having jurisdiction.

**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.



**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 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.

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

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

**49**

**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** When required, a qualified person shall perform the following procedures.

**10.4.7.2** 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.

**10.4.7.3** 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.

**50** **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.

**51** **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) **52** 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.

Any changes as a result of renumbering will be handled by the <sup>Index</sup> A.O.

**-A-**

- ABS footing pad ..... 6.3.1.3
- Accessory building or structure ..... *see* Manufactured home accessory building or structure
- Administration ..... Chap. 1
- Air conditioners ..... 8.8.4, 9.2.1
- Air inlets ..... 8.8.4, 9.3, 9.5.2
- Alterations ..... 4.2
  - Installation (definition) ..... 3.3.13
- Anchoring equipment
  - Definition ..... 3.3.2
  - Flood hazard areas ..... 6.1.5
- Anchoring instructions ..... 7.5
- Anchoring system ..... 7.5
  - Definition ..... 3.3.3
- Anchors ..... 7.5.2.3.1
  - Definition ..... 3.3.1
  - Freezing climates ..... 7.5.4.1
  - Installation ..... 7.5.2.4.2
  - Number and location of ..... 7.5.2.4
  - Wind zones, severe ..... 7.5.4.2
- Appliances
  - Gas appliances, conversion of ..... 10.4.1
  - Preparation of ..... Chap. 9
  - Venting
    - Clothes dryer ..... 9.1
    - Range, cooktop, and oven ..... 9.4
- Application of standard ..... 1.3
- Approved (definition) ..... 3.2.1
- Arid region (definition) ..... 3.3.4
- Authority having jurisdiction (AHJ) (definition) ..... 3.2.2
- Awnings ..... 8.4

**-B-**

- Base flood (definition) ..... 3.3.5
- Base flood elevation (BFE) (definition) ..... 3.3.6
- Bay windows ..... 8.3
- Bottom board repair ..... 7.7.5

**-C-**

- Cable TV ..... 8.9
- Chimneys, fireplace and wood-stove ..... 9.3
- Clearance under homes ..... 6.2.3.3
- Close-up ..... 7.7
- Clothes dryer vents ..... 8.8.4, 9.1
- Combustion air inlets ..... 8.8.4, 9.3.7, 9.5.2
- Comfort cooling systems ..... 9.2
- Concrete footings ..... 6.3.1.1, 6.3.2.2
- Cooktop venting ..... 9.4
- Crawl space ..... 8.8.2.1
- Crossovers ..... 7.4
  - Definition ..... 3.3.7
  - Drainage system ..... 10.3.4
  - Gas supply ..... 10.4.4
  - Water supply ..... 10.2.2.2

**-D-**

- Data plate ..... 4.3
  - Information on ..... 4.3.2
  - Location of ..... 4.3.1
- Definitions ..... Chap. 3
- Design zone maps ..... 4.3.4
- Downspouts ..... 5.7.4
- Drainage ..... 5.7, 10.3
- Ductwork crossovers ..... 7.4.2

**-E-**

- Eaves, hinged ..... 8.2
- Electrical systems ..... 4.4.1, 10.6; *see also* Lighting and light fixtures
  - Air conditioning system ..... 9.2.1
  - Ceiling fans ..... 8.5.6
- Encroachments ..... 5.2
- Evaporative coolers ..... 9.2.3
- Expanding rooms ..... 7.6.3
- Exterior siding
  - Close-up ..... 7.7.2
  - Light fixture, installation of ..... 8.5.4
  - Optional ..... 8.7, Fig. 8.7(b), Fig. 8.7(c)

**-F-**

- Fans
  - Ceiling ..... 8.5.6
  - Exhaust ..... 8.2.2
- Finishing ..... 7.7
- Fireplaces ..... 8.2.2, 9.3
- Fire separation distances ..... 5.3, 7.6.2
- Floating slab footing system ..... 6.3.2.2
- Flood damage resistant material (definition) ..... 3.3.10
- Flood hazard areas ..... 1.3.6, 9.5
  - Appliance installation in ..... 9.5
  - Definition ..... 3.3.8
  - Foundations ..... 6.1.5, 6.5.1
  - Oil storage tank ..... 10.5.4.3
  - Preinstallation considerations in ..... 1.3.6.3, 4.1.2
- Flood hazard map (definition) ..... 3.3.9
- Floor plan ..... 4.3.1
- Footings ..... 5.6, 5.8.3, 6.3
  - Acceptable types of ..... 6.3.1
  - Combination systems ..... 6.3.4
  - Definition ..... 3.3.10
  - Floating slab systems ..... 6.3.2.2
  - Freezing climates, placement in ..... 6.3.2
  - General elevation and foundations requirements in ..... 1.3.6.4
  - Insulated foundations ..... 6.3.2.3
  - Sizing of ..... 6.3.3
- Foundations ..... Chap. 6; *see also* Footings; Piers
  - Permanent ..... 6.4
  - Special considerations ..... 6.5
    - Flooding, areas prone to ..... 6.5.1
    - Snow load ..... 6.5.2
- Freezing climates
  - Anchors for ..... 7.5.4.1
  - Footing placement in ..... 6.3.2
  - Water supply protection ..... 10.2.3
- Frost penetration map ..... Fig. 6.3.2.1.3
- Furnaces ..... 8.2.2, 10.4.7.2, 10.5.1, 10.5.2

**-G-**

- Garden windows ..... 8.3
- Gas supply ..... *see* Manufactured home gas supply
- Ground covers ..... 5.8.2, 5.8.3
- Grounding of light fixtures ..... 8.5.2
- Ground moisture control ..... 5.8
- Gutters ..... 5.7.4
- Gypsum wallboard, unfinished ..... 7.7.4

**-H-**

- Heating oil systems ..... 10.5
- Heat pumps ..... 9.2.2
- Hinged roofs and eaves ..... 8.2
- Home installation manual supplements ..... 4.3.3

<b>-I-</b>	
<b>Installation</b>	
Considerations .....	4.4
Definition .....	3.3.11
Optional features .....	Chap. 8
Preinstallation considerations .....	4.4
<b>Installation alteration (definition) .....</b>	<b>3.3.12</b>
<b>Installation considerations .....</b>	<b>4.3</b>
<b>Installation instructions (definition) .....</b>	<b>3.3.13</b>
<b>Installation procedures .....</b>	<b>Chap. 7</b>
Anchoring instructions .....	7.5
Close-up/finishing .....	7.7
Before moving manufactured home to location .....	7.1
Multisection homes	
Crossover connections for .....	7.4
Interconnection of .....	7.3
Of on-site structures .....	7.6
Positioning of home .....	7.2
<b>Insulated foundations, footings for .....</b>	<b>6.3.2.3</b>
<b>Interconnection of multisection homes .....</b>	<b>7.3</b>
<b>Interior close-up .....</b>	<b>7.7.3</b>
<b>-J-</b>	
<b>Joints .....</b>	<b>8.10</b>
<b>-L-</b>	
<b>Labeled (definition) .....</b>	<b>3.2.3</b>
<b>Life safety features .....</b>	<b>Chap. 11</b>
<b>Lighting and light fixtures .....</b>	<b>8.5</b>
Chain-hung fixture, installation of .....	8.5.2.2, Fig. 8.5.2.2
Exterior .....	8.5.1, 8.5.2.1, 8.5.3 to 8.5.5
Grounding of .....	8.5.2
Siding .....	8.5.4
Surface-mounted exterior fixture, installation of .....	8.5.3, Fig. 8.5.3
<b>Listed (definition) .....</b>	<b>3.2.4</b>
<b>Lowest floor (definition) .....</b>	<b>3.3.14</b>
<b>-M-</b>	
<b>Manufactured home (definition) .....</b>	<b>3.3.15</b>
<b>Manufactured home accessory building or structure</b>	
Definition .....	3.3.16
On-site structures, installation of .....	7.6
Outside appliance installation, flood hazard areas .....	9.5.1
<b>Manufactured home gas supply .....</b>	<b>10.4</b>
Definition .....	3.3.17
<b>Manufactured home site</b>	
Definition .....	3.3.18
Preparation of .....	Chap. 5, 7.1
<b>Moving home to location .....</b>	<b>7.1</b>
<b>Multisection homes</b>	
Anchors .....	7.5.2.4.1
Crossovers .....	<i>see</i> Crossovers
Interconnection of .....	7.3
Piers for .....	6.2.5.5
<b>-O-</b>	
<b>Oil tanks and heating oil systems .....</b>	<b>10.5</b>
<b>On-site structures, installation of .....</b>	<b>7.6</b>
<b>Optional features .....</b>	<b>Chap. 8</b>
<b>Organic material, removal of .....</b>	<b>5.6</b>
<b>Oven venting .....</b>	<b>9.4</b>
<b>Over-the-roof straps .....</b>	<b>7.5.3</b>
<b>-P-</b>	
<b>Panels, optional .....</b>	<b>8.7, Fig. 8.7(a)</b>
<b>Permanent foundations .....</b>	<b>6.4</b>
<b>Permits, issuance of .....</b>	<b>5.4</b>
<b>-Q-</b>	
<b>Quick-disconnect, flexible gas connector .....</b>	<b>10.4.4.2</b>
<b>-R-</b>	
<b>Ramadas .....</b>	<b>8.4</b>
Definition .....	3.3.20
<b>Range venting .....</b>	<b>9.4</b>
<b>References .....</b>	<b>Chap. 2</b>
<b>Retroactivity of standard .....</b>	<b>1.4</b>
<b>Roof jacks .....</b>	<b>10.4.6</b>
<b>Roofs</b>	
Chimney extension above .....	9.3.5
Hinged .....	8.2
<b>-S-</b>	
<b>Scope of standard .....</b>	<b>1.1</b>
<b>Seams .....</b>	<b>8.10</b>
<b>Separation distances .....</b>	<b>5.3</b>
On-site structures .....	7.6.2
<b>Setback distances .....</b>	<b>5.2</b>
<b>Sewer drain connections .....</b>	<b>8.8.3</b>
<b>Shall (definition) .....</b>	<b>3.2.5</b>
<b>Should (definition) .....</b>	<b>3.2.6</b>
<b>Shutoff valves, water supply .....</b>	<b>10.2.2.1</b>
<b>Sidewall straps .....</b>	<b>7.5.3</b>
<b>Siding .....</b>	<i>see</i> Exterior siding
<b>Site preparation .....</b>	<b>Chap. 5</b>
<b>Skirting .....</b>	<b>5.8.1, 6.3.2.3.1, 8.8</b>
Definition .....	3.3.21
<b>Slabs .....</b>	<b>6.3.2.2</b>
<b>Sloped sites, drainage of .....</b>	<b>5.7.2</b>
<b>Smoke alarms .....</b>	<b>11.1</b>
<b>Snow load .....</b>	<b>6.5.2</b>
<b>Soil conditions .....</b>	<b>5.5</b>
<b>Stabilizing device (definition) .....</b>	<b>3.3.22</b>
<b>Stand (definition) .....</b>	<b>3.3.23</b>
<b>Standard (definition) .....</b>	<b>3.2.7</b>
<b>Straps, side-wall or over-the-roof .....</b>	<b>7.5.3</b>
<b>Structures</b>	
Definition .....	3.3.24
Drainage .....	5.7.3
On-site structures, installation of .....	7.6
<b>Support systems .....</b>	<b>7.1</b>
Definition .....	3.3.25
Flood hazard areas .....	6.1.5
<b>-T-</b>	
<b>Tanks, oil .....</b>	<b>10.5</b>
<b>Telephone .....</b>	<b>8.9</b>
<b>Term use .....</b>	<b>1.5</b>
<b>Tests, utilities .....</b>	<i>see</i> Utility connection
<b>Tie .....</b>	<i>see also</i> Anchoring equipment
Diagonal tie (definition) .....	3.3.26.1
Vertical tie (definition) .....	3.3.26.2

Tie-down straps ..... 7.5.2.3.2  
 Transporter, access for ..... 5.1  
 TV, cable ..... 8.9

-U-

Utility system connection ..... Chap. 10  
   Definition ..... 3.3.27  
   Drainage system ..... 10.3  
   Electrical system ..... 10.6  
   Gas supply ..... 10.4  
   Heating oil systems ..... 10.5  
   Proper procedures ..... 10.1  
   Tests ..... 10.1.2  
     Drainage system ..... 10.3.5  
     Electrical system ..... 10.6.3  
     Gas supply ..... 10.4.5  
     Heating oil systems ..... 10.5.5  
     Water supply ..... 10.2.4  
   Water supply ..... 10.2  
 Utility crossovers ..... 7.4.1  
   Drainage system ..... 10.3.4

Gas supply ..... 10.4.4  
 Water supply ..... 10.2.2.2  
 Utility schematics ..... 4.3.2  
 Utility system testing .....see Utility system connection

-V-

Valves, water supply ..... 10.2.1, 10.2.2.1  
 Vapor barrier ..... 8.8.2.1(2)  
 Vapor retarder ..... 5.8.1  
 Ventilation ..... 8.8.2  
   Options ..... 8.6  
 Venting  
   Clothes dryer ..... 9.1  
   Range, cooktop, and oven ..... 9.4  
 Vent stacks ..... 8.2.2

-W-

Water heaters ..... 8.2.2, 10.4.7.3  
 Water supply ..... 8.8.3, 10.2  
 Wind, security against ..... 7.5.1, 7.5.4.2  
 Windows, garden and bay ..... 8.3  
 Wood-stove chimneys ..... 9.3