

NFPA 225

Model Manufactured Home Installation Standard

2005 Edition



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An International Codes and Standards Organization

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NFPA 225

Model Manufactured Home Installation Standard

2005 Edition

This edition of NFPA 225, *Model Manufactured Home Installation Standard*, was prepared by the Technical Committees on Manufactured Housing, released by the Technical Correlating Committee on Manufactured Housing, and acted on by NFPA at its November Association Technical Meeting held November 13–17, 2004, in Miami Beach, FL. It was issued by the Standards Council on January 14, 2005, with an effective date of February 7, 2005.

This edition of NFPA 225 was approved as an American National Standard on February 7, 2005.

Origin and Development of NFPA 225

The first edition of NFPA 225 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 NFPA 225. In 2000, an agreement in principle was reached between NCSBCS and NFPA that would allow transfer of the ANSI standard to NFPA. It was a logical move since an installation standard would allow the basic criteria of the manufactured housing standard, as contained in NFPA 501, *Standard on Manufactured Housing*, to allow for the completed unit to be efficiently, effectively, safely, and adequately installed.

The second area that highlighted the need for the installation standard was passage of the Manufactured Housing Improvement Act (MHIA) of 2000. Although the MHIA was not considered 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. NFPA 225 thus not only was developed to pick up where that previous NCSBCS document had left off, it became an integral part of providing another option, along with other state-sponsored installation standards, that could potentially be considered by HUD.

The installation criteria in this standard are widely varied and cover a range of subjects. As written, NFPA 225 is 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, and procedures during on-site installation/erection, as well as management of appliances and utility connections. Requirements reflecting current design loads and practices associated with seismic, wind, and flood events have been included. 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, seismic events, and flood.

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Committee Scope: This Correlating Committee shall have primary responsibility for documents or portions of documents that provide a safe and healthy environment for the occupant of a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on administrative provisions and planning requirements for manufactured homes to assure the adequacy of architectural planning considerations and documentation of compliance for a safe and healthy environment for the occupants of a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on electrical conductors and electrical equipment installed within or on manufactured homes to provide a safe and healthy environment for the occupants of a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on fire safety to the occupants of a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on condensation control; air infiltration; thermal insulation; certification for heating and comfort cooling; and heating, cooling, and fuel-burning equipment that is installed within, on, or external to a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on plumbing systems that provide a safe and healthy environment for the occupants of a manufactured home.

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Committee Scope: This Committee shall have primary responsibility for documents or portions of documents on materials, products, equipment and workmanship and testing needed to ensure that there is a safe and healthy environment for the occupant of a manufactured home. The Committee shall also have the responsibility associated with the general requirements for designing the structure to fully withstand the adverse effects of transportation shock and vibration on a manufactured home.

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Information on referenced publications can be found in Chapter 2 and Annex E.

Chapter 1 Administration

1.1* Scope. This model standard shall cover the 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, *Standard on Recreational Vehicles*, or to park trailers as defined in ANSI A119.5, *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 Stan-*

dards, and 24 CFR 3282, *Manufactured Home Procedural and Enforcement Regulations*. Mobile homes built prior to June 15, 1976, are also covered by this standard.

1.3.5 This standard is designed to be adopted by authorities having jurisdiction over, and responsibility for, the safety and health of manufactured home users. It is intended to apply to all home installations, whether at new or existing manufactured home sites.

1.3.6 Flood Hazard Areas. The provisions of this standard shall apply to installations on home sites that are wholly or partly located in flood hazard areas, including installations of new manufactured homes, replacement manufactured homes, substantial improvement of existing manufactured homes, and repair of substantially damaged manufactured homes. Installations in flood hazard areas shall meet the requirements of Chapter 12.

1.3.6.1* Pre-Installation Considerations. Prior to the 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 hazard map. If the AHJ has not adopted a flood hazard map, the AHJ shall be consulted to determine installation requirements.

1.4 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

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

1.6 Equivalency.

1.6.1 General. Nothing in this standard shall be intended to prevent use of systems, fire resistance, effectiveness, durability, and safety over those prescribed by this standard. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency. The system, method, or device shall be approved for the intended purpose by the AHJ.

1.6.2 Approval of Alternatives. Alternative systems, methods, or devices approved as equivalent by the AHJ shall be recognized as being in compliance with this standard.

1.6.3 Permitted Alternatives. The provisions of this standard shall not be construed to prevent the use of construction systems, materials, or methods of design, or interpolations, calculations, evaluations, or similar evidence based on test data acceptable to the AHJ, as alternatives to the standards and

provisions set forth in this standard. Such alternatives shall be permitted to be offered for approval, and their consideration shall be as provided in 1.6.2 through 1.6.5.

1.6.4 Standards. Construction systems, materials, or methods of design referred to in this standard shall be considered as standards of quality and strength. New or alternative construction systems, materials, or methods of design shall be at least equal to, and shall meet the intent of, these standards for the corresponding use intended.

1.6.5 Systems, Materials, and Methods. Any person desiring to use construction systems, materials, or methods of design not specifically mentioned in this standard shall file with the authority having jurisdiction a request for permission to use such systems, materials, or methods. Where alternative construction systems or materials are requested, the request shall be submitted with documentation, in writing, that supports claims of the sufficiency of such construction systems or materials. If a test installation is proposed, a description of the location and purpose of the test shall also be submitted.

1.6.6 Approval. The AHJ shall approve alternate construction systems, materials, or methods of design when it is substantiated that the requirements of this standard are at least equaled. If, in the opinion of the AHJ, the requirements of this standard are not equaled by the alternative requested, approval for permanent work shall be refused. Consideration shall be given to test or prototype installations.

1.6.7 Tests.

1.6.7.1 Whenever there is insufficient evidence of compliance with the requirements of this standard, evidence that any material or method of construction does not conform to the requirements of this standard or insufficient evidence to substantiate claims for alternative construction systems, materials, or methods of construction, the AHJ shall be permitted to require tests for proof of compliance to be made by an approved agency at the expense of the owner or owner's agent.

1.6.7.2 Test methods shall be as specified by this standard for the material in question. If there are not appropriate test methods specified in the standard, the AHJ is authorized to accept an applicable test procedure from another source.

1.6.7.3 Copies of the results of all tests shall be retained for not less than 2 years after the acceptance of the building or structure.

1.6.8 Appeal. Any person whose request for use of alternative systems and materials or methods of design has been refused by the authority having jurisdiction shall be permitted to appeal to the board of appeals. [5000:1.5.8]

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, Quincy, MA 02169-7471.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2002 edition.

NFPA 70, *National Electrical Code*®, 2005 edition.

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

NFPA 501, *Standard on Manufactured Housing*, 2005 edition.

NFPA 501A, *Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities*, 2005 edition.

NFPA 1192, *Standard on Recreational Vehicles*, 2005 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2003 edition.

2.3 Other Publications.

2.3.1 ANSI Publication. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

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

2.3.2 ASCE Publications. American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191.

ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, 2002.

SEI/ASCE 24, *Flood Resistant Design and Construction*, 1998.

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.

ASTM D 4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*.

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

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

AWPA C9, *Plywood Preservative Treatment by Pressure Processes*, 2002.

2.3.5 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

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 defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or 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 Alteration. See 3.3.15, Installation Alteration.

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

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

3.3.4 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.

3.3.5 Arid. An area subject to 15 in. (381 mm) or less of annual rainfall.

3.3.6* Crossovers. Utility connections in multisection homes that are located where the sections are joined.

3.3.7 Elevation.

3.3.7.1 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. [5000, 2003]

3.3.7.2 Design Flood Elevation (DFE). The elevation of the design flood, including wave height, relative to the datum specified on a jurisdiction’s flood hazard map. [5000, 2003]

3.3.8 Flood.

3.3.8.1 Base Flood. The flood having a 1 percent chance of being equaled or exceeded in any given year. [5000, 2003]

3.3.8.2 Design Flood. The greater of either (1) the base flood or (2) the flood so designated by the jurisdiction as its regulatory flood, with a 1 percent chance, or less, of being equaled or exceeded in any given year. [5000, 2003]

3.3.9 Flood Damage-Resistant Material. Any construction material capable of direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repairs. [5000, 2003]

3.3.10* 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. [5000, 2003]

3.3.11 Flood Hazard Map. A map delineating the flood hazard area and adopted by a jurisdiction. [5000, 2003]

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

3.3.13* Foundation Wall. A wall below the floor nearest grade that serves as a structural support for the home.

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

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

3.3.16 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.

3.3.17* Lowest Floor. The floor of the lowest enclosed area of a manufactured home. For the purpose of this standard, *lowest floor* shall mean the bottom of the longitudinal chassis frame beam in A zones, and the bottom of the lowest horizontal structural member supporting the home in V zones. 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.

3.3.18 Manufactured Home. A structure, transportable in one or more sections, that, 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 ft² (29.7 m²) or more and that is built on a permanent chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected therein. The term *manufactured home* includes any structure that meets all the provisions of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency, and except that such term shall not include any self-propelled recreational vehicle. Calculations used to determine the number of square feet (square meters) 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.

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

3.3.20 Manufactured Home Gas Supply Connector. A listed connector designed for connecting the manufactured home to the gas supply source. [501A, 2005]

3.3.21 Manufactured Home Park or Subdivision. For all matters related to installation in flood hazard areas, the term *manufactured home park or subdivision* shall mean a parcel (or contiguous parcels) of land divided into two or more manufactured home sites for sale or rent.

3.3.21.1 Existing Manufactured Home Park or Subdivision.

For all matters related to installation in flood hazard areas, the term *existing manufactured home park or subdivision* shall mean a home park or subdivision for which the construction of facilities for servicing the sites (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or installation of pads) was completed prior to the effective date of the initial adoption of floodplain management regulations or map by the AHJ.

3.3.21.2 New Manufactured Home Park or Subdivision.

For all matters related to installation in flood hazard areas, the term *new manufactured home park or subdivision* shall mean a home park or subdivision for which the construction of facilities for servicing the sites (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or installation of pads) is completed on or after the effective date of the initial adoption of floodplain management regulations or map by the AHJ.

3.3.22 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.

3.3.23* Pier. An isolated support used in a support system extending between the footing and the manufactured home.

3.3.24 Ramada. Any freestanding roof or shade structure installed or erected above a manufactured home or any portion thereof. [501A, 2005]

3.3.25 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.

3.3.26 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.

3.3.27 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.

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

3.3.29 Substantial Improvement. For manufactured homes, including support and anchoring systems located wholly or partly within the flood hazard area: (1) any repair, addition, reconstruction, rehabilitation or improvement of the manufactured home, including support and anchoring systems, the cost of which equals or exceeds 50 percent of the market value of the manufactured homes, including support and anchoring systems; (2) if a manufactured home, including support

and anchoring systems, has sustained substantial damage, any repairs or reconstruction regardless of the actual work performed. Substantial improvement shall not include any project or improvement of a manufactured home required to correct existing health, sanitary, or safety code violations identified by the AHJ, and that are the minimum necessary to assure safe living conditions.

3.3.30 Support System. Piers, foundation walls, and other equivalent systems approved in accordance with 4.5.1.3 and their footings, anchorage to the manufactured home, shims, and any combination thereof that, when properly installed, support the manufactured home.

3.3.31 Tie. See 3.3.3, Anchoring Equipment.

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

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

3.3.32 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. See Chapter 12.

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

4.3* Data Plate. The home installation shall be capable of resisting the loads and conditions listed on the data plate.

4.4 Installation Considerations. The items listed in 4.4.1 through 4.4.4 shall be reviewed prior to installing the manufactured home.

4.4.1 Installation Instructions. Specific installation methods, operations, and assemblies in the manufacturer's installation instructions (if available) shall be followed.

4.4.2 Utility Schematics. Field installations shall be in accordance with the utility schematics provided by the manufacturer, or as required by the AHJ.

4.4.3 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.

4.4.4 The home shall be installed in accordance with the design zone maps indicated on the data plate.

4.5 Design and Construction. Installation of manufactured homes, including support and anchoring systems, shall be designed and constructed to support all loads and load combinations required by this chapter and elsewhere in this standard.

4.5.1 Design Methods. Design of support systems and their connection to the manufactured home shall be in accordance with 4.5.1.1, 4.5.1.2, or 4.5.1.3.

4.5.1.1 Prescriptive Design. Design shall be in accordance with the provisions of this standard.

4.5.1.2 Engineered Design. Design shall be in accordance with ASCE 7, *Minimum Design Loads for Buildings and Other Structures*.

4.5.1.3 Equivalency. Equivalent systems shall be permitted if approved by the authority having jurisdiction.

4.5.2 Combined Design Methods. Support systems shall not be designed using a combination of prescriptive design in accordance with 6.2.3 through 6.2.5 and engineered design in accordance with 4.5.1.2 or equivalency in accordance with 4.5.1.3, within the support system for a single home or accessory building.

4.5.3 Seismic Design.

4.5.3.1 Seismic Design Criteria.

4.5.3.1.1 Determination of Seismic Design Category. Seismic design categories (SDC) shall be determined from either Table 4.5.3.1.1 or Figure 4.5.3.1.1.

4.5.3.1.2 SDC A, B, and C. The provisions of 4.5.3.2 through 4.5.3.4 shall not apply to SDC A, SDC B, or SDC C.

4.5.3.1.3 SDC D₀, D₁, D₂, and E. Manufactured homes located in SDC D₀, D₁, D₂, and E shall meet the additional requirements of either 4.5.3.2 or 4.5.3.3, and 4.5.3.4.

4.5.3.2 Prescriptive Design.

4.5.3.2.1 Prescriptive design in accordance with the seismic requirements of Chapter 13 shall be permitted for homes located in seismic design categories D₀, D₁, D₂, or E, provided the following:

- (1) The 3-second gust basic wind speed is 90 mph (40.2 m/sec) or less, and
- (2) The home is located outside of a flood hazard area, or
- (3) If within a flood hazard area, is located outside a V zone or floodway

4.5.3.2.2 All other homes located in seismic design categories D₀, D₁, D₂, or E shall have an engineered design or approved equivalent system.

Table 4.5.3.1.1 Seismic Design Category by County

Seismic Design Category	State	Counties
SDC D ₀	Alaska	Bristol Bay, Juneau, Northwest Arctic
	Arizona	Coconino, La Paz, Mohave, Pima
	Arkansas	Arkansas, Cleburne, Faulkner, Fulton, Izard, Lonoke, Monroe, Montgomery, Phillips, Prairie, Pulaski, Sharp, Stone, Van Buren, White
	California	Butte, Calaveras, Madera, Sutter, Yuba
	Georgia	Catoosa, Murray, Whitfield
	Hawaii	Honolulu
	Idaho	Adams, Bannock, Bingham, Blaine, Camas, Cassia, Elmore, Franklin, Gem, Jefferson, Madison, Power, Valley, Washington
	Illinois	Bond, Clay, Clinton, Crawford, Edwards, Effingham, Fayette, Jasper, Jefferson, Lawrence, Madison, Marion, Monroe, Randolph, Richland, St. Clair, Wabash, Washington, Wayne
	Indiana	Gibson, Knox, Pike, Posey, Spencer, Vanderburgh, Warrick
	Kentucky	Christian, Daviess, Henderson, Hopkins, McLean, Muhlenberg, Webster
	Maine	Aroostook
	Mississippi	Benton, Coahoma, Lafayette, Marshall, Panola, Quitman, Tate
	Missouri	Carter, Iron, Jefferson, Madison, Oregon, Reynolds, St. Francois, St. Louis, Ste. Genevieve, Shannon, Washington
	Montana	Glacier, Granite, Lewis and Clark, Lincoln, Meagher, Powell, Silver Bow
	Nevada	Clark, Pershing, White Pine
	New Mexico	Bernalillo, Los Alamos, Rio Arriba, Sandoval, Santa Fe, Socorro, Valencia
	New York	Clinton, Essex, Franklin, St. Lawrence
	North Carolina	Cherokee, Columbus, Graham, Swain
	Oregon	Baker, Harney, Hood River, Jackson, Linn, Malheur, Umatilla
	South Carolina	Aiken, Allendale, Barnwell, Beaufort, Chesterfield, Darlington, Dillon, Fairfield, Hampton, Jasper, Kershaw, Lee, Lexington, Marlboro, Richland
	Tennessee	Benton, Blount, Bradley, Chester, Cocke, Decatur, Grainger, Hamblen, Hamilton, Hardeman, Hardin, Henderson, Houston, Humphreys, Jefferson, Knox, Loudon, McMinn, McNairy, Monroe, Montgomery, Polk, Sevier, Stewart, Union
	Texas	El Paso, Hudspeth
	Utah	Beaver, Carbon, Emery, Garfield, Kane, Millard, Piute, Sanpete, Sevier, Washington, Wayne
	Vermont	Franklin, Grand Isle
	Washington	Benton, Chelan, Kittitas, Klickitat, Skamania, Walla Walla, Yakima

Table 4.5.3.1.1 *Continued*

Seismic Design Category	State	Counties
SDC D₁	Alaska	Fairbanks North Star, Sitka
	Arizona	Yuma
	Arkansas	Independence, Lee, Randolph, Woodruff
	California	Amador, Glenn, Mariposa, Tulare, Tuolumne
	Hawaii	Maui
	Idaho	Boise, Bonneville, Butte, Caribou, Clark, Lemhi, Oneida, Teton
	Illinois	Franklin, Gallatin, Hamilton, Hardin, Perry, Saline, White
	Kentucky	Caldwell, Calloway, Crittenden, Lyon, Trigg, Union
	Mississippi	De Soto, Tunica
	Missouri	Perry, Ripley, Wayne
	Montana	Broadwater, Flathead, Jefferson, Missoula, Park, Sanders
	Nevada	Churchill, Elko, Eureka, Humboldt, Lander, Lincoln, Nye
	Oregon	Clackamas, Columbia, Lake, Marion, Multnomah, Washington
	South Carolina	Bamberg, Calhoun, Horry, Marion, Sumter
	Tennessee	Bedford, Carroll, Fayette, Henry, Madison
	Utah	Iron, Juab, Morgan, Rich, Tooele, Wasatch
	Washington	Clark, Cowlitz, Lewis, San Juan, Skagit, Thurston, Whatcom
	Wyoming	Park, Sublette
SDC D₂	Alaska	Aleutians East, Anchorage, Denali, Haines, Lake and Peninsula, Matanuska-Susitna
	Arkansas	Jackson, Lawrence
	California	Colusa, Del Norte, El Dorado, Fresno, Kings, Merced, Modoc, Nevada, Placer, Plumas, Sacramento, San Joaquin, Sierra, Siskiyou, Stanislaus, Tehama, Yolo
	Idaho	Bear Lake, Custer, Fremont
	Illinois	Jackson, Pope, Williamson
	Kentucky	Livingston, Marshall
	Missouri	Bollinger, Butler
	Montana	Beaverhead, Gallatin, Lake, Madison
	Nevada	Lyon, Mineral, Storey, Washoe
	Oregon	Benton, Clatsop, Coos, Curry, Douglas, Josephine, Klamath, Lane, Lincoln, Polk, Tillamook, Yamhill
	South Carolina	Berkeley, Charleston, Clarendon, Colleton, Dorchester, Florence, Georgetown, Orangeburg, Williamsburg
	Tennessee	Weakley
	Utah	Box Elder, Cache, Summit, Utah
	Washington	Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, Snohomish, Wahkiakum
	Wyoming	Lincoln, Teton
SDC E	Alaska	Kenai Peninsula, Kodiak Island, Yakutat
	Arkansas	Clay, Craighead, Crittenden, Cross, Greene, Mississippi, Poinsett, St. Francis
	California	Alameda, Alpine, Contra Costa, Humboldt, Imperial, Inyo, Kern, Lake, Lassen, Los Angeles, Marin, Mendocino, Mono, Monterey, Napa, Orange, Riverside, San Benito, San Bernadino, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Trinity, Ventura
	Hawaii	Hawaii
	Illinois	Alexander, Johnson, Massac, Pulaski, Union
	Kentucky	Ballard, Carlisle, Fulton, Graves, Hickman, McCracken
	Missouri	Cape Girardeau, Dunklin, Mississippi, New Madrid, Pemiscot, Scott, Stoddard
	Nevada	Douglas, Esmeralda
	Tennessee	Crockett, Dyer, Gibson, Haywood, Lake, Lauderdale, Obion, Shelby, Tipton
	Utah	Davis, Salt Lake, Weber

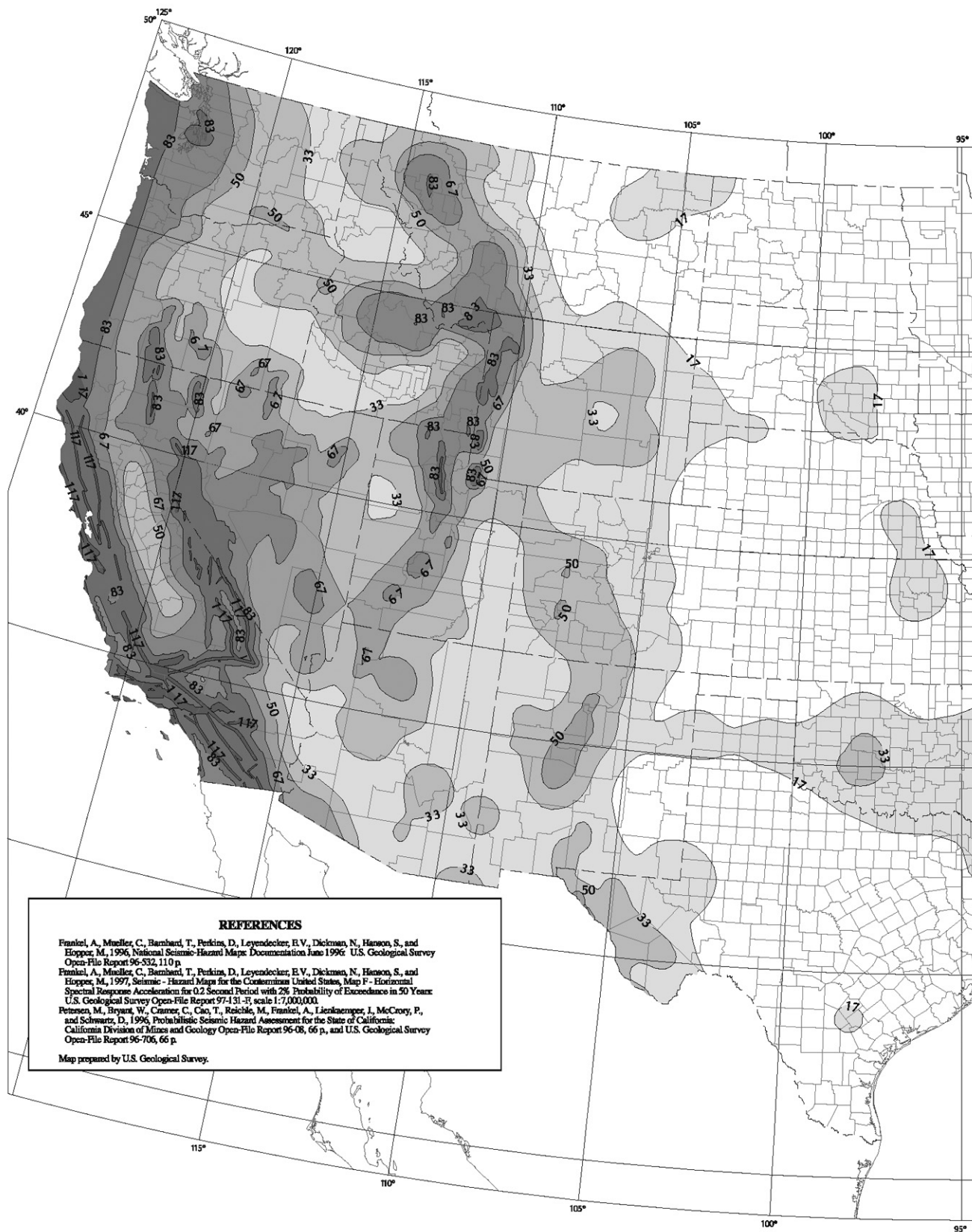
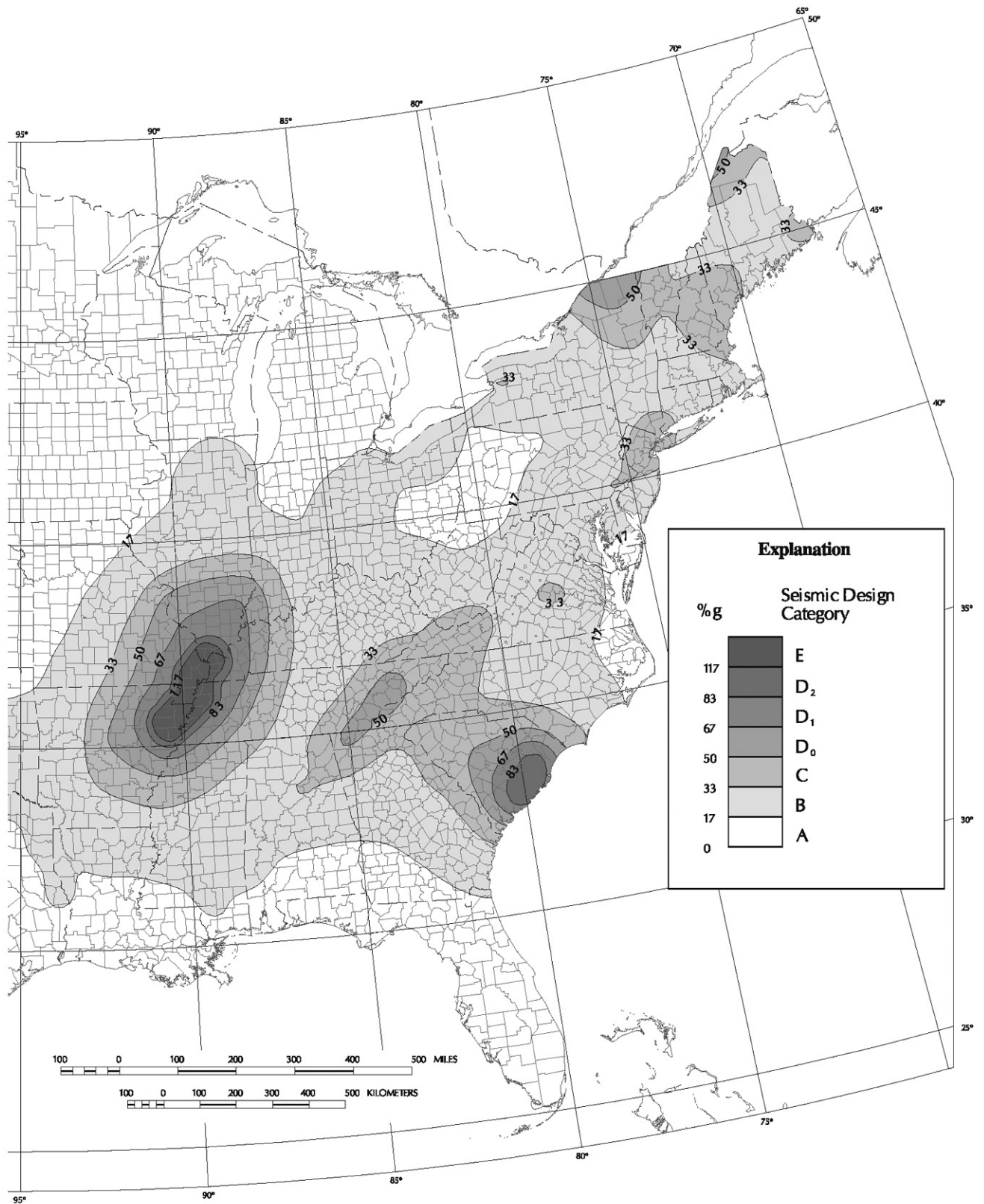


FIGURE 4.5.3.1.1 Seismic Design Category Map.

FIGURE 4.5.3.1.1 *Continued*

4.5.3.3 Engineered Design. Engineered design of support systems and their foundations and anchorage, in accordance with 4.5.1.2, shall include all applicable design loads and other applicable seismic provisions of ASCE 7, *Minimum Design Loads for Buildings and Other Structures*.

4.5.3.4 Seismic Installation and Equipment Bracing Requirements. Manufactured homes shall conform to the additional installation and equipment bracing requirements of Chapter 14.

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 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 Chapter 6 of NFPA 501A, *Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities*, or the requirements of the authority having jurisdiction, whichever is more stringent.

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

5.5 Site Preparation.

5.5.1 Prior to construction, the area to be occupied by the structure shall be cleared of debris, vegetation, and topsoil to a depth sufficient to remove all organic material.

5.5.2 Soil that supports footings and foundations shall be capable of accommodating all loads required by this standard. Fill soil that supports footings and foundations shall be designed, installed, and tested in accordance with accepted engineering practice. The design bearing capacity of soil shall be determined in accordance with Section 5.6.

5.6 Investigation and Bearing Capacity of Soil.

5.6.1* Presumptive Capacities. Where no unusual soil or saturation conditions are present, the allowable soil bearing pressures in Table 5.6.1 shall be permitted to be used. Higher values shall not be used unless they are substantiated by recognized tests, analysis, or other data, and then approved by the AHJ.

5.6.2 Soil Investigation. Where the soil bearing capacity is unknown or questionable, the AHJ shall be permitted to require evaluation of subsoil conditions by a registered professional engineer or by a load test in accordance with NFPA 5000, *Building Construction and Safety Code*, paragraph 36.3.2. When approved by the AHJ, the soil bearing capacity shall be permitted to be determined from local soil records.

5.6.3 Expansive Soils. [5000:36.3.3]

5.6.3.1 Where the nature of the soil is not known in sufficient detail, the authority having jurisdiction shall be permitted to require testing to determine the expansive characteristics of the soil. [5000:36.3.3.1]

5.6.3.2 Each potentially expansive stratum of soil above the level where a constant moisture content exists shall be tested

Table 5.6.1 Maximum Allowable Soil Pressures

Class of Material	Minimum Depth of Footing Below Adjacent Ground		Pressure Permitted if Footing Is at Minimum Depth*	
	ft	m	psf	kN/m ²
Compact fine sand	1	0.3	1000 [†]	48 [†]
Loose sand	2	0.6	500 [†]	24 [†]
Medium stiff clay	1	0.3	2000	96
Soft, sandy clay or clay	2	0.6	1000	48
Compact inorganic sand and silt mixtures	1	0.3	1000	48
Loose inorganic sand and silt mixtures	2	0.6	500	24
Loose organic sand and silt mixtures and peat	—	—	0	0

*These pressures are considered sufficient to prevent failure of the supporting ground but not to prevent excessive foundation movement or settlement where unusual soil or moisture conditions are encountered.

[†]Values are for footings 1 ft (0.30 m) wide and are permitted to be increased in direct proportion to the width of the footing to a maximum of 2½ times the designated value.

in accordance with ASTM D 4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*, to determine its plasticity index (PI). [5000:36.3.3.2]

5.6.3.2.1 If the PI of all strata is less than 15, the soil shall not be considered expansive. [5000:36.3.3.2.1]

5.6.3.2.2 If the PI of any stratum is 15 or greater, the soil shall be considered potentially expansive and shall be subjected to additional approved tests and evaluation to determine if the soil will adversely affect the structural integrity and serviceability of the structure. [5000:36.3.3.2.2]

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.

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