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**American National Standard
MANUFACTURED HOME
INSTALLATIONS**

Secretariat
National Conference of States on
Building Codes and Standards, Inc.

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American National Standards Institute, Inc.

American National Standard

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This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Manufactured Home Installations (Manufactured Home Sites, Set-ups, Utilities), A225.1. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the A225.1 Committee had the following members:

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American National Standard — Manufactured Home Installations

1 Introduction, applicability, and organization of standard

1.1 Scope

This standard covers the installation of manufactured homes, wherever located, whenever the manufacturer's installation instructions are not available. Included are requirements for manufactured home sites and set-ups.

1.2 Intended usage of manufactured homes covered under this standard

The provisions of this standard are intended to apply to manufactured homes (single-section, multisection, or expandable types) for use as single-family dwellings.

NOTE 1 — The Federal Manufactured Home Construction and Safety Standards (MHCSS) cover one-family occupancies only. This standard makes no provisions for other residential occupancies.

NOTE 2 — This standard does not apply to manufactured homes used for other than dwelling purposes.

NOTE 3 — The provisions of this standard shall not apply to recreational vehicles as defined in the National Fire Protection Association (NFPA) 501C, Standard for Recreational Vehicles, or to park trailers as defined in the ANSI A119.5, Standards for Park Trailers.

1.2.1 Types of manufactured homes covered

The manufactured homes covered under this standard are manufactured homes complying with the U.S. Department of Housing and Urban Development (HUD)'s MHCSS Program, as set forth in 24 C.F.R., Parts 3280, 3282, and 3283, as mandated in the United States of America and manufactured homes built prior to June 15, 1976, including those complying with the Standard for Mobile Homes, NFPA 501B/ANSI A119.1 edition, in effect at the time of

manufacture.

NOTE — The Federal standards, regulations, and requirements for manufactured housing, as authorized by 42.U.S.C.5401 et seq., are as follows:

*Part 3280 — MHCSS

*Part 3282 — Manufactured Home Procedural and Enforcement Regulations

*Part 3283 — Manufactured Home Consumer Manual Requirements

Hereafter, throughout sections three through eight of this document, "manufactured home" will be used interchangeably with "home."

1.2.2 Applicability

This standard is designed to be adopted by authorities having jurisdiction over and responsible 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.

While this standard provides useful technical data for improvements to existing sites falling within its scope, and such use is encouraged, it is not intended to be applied retroactively to existing sites except where the authority having jurisdiction considers such application essential for the safety and health of the occupants or users of the sites. This standard shall not be construed as relieving the installer of a manufactured home of the responsibility for compliance with the codes and regulations established by the authorities having jurisdiction.

1.2.3 Organization of standard

This standard consists of eight sections, generally divided by the kinds of work involved in properly setting up a home.

1.2.4 Use of this standard

This standard contains instructions, including specifications and procedures, for installation

and hook-up of a manufactured home. It has been written in an objective and easy-to-understand manner so that it can be understood by those who lack extensive technical training. It discusses the installation of the home from preparation of the site through final inspection. It includes many tables and figures giving important data for proper installation.

Careful adherence to this standard by the home owner and installation crew, and consultation with a registered engineer in those unusual circumstances it does not cover, will help ensure the home owner of a well-built, safe, and affordable home for many years to come.

1.3 Preinstallation considerations

Prior to locating or relocating a manufactured home, the authority having jurisdiction shall be contacted for installation procedures.

Some jurisdictions require licensed or registered installers. Many jurisdictions require permits to be obtained prior to the installation of such items as blocking, anchoring, and electrical and sewer or water connections or both. Inspections will be required in conjunction with permits to help ensure a correct and safe installation of the manufactured home, with notification to the jurisdiction at different times during the installation.

For private property, installation zoning or development covenants may apply and should also be taken into consideration.

1.3.1 Alterations

Prior to altering a home, i.e., modifying the electrical, plumbing, or heating or cooling systems; adding a room, carport, or garage; or making major repairs such as replacing a roof, be sure to contact the authority having jurisdiction. A plan approval and permit may be required.

1.3.2 Safety

Only trained crews should install the home. Installers should follow the safety instructions provided in this standard.

1.3.3 Support

Manufactured homes weigh several tons. Installers should use enough temporary blocking to support the home during installation. No one should be allowed under the home unless it is securely in place, even if it is not moving.

1.4 Consumer information card

The distributor or dealer of the manufactured home shall fill out the *consumer information card* and return it to the home's manufacturer, so that the consumer may be notified of revised instructions or new products.

2 Definitions

accessory building or structure, manufactured home: A building or structure that is an addition to or supplements the facilities provided by a manufactured home. Examples are: awnings, garages, storage structures, carports, fences, windbreaks, or porches.

anchoring equipment: Straps, cables, turnbuckles, and chains, including tensioning devices, that are used with ties to secure a manufactured home to ground anchors.

anchoring system: A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist the overturning of the home or sideways movement caused by wind.

approved: Acceptable to the authority having jurisdiction.

NOTE – NCSBCS and ANSI do not approve, inspect, or certify any installations, procedures, equipment, or material, nor do they approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NCSBCS/ANSI or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listing or labeling practices of an organization concerned

with product evaluations that is in a position to determine compliance with appropriate standards for current production of listed items.

authority having jurisdiction: The organization, office, or individual responsible for approving plans, equipment, an installation, or an alteration procedure.

awning: A shade structure supported by posts or columns and entirely or partially supported by a manufactured home installed, erected, or used on a manufactured home site.

baling: A method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a manufactured home with straps.

cabana: A room enclosure erected or constructed adjacent to a manufactured home for residential use by the occupant of the manufactured home.

carport: An awning or shade structure for a vehicle(s) that is freestanding and not attached to a manufactured home.

construction alteration: The replacement, addition, modification, or removal of any equipment or installation that may affect the originally approved design of construction, plumbing, heating, cooling, fuel-burning, or electrical systems.

diagonal tie: A tie intended to resist horizontal or shear forces and to resist vertical, uplift, and overturning forces.

dwelling unit: One or more habitable rooms that are designed to be occupied by one family, with facilities for living, sleeping, cooking, eating, and sanitation.

frame, main: That part of the structural system that is normally used to transmit accumulative design loads to the support system.

footing: That part of the support system that sits directly on the ground at, below, or partly below grade to support the piers.

foundation, manufactured home: A site-built or site-assembled system of stabilizing devices that

is:

- Capable of transferring design dead loads and lateral and vertical live loads, as required by the Manufactured Home Procedural and Enforcement Regulations, and other design loads unique to local home sites that result from wind, seismic, and water conditions, or that are imposed by or upon the structure, into the underlying soil or bedrock without failure;

- Placed at an adequate depth, or otherwise adequately designed, to prevent frost damage in areas that are susceptible to frost;

- Constructed of materials acceptable to the authority having jurisdiction.

garage: A freestanding structure located on a manufactured home site and designed for the storage of motor vehicles.

gas supply connector, manufactured home: A listed connector designed for connecting the manufactured home to the gas supply source.

ground anchor: A device placed at the manufactured home stand designed to transfer home anchoring loads to the ground.

habitable room: A room or enclosed floor space arranged for living, eating, food preparation, or sleeping purposes, not including bathrooms, toilet compartments, laundries, pantries, foyers, hallways, and other accessory spaces.

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 or anchoring systems.

installation alteration: The replacement, addition, modification, or removal of any components of the required ground support or ground anchoring systems.

installation instructions: Instructions provided by the manufacturer, which accompany each manufactured home and detail the manufacturer's requirements for ground support, anchoring systems, and other work completed

on site.

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; that is concerned with product evaluation; that maintains periodic inspection of production of labeled equipment or materials; and that provides labels, the use of which indicates a manufacturer's compliance with appropriate standards or performance in a specified manner.

listed: Equipment or materials included in a list that is published by an organization acceptable to the authority having jurisdiction; that is concerned with product evaluation; that maintains periodic inspection of production of listed equipment or materials; and that produces listings that state either that the equipment or materials meet appropriate standards or have been tested and found suitable for use in a specified manner.

NOTE – The means for identifying listed equipment may vary among organizations that are concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should use the system employed by the listing organization to identify a listed product.

manufactured home: A structure, transportable in one or more sections that, in its traveling mode, is 8 body feet or more in width or 40 body feet or more in length, or, when erected on site, is 320 or more square feet; that is built on a permanent chassis; that is designed to be used as a dwelling; that may or may not have a permanent foundation; that is connected to the required utilities; and that contains the plumbing, heating, air conditioning, and electrical systems; except that such term shall include any structure that meets the size requirements and for which the manufacturer has voluntarily filed a certification required by the Secretary of HUD; and that complies with the MHCSS.

NOTE – This definition should not be interpreted to include any types of recreational vehicles (including so-called "park models" or travel trailers) that may equal or exceed the body length or width

specified herein.

noncompliance: Failure of a manufactured home to comply with the MHCSS that does not constitute a defect, serious defect, or imminent safety hazard.

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:

- manufactured steel stands;
- pressure-treated wood;
- manufactured concrete stands;
- concrete blocks.

porch: An outside walking area with a floor that is elevated more than 8 inches above grade.

ramada: Any freestanding roof or shade structure installed or erected above a manufactured home or any portion thereof.

shall: Indicates a mandatory requirement.

should: Indicates a recommendation or that which is advised but not required.

site, manufactured home: 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.

skirting: A weather-resistant material used to enclose the space from the bottom of the manufactured home to grade.

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

stand, manufactured home: That area of a manufactured home site that has been reserved for the placement of a manufactured home.

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.

support system: A combination of footings, piers, and shims that will, when properly installed, support the manufactured home.

tie: See anchoring equipment.

utility connections: The connection of the manufactured home to existing utilities that include, but are not limited to, electricity, water, sewer, gas, or fuel oil.

vertical tie: A tie intended to resist uplifting and overturning forces.

3 Site preparation

3.1 Location and layout

3.1.1 Use of zone maps

A home is designed for certain weather conditions and roof loads [see zone maps near main electrical panel and in figures 3-1(a), (b), and (c)]. Do not site or relocate a home in a zone requiring greater wind, roof load, or heating or cooling capabilities than those for which it was designed.

3.1.2 Access for transporter

Before attempting to move a home, ensure that the transportation equipment and home can be routed to the installation site. Special transportation permits may be required from state, county, or city officials.

3.1.3 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.

3.1.4 Fire separation distance

The distance a home must be sited from other structures depends on its fire resistance rating and on local requirements. Contact the home's manufacturer or the inspection agency identified on the data plate for fire-resistance rating

information.

3.1.5 Issuance of permits

Ensure that all necessary local permits have been obtained and fees paid.

3.2 Soil conditions

3.2.1 Requirements

To help prevent settling or sagging, site the home on firm, undisturbed soil or fill compacted to at least 90 percent of its maximum relative density. Installation on loose, uncompacted fill may invalidate the home's limited warranty.

3.2.2 Bearing capacity

Test the bearing capacity of the soil in accordance with 3.2.3 before designing the foundation. If the soil cannot be tested, but its type can be identified, use the foundation bearing pressures shown in table 3-1 as a guide. If you cannot identify the soil, use a bearing capacity of 1,000 pounds per square foot. Under unusual conditions, or if the soil appears to be composed of peat or uncompacted fill, consult a local geologist, engineer, or architect.

3.2.3 Soil-bearing testing methods and equipment

Use a pocket penetrometer or other methods acceptable to the local jurisdiction having authority.

3.3 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. Remove shrubs and overhanging branches from the immediate vicinity of the home site to prevent windstorm damage.

3.4 Drainage

3.4.1 Purpose

Proper drainage prevents water build-up under the home, which may cause 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.

3.4.2 Elimination of depressions

Grade the home site to permit water to drain from under the home (see figure 3-2).

3.4.3 Drainage structures

Depending on the local landscape, ditches and culverts may be needed to drain surface runoff. If so, consult a registered engineer.

3.4.4 Gutters and downspouts

When gutters and downspouts are installed, direct the run off away from the home.

3.5 Ground moisture control

3.5.1 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.

3.5.2 Acceptable types of ground cover

Use a minimum of six-mil polyethylene sheeting or its equivalent.

3.5.3 Proper installation

Cover the entire area under the home with the sheeting and overlap it at least 12 inches at all joints. Where soil and frost conditions permit placement of footings at grade level, place the sheeting directly beneath the footings.

4 Foundations

NOTE - This section only covers foundations.

Installation procedures and methods for securing the home to its foundations are discussed in 5.

4.1 Piers

4.1.1 Importance

Proper pier installation is the most important part of home installation. Incorrect size, location, or spacing of piers may cause serious structural damage to the home. It is important to install piers around the perimeter as required. Failure to do so may lead to sagging floors, walls, and roofs (see 4.1.5.3).

4.1.2 Acceptable types

Piers may be concrete blocks, pressure-treated wood having 0.60 retention in accordance with American Wood Preservers Association (AWPA) C22 Standard, or adjustable metal or concrete piers (see figure 4-1). Manufactured piers shall be listed or labeled for the required load capacity.

4.1.3 Design requirements

4.1.3.1 Load-bearing capacity

The load that each pier must carry depends 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. Center beam/marriage wall blocking is required for multisection homes.

See tables 4-1 and 4-2 for pier capacities. These tables shall be used when the manufacturer's installation instructions are not available. Manufactured piers must be rated at least to these capacities, and locally constructed piers must be designed to transmit these loads safely (see 4.1.3.2).

4.1.3.2 Configuration

Figure 4-1 shows the recommended arrangement of concrete block piers constructed on site. Load-bearing (not decorative) concrete blocks should have dimensions of at least 8 inches x 8 inches x 16 inches. They must be stacked with their hollow cells aligned vertically. When piers are constructed of blocks stacked

side by side, each layer should be at right angles to the previous one (see figure 4-1).

Cap hollow block piers as shown in figure 4-1 to distribute the structural load evenly across them. Caps may be of solid masonry of at least 4 inches nominal thickness or hardwood at least 2 inches nominal thickness, or of steel (see figure 4-1). All caps shall be of the same length and width as the piers upon which they rest. Avoid using plywood, as it may lead to unwanted settling.

Use 4-inch x 6-inch hardwood shims to level the home and fill any gaps between the base of the I-beam and the top of the pier cap. Always use shims in pairs (see figure 4-1). Drive them in tightly so that they do not occupy more than 1 inch of vertical space. Use hardwood plates no thicker than 2 inches to fill in any remaining vertical gaps.

Select manufactured pier heights so that the adjustable risers do not extend more than 3 inches when finally positioned.

All piers must rest on footings (see 4.2) that extend below the frost line (see 4.2.2 for exceptions to placement) and are placed on either undisturbed soil or compacted fill.

4.1.3.3 Clearance under homes

A minimum clearance of 12 inches shall be maintained beneath the lowest member of the main frame (I-beam or channel beam) in the area of utility connections. No more than 25 percent of the lowest member of the main frame of the home shall be less than 12 inches above grade.

4.1.4 Design procedures

4.1.4.1 Piers less than 36 inches high

Piers less than 36 inches high may be constructed of single, open, or closed-cell concrete blocks, 8 inches x 8 inches x 16 inches. Install them so that the long sides are at right angles to the supported I-beam (see figure 4-1). Position open cells at right angles to the footers. Horizontal offsets should not exceed 1/2 inch top to bottom. Mortar will not normally be required. Manufactured piers

should be listed and labeled.

4.1.4.2 Piers 36 inches to 80 inches high and corner piers

Construct all piers between 36 inches and 80 inches high and all corner piers over three blocks high out of double, interlocked concrete blocks (see figure 4-1). Mortar will not normally be required.

4.1.4.3 Piers over 80 inches high

Where permitted by local codes, lay blocks in concrete mortar with steel reinforcing bars inserted in the block cells and fill the cells with concrete. Where such construction is not permitted by local codes, piers over 80 inches high shall be designed by a registered engineer.

4.1.4.4 Elevated homes

When more than one-fourth of the area of a home is installed so that the bottom of the main-frame members are more than 3 feet above ground level, the home stabilizing devices shall be designed by a qualified engineer and be approved prior to installation by the authority having jurisdiction.

4.1.5 Location and spacing

The location and spacing of piers 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. In general, locate piers no more than 2 feet from either end and not more than 8 feet center-to-center under the main rails.

4.1.5.1 Single-section homes

Figure 4-2 shows the recommended location and spacing of piers for a single-section home when the manufacturer's installation instructions are not available.

4.1.5.2 Multisection homes

Figure 4-3 shows the recommended location and spacing of piers for a multisection home when the manufacturer's installation instructions

are not available.

4.1.5.3 Perimeter blocking

Place piers on both sides of side wall exterior doors and any other side wall openings greater than 4 feet (such as entry and sliding glass doors); under porch posts, fireplaces, and wood stoves; and under the locations where heavy pieces of furniture, such as pianos, organs, waterbeds, etc., are expected to be placed.

4.2 Footings

Footings shall be placed a minimum of 4 inches below grade in undisturbed soil. Support every pier with a properly designed footing (see 4.2.1.1).

4.2.1 Acceptable types of footings

4.2.1.1 Concrete

Footings may consist of precast or poured-in-place concrete, pads, slabs, or ribbons at least 3 1/2-inches thick, with a 28-day compressive strength of at least 3,000 pounds per square inch.

4.2.1.2 Pressure-treated permanent wood

Two layers of nominal 2-inch thick pressure-treated wood having 0.60 retention in accordance with AWPAC22 Standard, with the long dimensions of the second layer placed perpendicular to that of the first, may also be used.

4.2.1.3 Other materials

Other materials approved for footings may be used when approved by local authorities if they provide equal load-bearing capacity and resistance to decay. Examples include:

- 1/2 inch maximum crushed stone;
- 3/8 inch or 3/4 inch graduated gravel;
- coarse sand, with grains no smaller than 1/16 inch, placed so it provides a soil-bearing capacity of at least 3,000 pounds per square foot.

4.2.2 Placement in freezing climates

4.2.2.1 Conventional footings

In areas subject to ground frost heave, place footings below the frost line. Consult local authorities to determine the depth of the frost line. In the absence of a local code, use the frost penetration map provided in figure 4-4 as a guide.

4.2.2.2 Floating slab systems

When properly designed by a registered professional engineer, a "floating slab system" may be used above the frost line. The design shall accommodate the anchorage requirements identified in 5.

4.2.2.3 Insulated foundations

Footings may also 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. Useful design guidelines may be found in the references found in Annex F. Insulation systems should be compatible with the requirement to cross-ventilate the entire space under the home.

4.2.3 Proper sizing of footings

Proper sizing of footings depends upon the load-carrying capacity of both the piers and the soil. See table 4-3 for recommended footing sizes.

4.3 Permanent foundations

Check local building codes and regulations and consult a registered engineer when the home is to be sited on a permanent foundation (such as a full basement, crawl space, or load-bearing perimeter foundation). To obtain a permanent foundation design that meets most local codes, write to the manufacturer of the home. Useful ideas and design guidelines can also be found in reference publications, such as those listed in Annex F.

4.4 Special considerations

Also see 5.5.3.

4.4.1 Areas prone to flooding

Special elevations and anchoring techniques are required when locating a home in an area prone to flooding. Consult an engineer and the local building official to make sure that home design and construction conform to applicable federal, state, and local codes and regulations. The Federal Emergency Management Agency (FEMA) publication listed in Annex F contains design and construction recommendations for elevated foundations as well as for connections and anchoring systems that will allow the foundation system to resist flood forces.

4.4.2 Severe wind areas

Special foundation and anchoring techniques are required when locating a home in a severe wind area is unavoidable. Consult a registered engineer. The HUD foundations design guide listed in Annex F contains recommendations for designing foundations and anchoring systems. Do not place the home in a more severe wind zone than the one indicated on the data plate posted in the home.

4.4.3 Special snow load conditions

Homes designed for and located in heavy snowfall areas or that are subjected to other extreme loading conditions may require special piers or footings. Check with the local authority having jurisdiction.

4.5 Important reference documents

See Annex F.

5 Installation procedures

5.1 Moving manufactured home to location

The following items shall be completed or verified before placing the manufactured home:

- The site is properly prepared (see 3).
- All footing work necessary for setting the

home is completed.

- Utilities are available.

- Any trenching, for crossover drain lines or for wheels that will be left in place, is complete.

- Items that could be difficult to install after the home is sited (such as anchors and ground moisture retarders), are in their proper locations.

CAUTION: *The home weighs several tons. Use adequate temporary support blocking to safeguard workers.*

5.2 Positioning home

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

5.3 Interconnection of multisection homes

The following items shall be completed during the interconnection of multisection homes when the manufacturer's installation instructions are not available.

- Provide an air infiltration barrier on the mating edges of the floor, end walls, and ceilings.

- Fasten the roof at the ridge with #10 x 4-inch wood screws, at a minimum, at 12-inch, on-center, staggered intervals. Secure end walls with #10 x 4-inch wood screws, at a minimum, at 6-inch, on-center, staggered intervals. Fasten floors together at the mating line with #10 x 4-inch wood screws, at a minimum, at 12-inch, on-center, staggered intervals.

- Mating walls shall be firestopped in accordance with the MHCSS.

**Table 5-1 – Normal Home Installations
(Single- Or Multisection Homes)**

**Types Of Foundation Systems –
Main Components**

Piers–Ground anchors:

The manufactured home rests on piers of concrete block; formed-in-place concrete; permanent wood; or steel pedestals on permanent wood, crushed stone, or concrete footers. The ground anchors in the soil are angled to resist the straps or embedded in dead-men in the soil. Straps are tied to the frame, with or without over-the-top straps.

Concrete slab or continuous footings:

The manufactured home rests on a concrete slab or ribbons of concrete. The straps are tied between the frame and the perimeter footers or concrete slab.

Pile/post system:

The manufactured home rests on piles or posts placed sufficiently deep in the ground to resist all wind, snow, and earthquake forces. Straps fasten the home to the piles or posts or to caps placed thereon.

**Concrete, concrete block, or wood-
foundation, load-bearing, perimeter walls:**

The manufactured home rests on exterior load-bearing walls that sit on concrete or gravel footings. Straps fasten the home to the walls to resist all external forces.

**5.4 Cross-over connections for multisection
manufactured homes**

5.4.1 Utility cross-overs

Connect water, drainage, gas, electricity, and telephone utility cross-overs. The correct procedures are outlined in 8.

5.4.2 Duct-work cross-overs. Clamp the flexible air conditioning or heating ducts or both to the sleeves projecting through the bottom covering, seal the ducts' adjustable collars with several wrappings of duct tape, and suspend/support them above the ground (see figure 5-1).

5.5 Anchoring instructions

After blocking and leveling, the installer should secure the manufactured home against the wind, unless the jurisdiction permits otherwise. The type of installation is the determining factor in deciding how this should be done, as is described in the following sections.

5.5.1 Normal installations

Table 5-1 summarizes and defines the types of normal installations. The pier-and-ground-anchor system, as provided in this standard, is most common. When using another type of installation, consult a registered engineer.

NOTE – The anchoring or foundation system shall be capable of meeting the loads required by the MHCSS.

5.5.1.1 Number and location of anchors

Select the number and location of straps and anchors from the chart and diagram in figure 5-2. Use either the single- or the double-strap method. Use only approved ground anchors capable of resisting at least the minimum loads given in the chart for the method selected.

5.5.1.2 Installation of anchors

The following is one example: Install the anchors at the locations selected from figure 5-2 when the home manufacturer's installation instructions are not available. Follow the anchor manufacturer's instructions. Use single-headed anchors at all "frame-tie-only" locations when using the single-strap method, and double-headed anchors when employing the double-strap method. Install single- or double-headed anchors at all over-the-roof-tie locations. When using a single strap, line up the shaft of each anchor with its strap (see figure 5-3). When connecting more than one strap to a single anchor, line the shaft of the anchor with the results achieved by calculating the combined forces (see figures 5.4). The ground anchors must be sized for the direction of the load and the type of soil. (See figures 5.3 and 5.4 for additional information on the installation of anchors and tiedowns.)

5.5.2 Over-the-roof straps

If over-the-roof straps are provided with the home, they must be reinstalled.

5.5.3 Severe climatic conditions

5.5.3.1 Freezing climates

Be sure anchor augers are installed below the frost line. During periods of frost heave, be prepared to lessen tension on the straps.

5.5.3.2 Severe wind zones

Before a home is installed in a severe wind zone or is located within 1,500 feet of a coastline in Wind Zones II or III, seek the advice of an engineer. Have engineered drawings showing foundation, connection, and anchorage details approved by local authorities. Design guidelines may be found in HUD's permanent foundations guidebook referenced in Annex F. Homes destined for severe wind areas in Zone I shall be designed and installed for Zone II conditions (see figure 3-1).

5.5.3.3 Areas prone to flooding

Foundation considerations are discussed in 4.4.1 and the FEMA document referenced in Annex F. Unconventional anchorage and tie-downs often are needed in designing and constructing the special elevated foundations required in areas prone to flooding. Consult an engineer and the local building official for guidance.

5.6 Installation of on-site structures

Design all buildings and structures to support all of their own live and dead loads. Provide fire separation, as state or local ordinances require, for occupancy.

5.6.1 Expanding rooms

Install expanding rooms in accordance with the manufacturer's instructions. When the manufacturer's instructions are not available, perimeter blocking shall be installed in accordance with table 4-1; ground anchors shall be installed in accordance with figure 5-2.

5.6.2 Garages and carports

A garage or carport must be installed according to the manufacturer's instructions and to all applicable local codes. The garage or carport must be supported independently of the factory-built portion of the manufactured home. Electrical circuits in a garage shall be provided with ground-fault circuit protection.

5.6.3 Porches

Site-constructed porches must be constructed and inspected according to applicable building codes.

5.6.4 Steps, stairways, and landings

Steps, stairways, and landings must be constructed and inspected according to applicable building codes.

6 Installation of optional features

NOTE - Where applicable, and specific to manufacturer's product.

6.1 Hinged roofs and eaves

If the home has a hinged roof or eave(s), caution must be taken.

6.1.1 Moving the home

Plan to move the home without dismantling it, if possible.

6.1.2 Hinged roofs or eaves

If a hinged roof or eave must be dismantled, obtain professional assistance to ensure that no damage is done in the process.

6.1.3 Reinstalling dismantled roofs or eaves

When reinstalling dismantled roofs or eaves, particular care should be taken to ensure that all vent stacks, furnaces, water heaters, ventilation systems, fireplaces, and wood stoves are properly installed in accordance with listed appliance manufacturers' instructions.

6.2 Garden and bay windows

If the home is supplied with a garden or bay window that was dismantled or removed for transportation, it must be reinstalled to resist the elements and be supported as required.

6.3 Awnings and ramadas

Choose only freestanding products with support columns.

6.4 Miscellaneous lights and fixtures

Some exterior lights, ceiling fans and chain-hung fixtures may not yet be installed when the home is delivered. All of these fixtures must be grounded by a fixture-grounding screw or by a fixture-grounding wire. For chain-hung fixtures, use both of these methods. When fixtures are mounted on combustible surfaces such as hardboard, install a noncombustible ring to completely cover the combustible surface exposed between the fixture canopy and the wiring outlet box. If siding has not been installed at a fixture location, remove the outlet box and install the siding with a hole for the outlet box. Then reinstall the outlet box and proceed as for other fixtures, which shall be installed according to their listings.

6.4.1 Exterior lights

Remove the junction box covers and make wire-to-wire connections, using wire nuts. General practice is to connect wires black-to-black, white-to-white, and ground-to-ground. Push the wires into the box and secure the light fixture to the junction box. Caulk around the base of the light fixture to ensure a water-tight seal to the side wall. Install the light bulb and attach the globe, as in figure 6-1.

6.4.2 Ceiling fans

To reduce the risk of injury, install ceiling fans with the trailing edges of the blades at least 6 feet 4 inches above the floor. Connect the wiring, as shown in figure 6-2, and follow the manufacturer's instructions, as in shown in figure 6-2.

6.5 Ventilation options

Follow the component manufacturer's instructions (see, for example, figure 6-3.)

6.6 Optional panels, siding, and moulding

If the home is equipped with optional panels, siding, or moulding, refer to figure 6-4 for the proper installation procedures.

6.7 Exterior coverings

Install exterior coverings (stucco, plywood, vinyl, or hardboard exterior siding; shingled or tiled roofs; etc.) according to the product manufacturer's instructions. Do not cover the home's label (the "HUD" label) when applying any exterior coverings.

6.8 Skirting

Skirting, if used, shall be of durable materials suitable for exterior exposures. Skirting must not be attached in a manner that can cause water to be trapped between the siding or trim to which it is attached. The skirting should be recessed under the siding or trim. Most local codes do not permit wood, including lumber and all wood siding used for skirting, to be used within 6 inches of the ground unless it is pressure treated to prevent decay and termite infestations.

Ventilation shall be provided for the crawl space at a minimum of one square foot of free area for every 150 square feet of the home's floor area. Ventilation openings shall be placed at or near each corner of the home and as high as practicable. Openings shall be located to provide cross-ventilation on at least two opposite sides.

Except in arid regions with dry soil conditions, a uniform 6-mil polyethylene sheet material or other acceptable vapor barrier material should be installed on the ground surface beneath the home to further reduce moisture. Where an acceptable ground vapor barrier is installed and one such ventilation opening is within 3 feet of each corner of the home, the total area of ventilation openings may be reduced to one square foot for every 1,500 square feet of the

home's floor area. Where local codes have minimum ventilation requirements for crawl spaces, these requirements shall apply to homes with skirting and continuous foundations.

Access opening(s) not less than 18 inches in any dimension and not less than three square feet 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.

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

6.9 Telephone and cable TV

CAUTION: *Careless installation of telephone and cable television lines may be hazardous. Failure to follow these instructions may result in serious personal injury or death.* The walls and floors of the home contain electrical circuits, plumbing, and duct work. Avoid contact with these systems when drilling through and placing cables within these cavities. Only trained professionals should handle such work.

6.10 Joints and seams

Where appropriate, weatherproof all joints and seams that were disturbed during relocation of the home.

7 Preparation of appliances

7.1 Clothes dryer vent

The clothes dryer must exhaust to the exterior of the home, or beyond any perimeter skirting installed around it, as shown in figure 7-1. **IMPORTANT:** *Do NOT let the exhaust system end under the home, where excess moisture or flammable material can accumulate.* (Follow the dryer manufacturer's instructions for installing the exhaust system.)

7.2 Comfort cooling systems

IMPORTANT: *Before installing a comfort cooling system, check the home's data plate to assure that the home has been designed for*

the installation of central air conditioning. Only qualified personnel may install a comfort cooling system not provided with the home. Follow the product manufacturer's installation instructions and conform to all local codes.

7.2.1 Air conditioners

An installed central air conditioning system must not exceed the rating shown on the home's compliance certificate.

The home's electrical distribution panel may contain optional factory-installed circuits for air conditioning. The maximum full-load ampere draw for the desired air conditioning unit must not exceed the circuit rating shown. **IMPORTANT:** *Electrical circuits within the home may not have been sized for the additional load of non-factory-installed air conditioning, and a separate, outside electrical supply may have to be provided.*

"A"-coil air conditioning units must be compatible and listed for use with the furnace in the home. Follow the air conditioner manufacturer's instructions. Direct all condensation beyond the perimeter of the home by means specified by the equipment manufacturer.

7.2.2 Heat pumps

Install heat pumps according to the heat pump manufacturer's instructions.

7.2.3 Evaporative coolers

Install a roof-mounted cooler by following the appliance manufacturer's instructions. Before installing a roof-mounted cooler, be sure that the roof will support the weight of the cooler. A rigid base must be provided to evenly distribute the cooler's weight over several rafters.

7.3 Fireplace and wood-stove chimneys and air inlets

Fireplaces and wood stoves require on-site installation of additional section(s) of approved, listed chimney pipe, a spark arrestor, and a rain-cap assembly (see figure 7-2.). Fireplace and wood-stove chimneys and air inlets shall be

installed in accordance with their listings. All fireplaces and wood stoves installed shall be listed for use in manufactured housing. For field installation, approval from the manufacturer and the authority having jurisdiction shall be required to ensure compliance with the required standards.

7.3.1 Minimum extensions above roof

To ensure sufficient draft for proper operation, extend the finished chimney at least 3 feet above the highest point at which it penetrates the roof and at least 2 feet higher than any building or other obstruction located within a horizontal distance of 10 feet. If there are obstructions on the site that extend higher than the home's roof peak and are within 10 feet of the chimney, the installer may have to provide an additional section of chimney pipe, if required to do so by local codes.

7.3.2 Required components

The required components of a correctly-installed chimney are as shown in figure 7-2.

7.3.3 Combustion air duct inlets

Combustion air-intake ducts end just below the bottom covering of the floor. The ducts must be extended to the outside when the home has a basement or crawlspace. If the added ducts are not supplied, they may be purchased at a hardware store. The fireplace manufacturer's instructions for installing combustion air ducts can be found in the fireplace/stove or with the chimney parts. Do not allow the combustion air inlet to drop material from the hearth to the area beneath the home. Locate the inlet damper above the expected snow level, as shown in figure 7-2.

7.4 Range, cook-top, and oven venting

IMPORTANT: *If the home is equipped with a combination range (cook-top)/grill or oven that contains its own exhaust system, the vent must exhaust to the exterior of the home. If perimeter skirting is installed, the vent must exhaust through the skirting.*

8 Utility-system connection and testing

8.1 Proper procedures

Consult local, county, or state authorities before connecting any utilities. Only qualified service personnel, familiar with local codes and licensed where required, should make utility connections and conduct tests.

8.2 Water supply

8.2.1 Maximum supply pressure and reduction

The water systems of the home were designed for a maximum inlet pressure of 80 pounds per square inch. **IMPORTANT:** *If the home is located in a water district where the local water supply pressure exceeds 80 pounds per square inch, install a pressure-reducing valve.*

8.2.2 Connection procedures

8.2.2.2 Mandatory shut-off valve

Install an accessible shut-off valve between the water supply and the inlet, as shown in figure 8-1. It must be a full-flow gate or ball valve.

8.2.2.3 Cross-overs

Multisection homes with plumbing in both sections require water-line cross-connections, as shown in figure 8-2. Remove the shipping caps from the water lines and install the cross-over connectors provided with the home. If freezing could occur, wrap water connectors with insulation.

8.2.3 Freezing protection

8.2.3.1 Necessity

In areas subjected to subfreezing temperatures, protect exposed sections of water-supply piping, shut-off valves, pressure reducers, and pipes in water-heater compartments with uninsulated doors, from freezing.

8.2.3.2 Use of heat tapes

Heat tapes (either automatic or nonautomatic)

can protect exposed plumbing from freezing.
CAUTION: *In order to reduce the risk of fire, use only heat tapes listed by a nationally recognized testing laboratory for use with manufactured homes, and install them only in accordance with the manufacturer's instructions. Plug the 3-wire, grounded cord set of the heat tape into the outlet located under the home near the water supply inlet (figure 8.1).*

8.2.4 Testing procedures

Even though the water system was tested at the factory, it shall be rechecked for leaks at the installation site. The test shall be made by subjecting the system to air or water at 100 pounds per square inch for 15 minutes without loss of pressure.

8.3 Drainage system

8.3.1 Assembly and support

If portions of the drainage system were shipped loose when the home was relocated, reinstall them in accordance with the MHCSS, Part 3280.608 (see figure 8-3).

8.3.2 Proper slopes and connector sizes

Drain lines must slope at least 1/4 inch fall per foot of run unless otherwise noted on the schematic diagram (see figure 8-4).
EXCEPTION: 1/8-inch fall per foot is allowed when a clean-out is installed at the upper end of the run. Connect the main drain line to the site's sewer hook-up, using an approved elastomer coupler (figure 8-5).

8.3.3 Cross-overs

Connect multisection-home, drainage-line cross-overs as shown in figure 8-6.

8.3.4 Testing procedures

Even though the drainage system was tested at the factory, it shall be rechecked for leaks after installation at the site. This shall be accomplished by capping the water line, filling it with water, and holding it 15 minutes.

8.4 Gas supply

8.4.1 Type of gas system furnished with home

All gas-burning appliances, including the heating system, are equipped for either natural gas (NG) or liquified petroleum gas (LPG). A qualified service person must convert the appliances from one type of gas to the other, following the instructions provided by the manufacturer of each appliance.

8.4.2 Orifices and regulators

IMPORTANT: *Special orifices and regulators are required for specific gases. See the instructions accompanying each gas-burning appliance for modification instructions. Before making any connections to the site supply, check the inlet orifices of all gas-burning appliances to ensure they are correctly set up for the type of gas to be supplied. Special attention should be given to homes sited at altitudes above 3,000 feet.*

8.4.3 Proper supply pressure.

IMPORTANT: *The gas piping system in the home has been designed for a pressure that is not to exceed 14 inches of water column (8 ounces or 1/2 pound per square inch). If gas from any supply source exceeds, or may exceed, this pressure, a regulator must be installed. To operate gas-burning appliances safely and efficiently, do not exceed the design pressure limitations. For NG systems, the incoming gas pressure should remain between 6 inches and 8 inches of water column. For LPG systems, the pressure should register between 12 inches and 14 inches of water column.*

8.4.4 Cross-overs

A gas cross-over may need to be installed in multisection homes. All cross-overs and fittings must be listed for exterior use and be of the same size as the main unit pipe. Do not use tools to connect or remove the flexible connector quick-disconnect.

8.4.5 Testing procedures

Even though the gas system was tested at the factory, it shall be retested for leaks at the installation site by qualified personnel (see 8.4.3).

8.4.6 Connection procedures

Inspect gas-burning appliance vents to ensure that they have been connected to the appliance, and ensure that roof jacks are installed and have not come loose during transit. **IMPORTANT:** *Have the gas system connected to the gas supply only by an authorized representative of the gas company.*

8.4.7 Gas appliance start-up procedures

One at a time, open each equipment shut-off valve, light pilot lights, and adjust burners according to each appliance manufacturer's instructions. **IMPORTANT:** *Ensure that the water heater is filled with water before lighting the pilot light.* Check the operation of the furnace and water heater thermostats and set them to the desired temperatures.

8.5 Heating oil systems

Homes equipped with oil-burning furnaces must have their oil supply tankage and piping installed on site. These items are not supplied by the manufacturer. Consult the oil-burning furnace manufacturer's instructions for proper pipe size and installation procedures. **IMPORTANT:** *All oil storage tanks and pipe installations must meet all applicable local regulations and should be made only by experienced, qualified personnel.*

8.5.1 Tank installation requirements

Unless the home is installed in a community with a centralized oil distribution system, an oil storage tank must be installed outside the home. Locate the tank where it is accessible to service and supply and safe from fire and other hazards.

8.5.2. Leak test procedure

Before operating the system, check for leaks in

the tank and supply piping. Fill the tank to capacity with fuel and examine all joints in the system for leakage.

8.6 Electricity

A large-enough power supply must be available at the site. An inadequate power supply may result in improper operation of, and possible damage to, motors and appliances. The current rating in amperes of the home can be found on the tag located outside, next to the feeder or service entrance, and also on the electrical distribution panel.

8.6.1 Description and rating of house wiring

The home is designed for connection to an electrical wiring system rated at 120/240 volts AC. **IMPORTANT:** *Proper and safe connection depends on the type of supply system with which the home is equipped.*

8.6.2 Electrical equipment/ installations

All electrical equipment and installations shall be designed, constructed, and maintained in accordance with the applicable provisions of the MHCSS, the National Fire Protection Association (NFPA) 70, the National Electrical Code (NEC), or the local jurisdiction having authority, or all of the above.

Annex A
(informative)

Final Inspection Checklist

This Annex is not part of the requirements of this document, but is included for informational purposes only.

Final inspection shall be made when the home installation (set-up) is complete. A checklist such as the one given below should be developed to ensure that no items have been overlooked and that work has been properly completed.

1 Water and drain systems

Check to ensure that:

- correct materials for water and drain lines have been used;
- connections and splices are properly made;
- supports are of correct material and are properly spaced;
- necessary inspections and tests have been made;
- water lines are protected from freezing when applicable;
- proper slope has been maintained on drain lines.

2 Electrical systems

Check to ensure that:

- panel amperage matches connection to home;
- electrical inspections have been performed; connections between multisections are in accordance with the MHCSS and access covers are in place.

3 Gas/fuel oil systems

Check to ensure that:

- correct materials and fittings are used;
- the pressure test has been conducted on the gas system;
- the connection between multisections are in accordance with the MHCSS, with access as required.

4 Appliance function, operation, and venting

Check to ensure that:

- vent or chimney extensions shipped loose on the home have been mounted and serviced in accordance with the manufacturer's instructions;
- appliances and valves have been tested and are properly working;
- venting of appliances under unit are in accordance with the MHCSS;
- dryer is properly vented;
- solid-fuel-burning fresh air intake is properly installed
- temporary shipping blocks have been removed;
- exhaust fan operation and air flow are correct.

5 Windows and doors

Check to ensure that:

- windows meet egress requirements and have operation instructions on them;

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- doors function properly;
- temporary shipping hardware has been removed from windows and doors.

6 Exterior of home

Check:

- for damage to under carriage or bottom board;
- chassis, floor joists, or both for installation/transportation damage;
- bottom board for rips or tears;
- for damage to siding (cracks, breaks, holes, nail pops, etc.);
- for damage to metal or composition roofs:
 - for holes or rips in metal roof;
 - shingles for damage and sealing;
 - drip edge or fascia damage.
- roof openings for sealing (vents, stacks, etc.);
- to ensure that when gutters and downspouts are installed, the water is diverted away from the home.

7 Interior of home

Check:

- for damage to floor coverings (vinyl, carpet);
- for damage to wall finish (holes, cracks, nail pops, etc.);
- for damage to ceiling finish (holes, cracks, nail pops, etc.);
- for damage to interior trim (splints, cracks, nail pops, etc.);
- multisection common areas for correct finishing.

8 Skirting

Check to ensure that:

- skirting used is in accordance with owner's specifications;
- venting is in accordance with the manufacturer's specifications;
- skirting is constructed to prevent frost movement in areas of where it occurs;
- polyethylene ground cover is correctly installed.

9 Blocking/footings

Check to ensure that:

- footings are of proper size and construction for soil conditions;
- spacing of piers is in accordance with the manufacturer's guidelines;
- footing depth is below frost line;
- foundation walls, if required, meet local codes, ordinances, or covenants;
- pier construction meets manufacturer's specifications.

10 Anchoring

Check to ensure that:

- approved anchors are used;
- correct number of anchors, straps, or both are used according to the manufacturer's instructions;
- anchors are installed at correct angles and in accordance with the anchor manufacturer's listing for approval.

11 Miscellaneous

Check to ensure that:

- the smoke detector(s) is operating

correctly;

- construction seals (the "HUD Label") have not been damaged, removed, or covered by skirting;

- installation/anchoring certificates, seals, or both have been issued and installed if required;

- data plate is intact and legible;

- low-hanging tree branches and bushes have been trimmed.

All transit and installation damage is required to be reported to the manufacturer if the home is a new unit. Check with local authorities having jurisdiction prior to installation for code requirements and permits/inspections required.

Annex B
(informative)

**Barrier-free Design Aspects for the
Physically Handicapped (Exterior Only)**

This Annex is not part of the requirements of this document, but is included for informational purposes only.

1 General

The following are offered as guidelines to providing basic barrier-free design features in manufactured home communities to the extent considered desirable or needed by the operators to facilitate use by the physically handicapped. The Annex material represents informational material only and does not constitute a part of the mandatory provisions of this standard.

NOTE 1 – Dimensions herein are in U.S. units only, as they are advisory.

NOTE 2 – This is a developing technology, and data herein should be checked with the latest guide from recognized authorities.

2 Walks

Walks should be 42 inches wide. If the slope of a walk is greater than 5 percent (1-inch rise in a 20-inch run), a handrail should be provided. The slope of a walk should not exceed 8.33 percent (1-inch rise in a 12-inch run).

Walks should have a continuous common surface, not interrupted by steps or abrupt changes in level greater than 1/2 inch. Where walks cross driveways or parking lots, they should blend to a common level by means of curb cuts, ramps, or other means. Curb cuts should have a textured, nonslip surface (such as broom-finished concrete).

Walks should be provided with a level area no less than 5 feet x 5 feet where they terminate at doors. In no case should such walks extend less than 1 foot beyond the side from which the door opens.

3 Ramps

Ramps should not have a slope greater than 1 foot within 12 feet (or 8.33 percent) and should be no less than 4 feet in clear width. Ramps should be structurally designed to carry a minimum live load of 100 pounds per square foot when freestanding.

If the ramp slope is greater than 5 percent and there is no drop-off, one handrail should be provided. Where a ramp drops off on one or both sides, handrails should be required on both sides of the ramp. Handrails should be 32 inches in height, measured from the surface of the ramp and extended 1 foot beyond the top and bottom of the ramp or turn at right angles.

The ramp should have a nonslip surface. Each ramp should have a level platform at the top that is at least 5 feet x 5 feet and this platform should extend at least 1 foot on the side from which a door opens. Each ramp should have at least 5 feet of straight, level clearance at the bottom. Straight-run ramps should have, at a minimum, 3-foot-long intermediate-level platforms at intervals of 30 feet for purposes of rest and safety, and wherever they turn should have level platforms that should be at least as wide as the ramp and 5 feet long (deep).

4 Doors and doorways

Each exterior and interior door should have a clear opening of no less than 32 inches when the door is open. Such a door should be operable by a single effort with one hand. The distance between two doors (e.g., outer and inner) should be a minimum of 6 1/2 feet. The floor on the inside and outside of each such double doorway should be level and clear for a distance of 5 feet from the door and should extend 1 foot beyond the side from which the door opens.

The bottom rail of narrow, stile-framed glass doors should have a minimum height of 7 1/2

inches. Exterior thresholds should be level, with a maximum edge height of 3/4 inch. Interior thresholds should be flush with the floor or leveled at not more than 5 percent slope, with a maximum edge height of 1/2 inch. Where door closures are used, the pressure to open a door should not exceed a maximum of 15 pounds. (The lightest possible door pressure for use by the disabled is preferred.)

5 Outside stairs

Outside stairs should not have abrupt (square) nosing; a 1-inch-diameter, rounded nosing is desirable. Stairs should have at least one continuous handrail, 21 inches in height, measured from the tread at the face of the riser. The handrail should extend at least 18 inches beyond the top step and beyond the bottom step or turn at right angles. Care should be taken that the extension of the handrails is not in itself a hazard, and the extensions should be made on the side of a continuing wall where available.

6 Other facilities for assistance to the physically challenged

Special designs are available for such other facilities as listed herein for the convenience of physically challenged persons. These include:

- Campsites;
- Control devices for light, power, heat, ventilation, windows, draperies, doors, and similar devices;
- Elevators;
- Kitchen arrangements;
- Swimming pool facilities;
- Telephone;
- Toilet compartments and toilet fixtures (including showers);
- Water fountains.

7 Available texts for further guidance are:

"Barrier-free Site Design," available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. This publication is based on research and studies conducted by the American Society of Landscape Architects foundation under contract with the U.S. Department of Housing and Urban Development and Office of Policy Development and Research and was issued in April, 1975 (HUD-PDR-84). This publication also contains a helpful bibliography with additional data;

"An Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code," originally issued in 1974, with subsequent updates, is available from the North Carolina Department of Insurance, P. O. Box 26387, Raleigh, NC 27611;

"American National Standard for Accessible and Usable Buildings and Facilities and Usability for Physically Handicapped People," American National Standard A117.1, 1992. This standard applies to buildings, outdoor facilities, public walks, and residential structures and is available from the Council of American Building Officials (CABO), 5203 Leesburg Pike, #708, Falls Church, VA 22031;

"Design for the Physically Handicapped," U.S. Department of the Army, Office of the Corps of Engineers, Washington, DC 20314;

Public Law, P.L.-101-396, July, 1990;

Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Final Guidelines;

"Interim Guidelines for Building Occupant Protection from Tornadoes and Extreme Winds," TR-83A, January, 1980, Sections 1 and 2, Published by the Federal Emergency Management Agency (FEMA), Washington, DC.

Annex C
(informative)

SAMPLE

Sample Checklist for Enforcement Officials

This Annex is not part of the requirements of this document, but is included for informational purposes only.

Owner: _____

Address: _____

Manufacturer: _____

Model: _____ Serial #: _____ Date of Mfr: _____

"HUD" Label/State Label Number: _____

Dealer: _____ Dealer #: _____

Installer: _____ Installer #: _____

Local Building Official Inspection: _____

Local Permits: _____

INSTALLATION:

Seals: Installation #: _____ Anchor #: _____

Instructions Used: Manufacturer: _____ State: _____

Support Footings: Type: _____ Size: _____

Piers: Materials: _____

Spacing: _____

Shims: _____

Lot/Soil Conditions: _____

Anchors: Spacing: _____

Equipment Used: _____

Equipment Approved: _____

Frame Removed: Permitted by Manufacturer: _____
(prior to 11/89)

Foundation to Local Building Code: _____

Support Locations According to Manufacturer: _____

Skirting: Type: _____

Attachment to Home: _____

Poly on Grade: _____

Access Panel: _____

UTILITIES:

Water: Correct Materials/Fittings: _____

Protected From Freezing: _____

Support Spacing: _____

Waste: Correct Materials/Fittings: _____

Slope to Drain: _____

Support Spacing: _____

Main Sewer Connection (Gasketed): _____

Gas: Correct Materials/Fittings: _____

Pressure Test: _____

Electric: Connection Between Halves ("HUD Code"): _____
("Pre-HUD-Code" homes only)

Aluminum Wiring: _____

Method Used to Eliminate or Reduce Danger: _____

Supply Amps (matches panel in home): _____

DATA PLATE:

Roof-zone Load: _____ Heating Zone: _____

Furnace: Original (yes/no): _____ Gypsum Board Lined: _____

Water Heater: Original (yes/no): _____ Gypsum Board Lined: _____

Dryer: Original (yes/no) _____ Range: Original (yes/no): _____

MISCELLANEOUS:

Fireplace: Yes/No/Model: _____ Approved: _____

Chimney: _____ Fresh Air Intake: _____

Venting: Skirting/Foundation: _____

Roof and/or O.H.s _____

Smoke Detectors: _____

Alterations: _____ Approved: _____ Inspected: _____

Comments: _____

Date: _____ Inspector: _____ Time: _____

Present During Inspection: _____

Annex D
(informative)

**Suggested Acceptance Guidelines for
"Pre-HUD-Code" (pre-MHCSS) Manufactured (mobile) Homes**

This Annex is not part of the requirements of this document, but is included for informational purposes only.

"Pre-HUD-Code" homes are homes built prior to the MHCSS, 24 CFR 3280, which became effective on June 15, 1976, or homes built prior to the implementation of individual states' inspection and certification programs in accordance with ANSI Standard A119.1.

Building officials or other regulatory agencies having jurisdiction over pre-code manufactured (mobile) homes may enforce, by ordinance or legislation, compliance with the following items prior to issuance of permits or certificates of occupancy.

1 Exits and egress windows

1.1 Egress windows

The home has at least one egress window in each bedroom, or a window that meets the minimum specifications of MHCSS 3280.106 and 3280.404 for manufactured homes. These standards require the window to be at least 22 inches in the horizontal or vertical position in its least dimension and at least five square feet in area. The bottom of the window opening shall be no more than 36 inches above the floor, and the locks and latches and any window screen or storm window devices that need to be operated to permit exiting shall not be located more than 54 inches above the finished floor.

1.2 Exits

The home is required to have two exterior exit doors, located remotely from each other, as required in MHCSS 3280.105. This standard requires that single-section homes have the doors no less than 12 feet, center-to-center, from each other, and multisection home doors no less than 20 feet center-to-center from each other when measured in a straight line,

regardless of the length of the path of travel between the doors.

One of the required exit doors must be accessible from the doorway of each bedroom and no more than 35 feet away from any bedroom doorway. An exterior swing door shall have a 28-inch-wide x 74-inch-high clear opening and sliding glass doors shall have a 28-inch-wide by 72-inch-high clear opening. Each exterior door other than screen/storm doors shall have a key-operated lock that has a passage latch; locks shall not require the use of a key or special tool for operation from the inside of the home.

2 Flame spread

2.1 Walls, ceilings, and doors

Walls and ceilings adjacent to or enclosing a furnace or water heater shall have an interior finish with a flame-spread rating not exceeding 25. Sealants and other trim materials 2 inches or less in width used to finish adjacent surfaces within these spaces are exempt from this provision, provided all joints are supported by framing members or materials with a flame-spread rating of 25 or less. Combustible doors providing interior or exterior access to furnace and water heater spaces shall be covered with materials of limited combustibility (i.e., 5/16-inch gypsum board, etc.), with the surface allowed to be interrupted for louvers ventilating the space. However, the louvers shall not be of materials of greater combustibility than the door itself (i.e., plastic louvers on a wooden door). Reference MHCSS 3280.203.

2.2 Exposed interior finishes

Exposed interior finishes adjacent to the cooking range (surfaces include vertical surfaces between the range top and overhead cabinets, the ceiling, or both) shall have a flame-spread rating not exceeding 50, as required by MHCSS

3280.203. Backsplashes not exceeding 6 inches in height are exempted. Ranges shall have a vertical clearance above the cooking top of not less than 24 inches to the bottom of combustible cabinets, as required by MHCSS 3280.204(e).

3 Smoke detectors

3.1 Location

A smoke detector shall be installed on any wall in the hallway or space communicating with each bedroom area between the living area and the first bedroom door, unless a door(s) separates the living area from that bedroom area, in which case the detector(s) shall be installed on the living-area side, as close to the door(s) as practicable, as required by MHCSS 3280.208. Homes with bedroom areas separated by any one or combination of common-use areas such as a kitchen, dining room, living room, or family room (but not a bathroom or utility room) shall be required to have one detector for each bedroom area. When located in hallways, the detector shall be between the return air intake and the living area.

3.2 Switches and electrical connections

Smoke detectors shall have no switches in the circuit to the detector between the over-current protection device protecting the branch circuit and the detector. The detector(s) shall be attached to an electrical outlet box and connected by a permanent wiring method to a general electrical circuit. The detector(s) shall not be placed on the same branch circuit or any circuit protected by a ground-fault circuit interrupter.

4 Solid-fuel-burning stoves/fireplaces

4.1 Solid-fuel-burning fireplaces and fireplace stoves

Solid-fuel-burning, factory-built fireplaces and fireplace stoves may be used in manufactured homes, provided that they are listed for use in manufactured homes and installed according to their listing/manufacture's instructions and the

minimum requirements of MHCSS 3280.709(g).

4.2 Equipment

A solid-fuel-burning fireplace or fireplace stove shall be equipped with an integral door or shutters designed to close the fire chamber opening and shall include complete means for venting through the roof, a combustion air inlet, a hearth extension, and means to securely attach the unit to the manufactured home structure.

4.2.1 Chimney

A listed, factory-built chimney designed to be attached directly to the fireplace/fireplace stove and equipped with, in accordance with the listing, a termination device and spark arrester, shall be required. The chimney shall extend at least 3 feet above the part of the roof through which it passes and at least 2 feet above the highest elevation of any part of the manufactured home that is within 10 feet of the chimney.

4.2.2 Air-intake assembly and combustion-air inlet

An air-intake assembly shall be installed in accordance with the terms of listings and the manufacturer's instructions. A combustion air inlet shall conduct the air directly into the fire chamber and shall be designed to prevent material from the hearth from dropping onto the area beneath the manufactured home.

4.2.3 Hearth

The hearth extension shall be of noncombustible material that is a minimum of 3/8-inch thick and shall extend a minimum of 16 inches in front and 8 inches beyond each side of the fireplace/fireplace stove opening. The hearth shall also extend over the entire surface beneath a fireplace stove and beneath an elevated or overhanging fireplace.

5 Electrical wiring systems

5.1 Testing

All electrical systems shall be tested for continuity in accordance with MHCSS 3280.810, to ensure that metallic parts are properly bonded; tested for operation, to demonstrate that all equipment is connected and in working order; and given a polarity check, to determine that connections are proper.

5.2 Protection

The electrical system shall be properly protected for the required amperage load. If the unit wiring employs aluminum conductors, all receptacles and switches rated at 20 amperes or less that are directly connected to the aluminum conductors shall be marked CO/ALR. Exterior receptacles, other than heat tape receptacles, shall be of the ground-fault circuit interrupter (GFI) type. Conductors of dissimilar metals (copper/aluminum or copper-clad aluminum) must be connected in accordance with NEC Section 110-14.

6 Replacement furnaces and water heaters

6.1 Listing

Replacement furnaces or water heaters shall be listed for use in a manufactured home. Vents, roof jacks, and chimneys necessary for the installation shall be listed for use with the furnace or water heater.

6.2 Securement and accessibility

The furnace and water heater shall be secured in place to avoid displacement. Every furnace and water heater shall be accessible for servicing, for replacement, or both as required by MHCSS 3280.709(a).

6.3 Installation

Furnaces and water heaters shall be installed to provide complete separation of the combustion system from the interior atmosphere of the manufactured home, as required by MHCSS

3280.709(d).

6.3.1 Separation

The required separation may be achieved by the installation of a direct-vent system (sealed combustion system) furnace and water heater or the installation of a furnace and water heater with enclosures that separate the furnace and water heater venting and combustion systems from the interior atmosphere of the home. There shall be no doors, grills, removable access panels, or other openings into the enclosure from the inside of the manufactured home. All openings for ducts, piping, wiring, etc., shall be sealed.

6.3.1.1 Water heater

The floor area in the area of the water heater shall be free from damage from moisture to ensure that the floor will support the weight of the water heater.

Annex E
(informative)

**Sample Schedule for Manufactured
Home Installation Permits**

This Annex is not part of the requirements of this document, but is included for informational purposes only.

For installation of new or relocated homes in a municipality, a basic permit flat fee may be established by the municipality to cover the following inspections:

- foundation inspection:
 - frost depth foundation (requires extra inspection)
 - piers and footings on grade (common to most park installations)
 - skirting installation/ventilation
 - anchoring of unit (when required by local ordinance or by manufacturer's instructions)
- plumbing inspection:
 - sewer connection
 - water connection
 - on-site work performed on home water/drain lines
- gas-line inspection:
 - materials and connections
 - testing
- structural inspection:
 - data plate information (June 15, 1976 and newer)
 - structural damage
 - precode upgrading rules by municipal ordinance (see Annex D)
- electrical inspection (state electrical board or municipality)

Separate permit or hourly inspection fees in excess of the original basic permit flat fees may be established by the municipality for the following:

- required corrections – reinspection
- accessory structures or buildings
- inspection (i.e., wood decks, carports, entry ways, out-buildings, etc.)
- alterations to original home inspection (i.e., structural, mechanical, plumbing, electrical). Contact state building codes division prior to issuance, as submittal to state may be required for approval.
- plan review of accessory structures or alterations

Annex F
(informative)

**Bibliography of Foundation Plans
Available From Manufacturer**

This Annex is not part of the requirements of this document, but is included for informational purposes only.

ASCE 7-1988, "Minimum Design Loads for Buildings and Other Structures," American Society of Civil Engineering, 1430 Broadway, New York, NY 10018

FEMA 85, "Manufactured Home Installation in Flood Hazard Areas," Federal Emergency Management Agency, Washington, DC 20472, September, 1985

HUD Handbook 4930.3 (1989), "Permanent Foundations Guide for Manufactured Housing," U.S. Department of Housing and Urban Development, 451 7th Street, SW, Washington, DC 20410

"Permanent Wood Foundation System -- Design, Fabrication, and Installation Manual -- 1987," National Forest Products Association (NFPA), 1250 Connecticut Avenue, NW, Washington, DC 20036

"Frost-Free Shallow Foundation Design Guidelines," Energy Design Update, March, 1988

"Building Foundation Design Guidebook," Doc. No. DE88013350, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161

Annex G
(informative)

Tables

This Annex is not part of the requirements of this document, but is included for informational purposes only.

Table 3-1 – General Description of Soils

Soil Type Based on the unified classification system	Allowable Pressure (pounds per square foot) No allowances made for overburden pressure, embedment depth, water table height, or settlement problems
Rock or hard pan	4,000 and up
Sandy gravel and gravel	2,000
Sand, silty sand, clayey sand, silty gravel, or clayey gravel	1,500
Clay, sandy clay, silty clay, or clayey silt	1,000
Uncompacted fill	Special analysis is required
Peat or organic clays	Special analysis is required

NOTE –

1. To be used only when none of the following is available: soils investigation and analysis of the site; compliance with the local building code; and evaluation by a registered professional engineer, architect, or building official.
2. Hereafter, the words "engineer" or "architect" shall refer to a registered professional engineer or architect.

**Table 4-1 – Minimum Pier Capacity
Frame Plus Perimeter Blocking
(Both Frame and Perimeter Blocking Required)**

Section Width (feet)	Roof Live Load (pounds per square foot)	Pier Location	Minimum Pier Capacity (pounds)			
			Maximum Pier Spacing (feet)			
			4	6	8	10
8	20	Frame	900	1300	1800	2200
		Perimeter	600	800	1100	1400
	30	Frame	900	1300	1800	2200
		Perimeter	700	1100	1400	1800
	40	Frame	900	1300	1800	2200
		Perimeter	900	1300	1800	2200
10	20	Frame	1100	1700	2200	2800
		Perimeter	700	1100	1400	1800
	30	Frame	1100	1700	2200	2800
		Perimeter	900	1400	1800	2300
	40	Frame	1100	1700	2200	2800
		Perimeter	1100	1700	2200	2800
12	20	Frame	1300	1900	2600	3200
		Perimeter	800	1200	1600	2000
	30	Frame	1300	1900	2600	3200
		Perimeter	1100	1600	2100	2600
	40	Frame	1300	1900	2600	3200
		Perimeter	1300	1900	2600	3200
14	20	Frame	1500	2200	3000	3700
		Perimeter	900	1400	1900	2400
	30	Frame	1500	2200	3000	3700
		Perimeter	1200	1800	2400	3000
	40	Frame	1500	2200	3000	3700
		Perimeter	1500	2200	3000	3700
16	20	Frame	1700	2600	3400	4300
		Perimeter	1100	1600	2200	2700
	30	Frame	1700	2600	3400	4300
		Perimeter	1400	2100	2800	3500
	40	Frame	1700	2600	3400	4300
		Perimeter	1700	2600	3400	4300
18	20	Frame	1900	2900	3900	4800
		Perimeter	1200	1800	2500	3100
	30	Frame	1900	2900	3900	4800
		Perimeter	1600	2400	3200	3900
	40	Frame	1900	2900	3900	4800
		Perimeter	1900	2900	3900	4800

**Table 4-2 – Minimum Pier Capacity
Multisection Center-Beam Blocking**

Section Width (feet)	Roof Live Load (pounds per square foot)	Pier Load and Minimum Pier Capacity (pounds)						
		Mating Wall Opening (feet)						
		5	10	15	20	25	30	35
8	20	600	1200	1800	2400	3000	3600	4200
	30	800	1600	2400	3200	4000	4800	5600
	40	1000	2000	3000	4000	5000	5000	7000
10	20	800	1500	2300	3000	3800	4500	5300
	30	1000	2000	3000	4000	5000	6000	7000
	40	1300	2500	3800	5000	6300	7500	8800
12	20	900	1800	2600	3500	4400	5300	6100
	30	1200	2300	3500	4700	5800	7000	8200
	40	1500	2900	4400	5800	7300	8800	10200
14	20	1000	2000	3000	4100	5100	6100	7100
	30	1400	2700	4100	5400	6800	8100	9500
	40	1700	3400	5100	6800	8400	10100	11800
16	20	1200	2300	3500	4700	5800	7000	8100
	30	1600	3100	4700	6200	7800	9300	10900
	40	1900	3800	5800	7500	9700	11600	13600

EXAMPLE: 14-foot section width
30-pounds-per-square-foot roof live load
18-foot-wide mating-wall opening

Follow down the "Section Width" column to "14 feet." Follow across to "30 pounds per square foot" (psf) in the "Roof Live Load" column. Since the mating wall opening is 18 feet wide, follow across to the column headed "20." (For any opening width that is not shown, use the next highest number on the chart.) The required pier capacity is 5,400 pounds.

Table 4-3 – Footing Size^{1,2}

Pier Capacity (pounds.)	Minimum Footing Size or Equal Area (inches)			
	Soil Capacity			
	1000 psf ³	1500 psf ³	2000 psf ³	4000 psf ³
600	9 x 9	8 x 8	7 x 7	5 x 5
800	11 x 11	9 x 9	8 x 8	5 x 5
1000	12 x 12	10 x 10	8 x 8	6 x 6
1500	15 x 15	12 x 12	10 x 10	7 x 7
2000	17 x 17	14 x 14	12 x 12	8 x 8
2500	19 x 19	15 x 15	13 x 13	10 x 10
3000	21 x 21	17 x 17	15 x 15	11 x 11
3500	22 x 22	18 x 18	16 x 16	12 x 12
4000	24 x 24	20 x 20	17 x 17	13 x 13
4500	25 x 25	21 x 21	18 x 18	13 x 13
5000	27 x 27	22 x 22	19 x 19	14 x 14
5500	28 x 28	23 x 23	20 x 20	15 x 15
6000	29 x 29	24 x 24	21 x 21	15 x 15
6500	31 x 31	25 x 25	22 x 22	16 x 16
7000	32 x 32	26 x 26	22 x 22	16 x 16
7500	33 x 33	27 x 27	23 x 23	17 x 17
8000	34 x 34	28 x 28	24 x 24	17 x 17
8500	35 x 35	29 x 29	25 x 25	18 x 18
9000	36 x 36	29 x 29	25 x 25	19 x 19
10000	38 x 38	31 x 31	27 x 27	20 x 20
11000	40 x 40	32 x 32	28 x 28	21 x 21
12000	42 x 42	34 x 34	29 x 29	22 x 22
13000	43 x 43	35 x 35	31 x 31	22 x 22
14000	45 x 45	37 x 37	32 x 32	23 x 23
15000	46 x 46	38 x 38	33 x 33	24 x 24
16000	48 x 48	39 x 39	34 x 34	25 x 25
17000	49 x 49	40 x 40	35 x 35	25 x 25
18000	51 x 51	42 x 42	36 x 36	26 x 26
19000	52 x 52	43 x 43	37 x 37	

NOTE –

1. The footing sizes shown are for square pads and are based on the area (square inches) required for the load. Other footing configurations, such as a rectangular configuration, may be used, provided the area (square inches) is equal to or greater than the area of the square footing shown in the table. For example, a 12-inch x 22-inch (264-square-inch) footing may be used in place of a 16-inch x 16-inch (256-square-inch) footing. Also, two 12-inch x 24-inch pads may be used in place of one 24-inch x 24-inch pad.

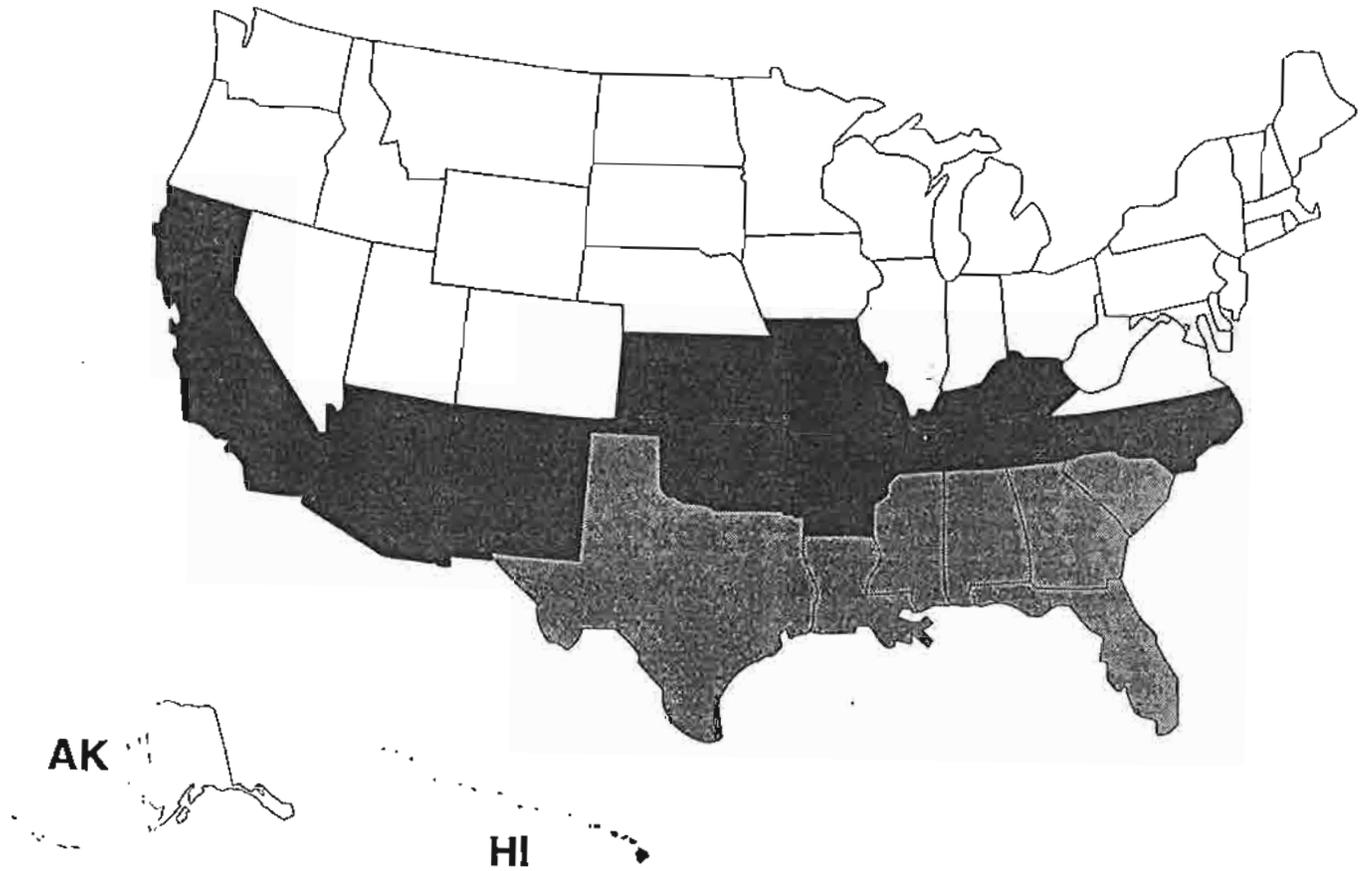
2. Local regulations may require design verification by an engineer.

3. psf – pounds per square foot

Annex H
(informative)

Illustrations

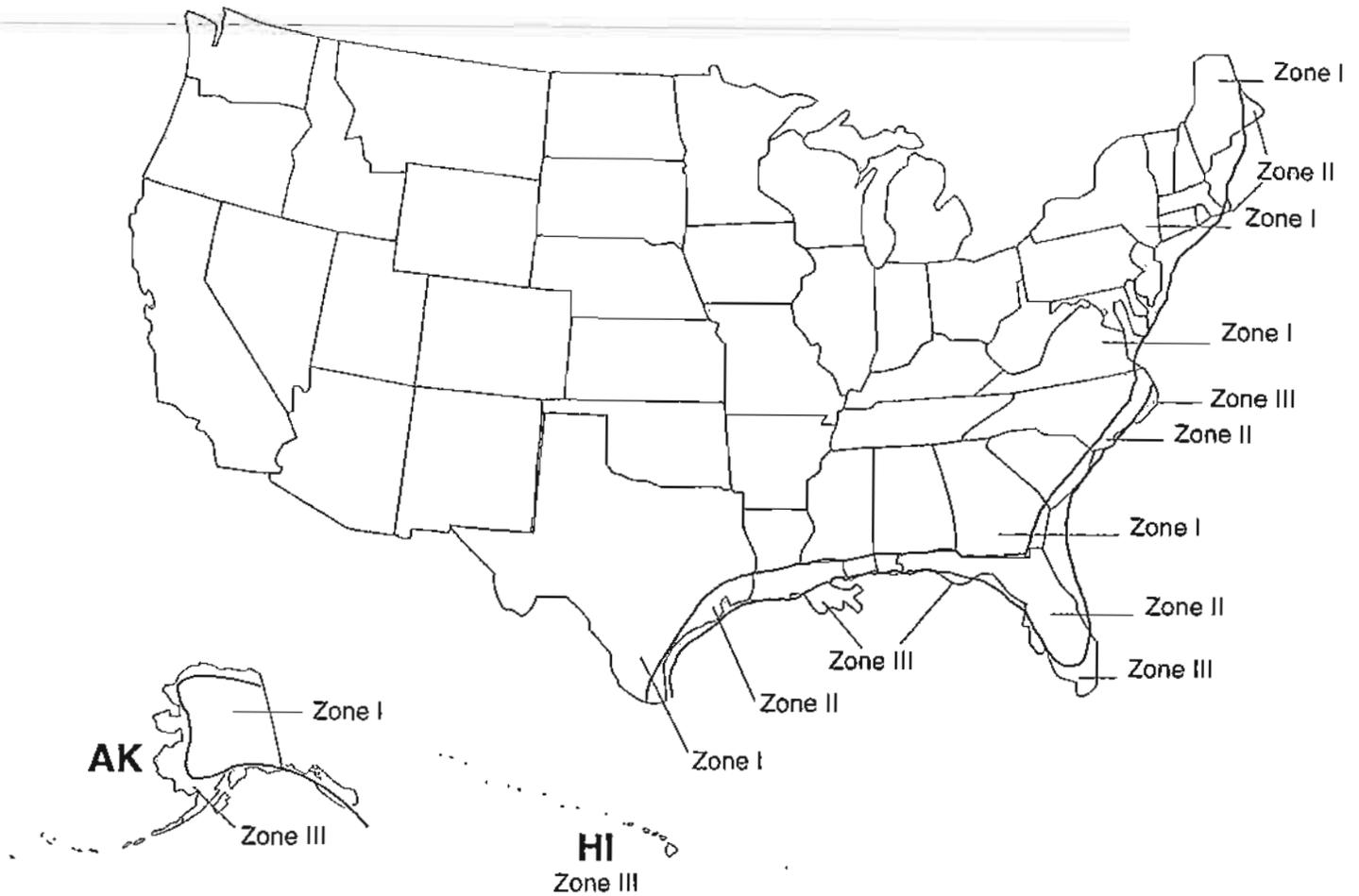
This Annex is not part of the requirements of this document, but is included for informational purposes only.



Zone	1	2	3
U-value	0.116	0.096	0.079

Reference -- Manufactured Home Construction and Safety Standards (MHCSS) 24 CFR 3280.506, latest edition

Figure 3-1(b) -- Heating- and cooling-design zone map (informational only)



Design Wind-load Zones:

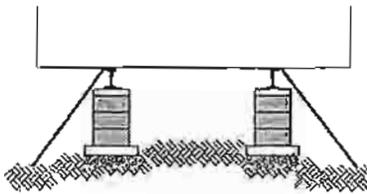
Standard Wind	Zone I	15 psf Horizontal	9 psf uplift*
Hurricane	Zone II	±39 psf Horizontal	27 psf uplift
Hurricane	Zone III	±47 psf Horizontal	32 psf uplift
			* net uplift

Note --
psf: pounds per square foot

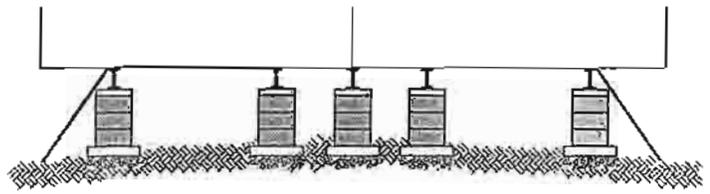
Reference -- Manufactured Home Construction and Safety Standards (MHCSS) 24 CFR 3280.305(c)(2), latest edition

Figure 3-1(c) -- Wind-load zone map (informational only)

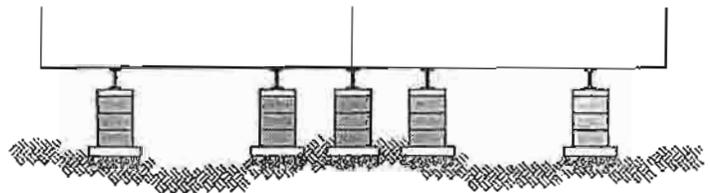
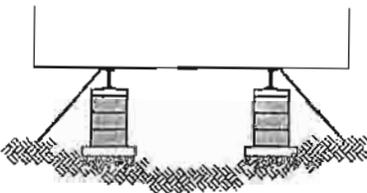
Single-section



Multisection

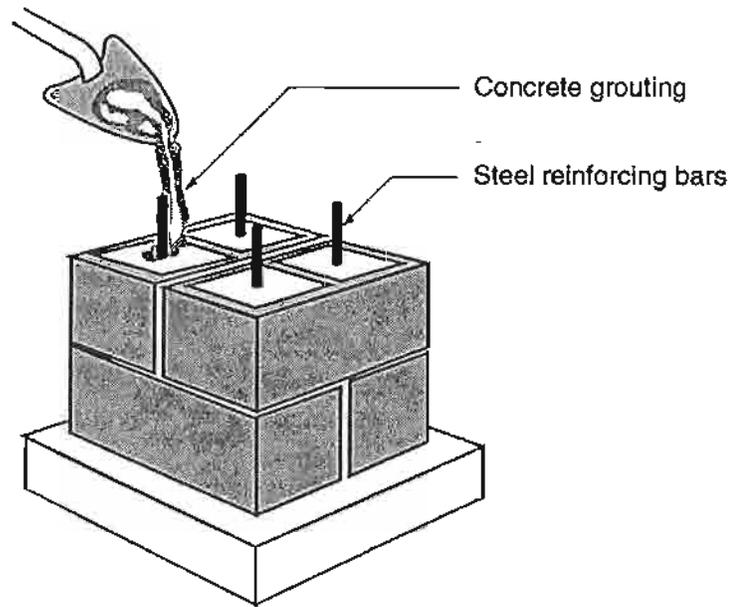
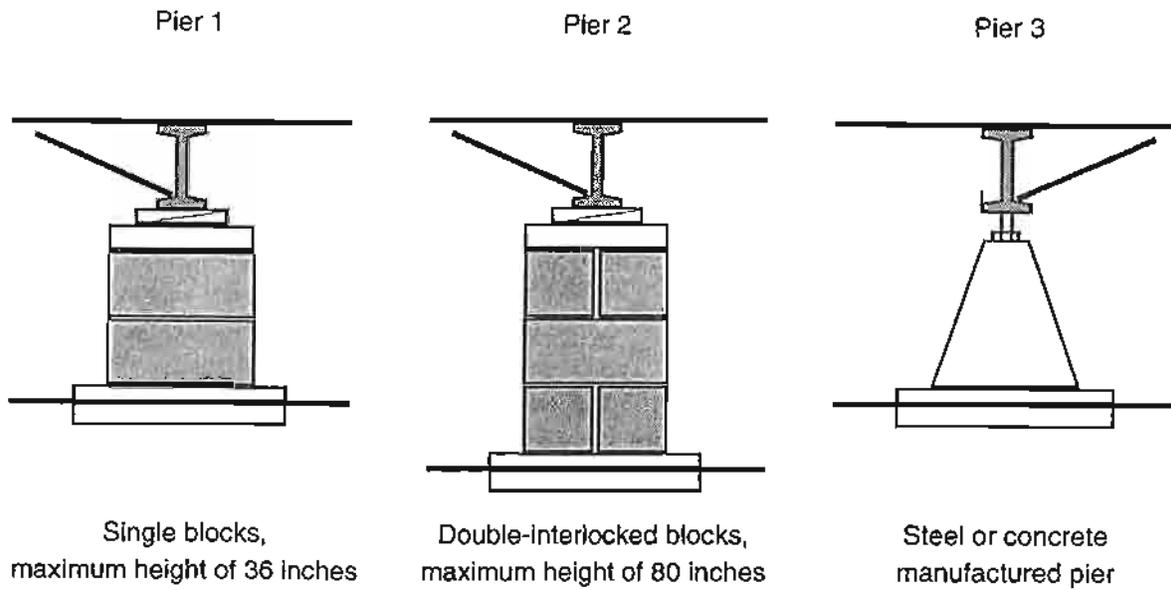


DO: *Crown and grade the site to slope away from the home and cover it with 6-mil-thick polyethylene sheeting or the equivalent.*



DON'T: *Grade the site so that water collects beneath the home.*

Figure 3-2 -- Elimination of water beneath the home



For piers exceeding 80 inches in height, the concrete blocks should be filled with concrete grouting and steel reinforcing bars should be utilized.

Figure 4-1 – Typical footing and pier installation

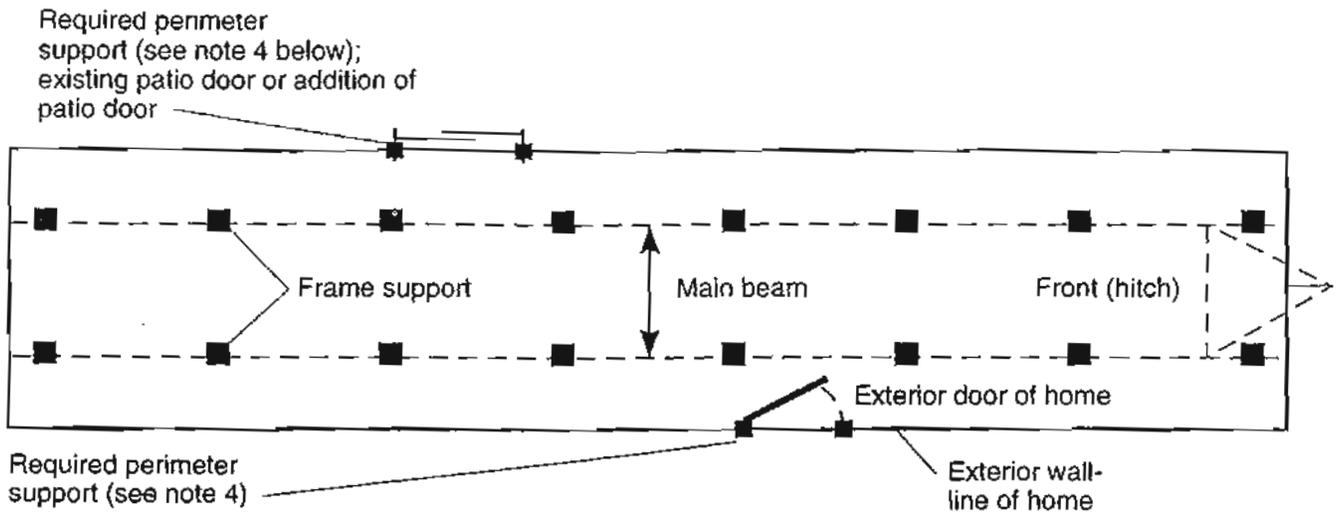


Figure 4-2 – Typical blocking diagram for single-section home when manufacturer's instructions are not available

Note (applies to both figures 4-2 and 4-3) --

1. See table 4.1 for required pier capacity and spacing.
2. See table 4.3 and section 4.2 for footing requirements.
3. Piers shall be located at a maximum of 2 feet from both ends.
4. Place piers on both sides of entry doors and at any other openings greater than 4 feet in width, such as patio or atrium doors; under porch posts, fireplaces, and wood stoves; and under those places where heavy pieces of furniture such as pianos, organs, waterbeds, etc., may be placed.

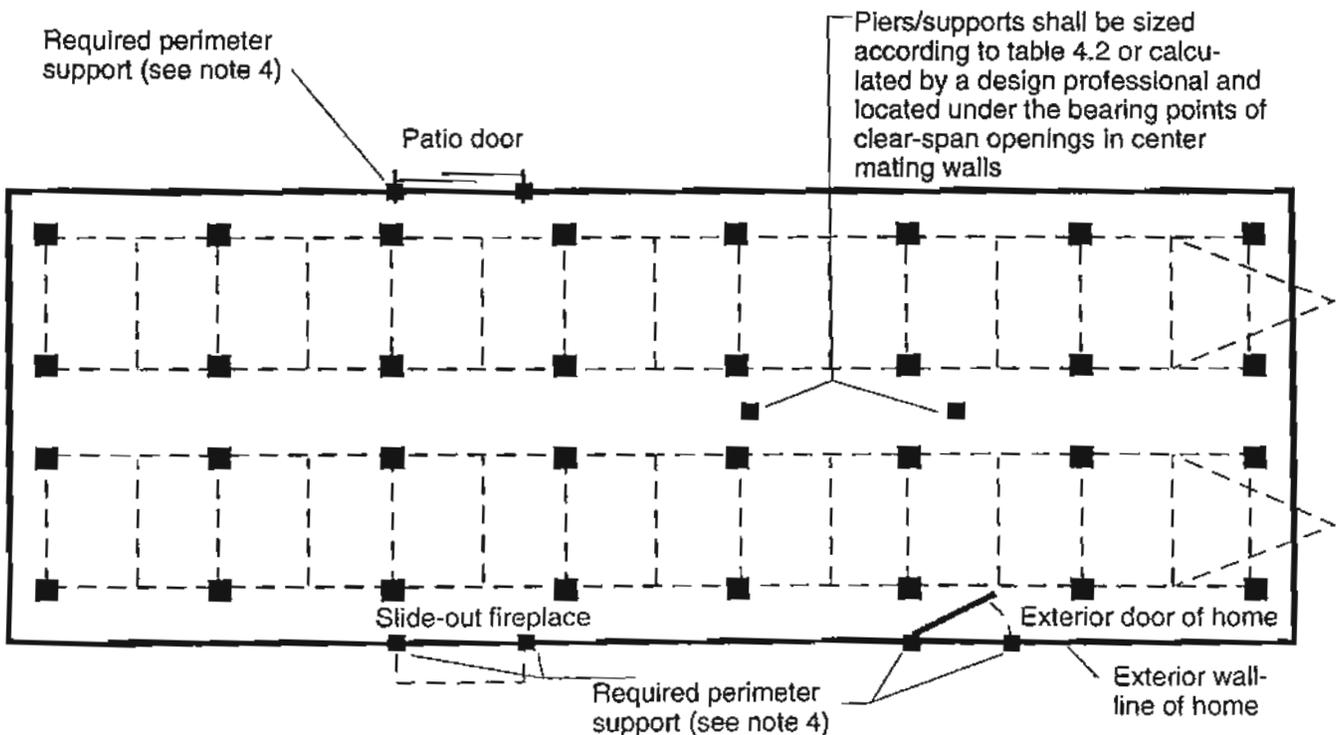
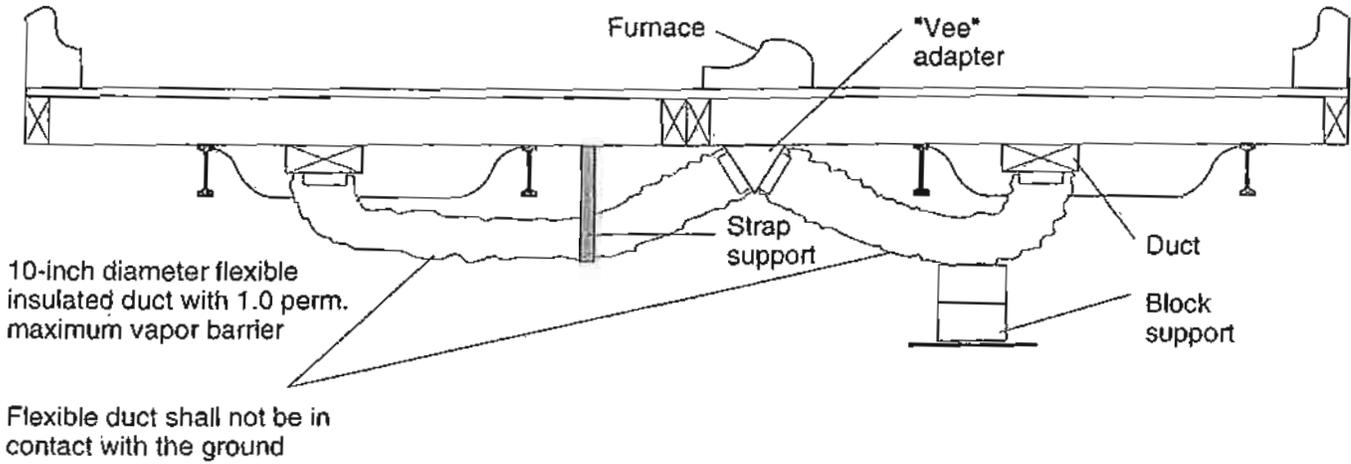


Figure 4-3 – Typical blocking diagram for multisection home when manufacturer's installation instructions are not available

- (a) This system is utilized when a cross-over duct has not been built into the floor, and the furnace is outside the l-beam. With this type of installation, it is necessary for two flexible ducts to be installed.



- (b) This system is used when a cross-over 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.

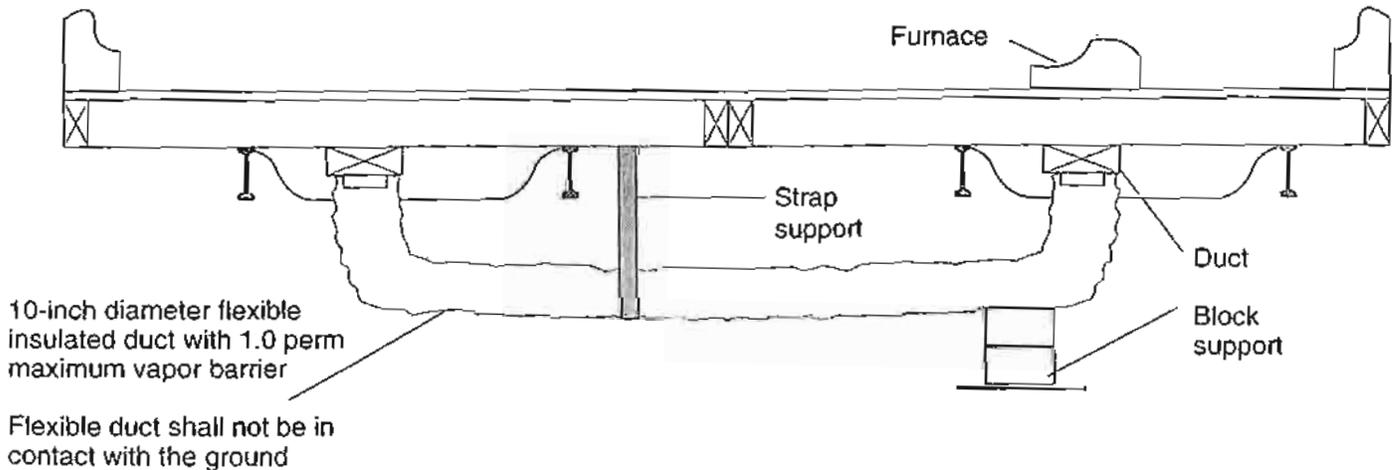


Figure 5-1 -- Cross-over duct installation

Strap Method	Anchor Min. Ultimate Load Capacity	Maximum Anchor Spacing		
		Zone I	Zone II ³	Zone III ³
Single Strap	4725 lbs.	11' - 0"	6' - 0"	4' - 6"
Double Strap	4725 lbs. ¹	11' - 0" ²	6' - 0" ²	4' - 6" ²

Note --

- 1 Unless listed/labeled for a higher capacity by the anchor manufacturer
- 2 Unless a greater spacing is specified by the anchor manufacturer
- 3 All homes located in Wind Zones II and III shall have a vertical tie installed at each diagonal tie location.

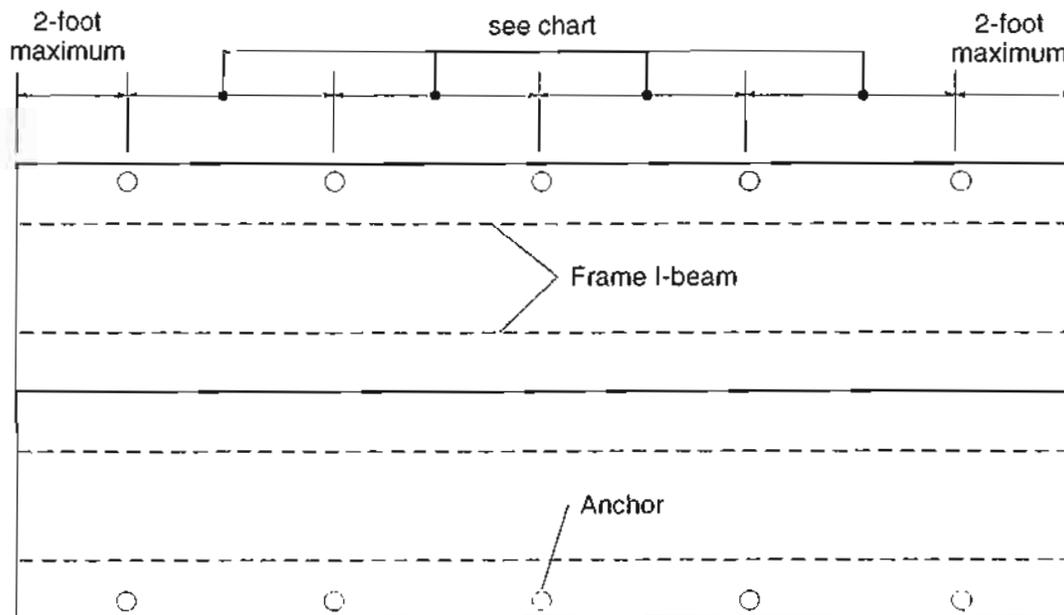
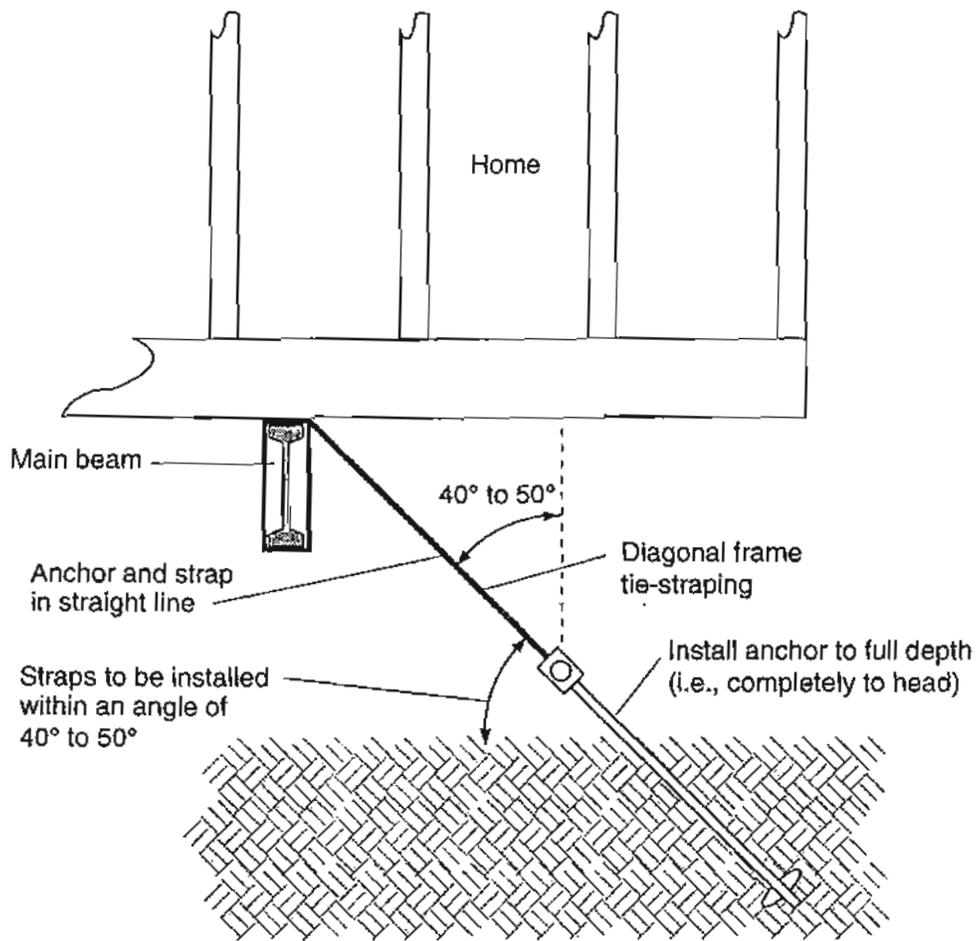


Figure 5-2 – Number and location of straps and ground anchors

Diagonal ties

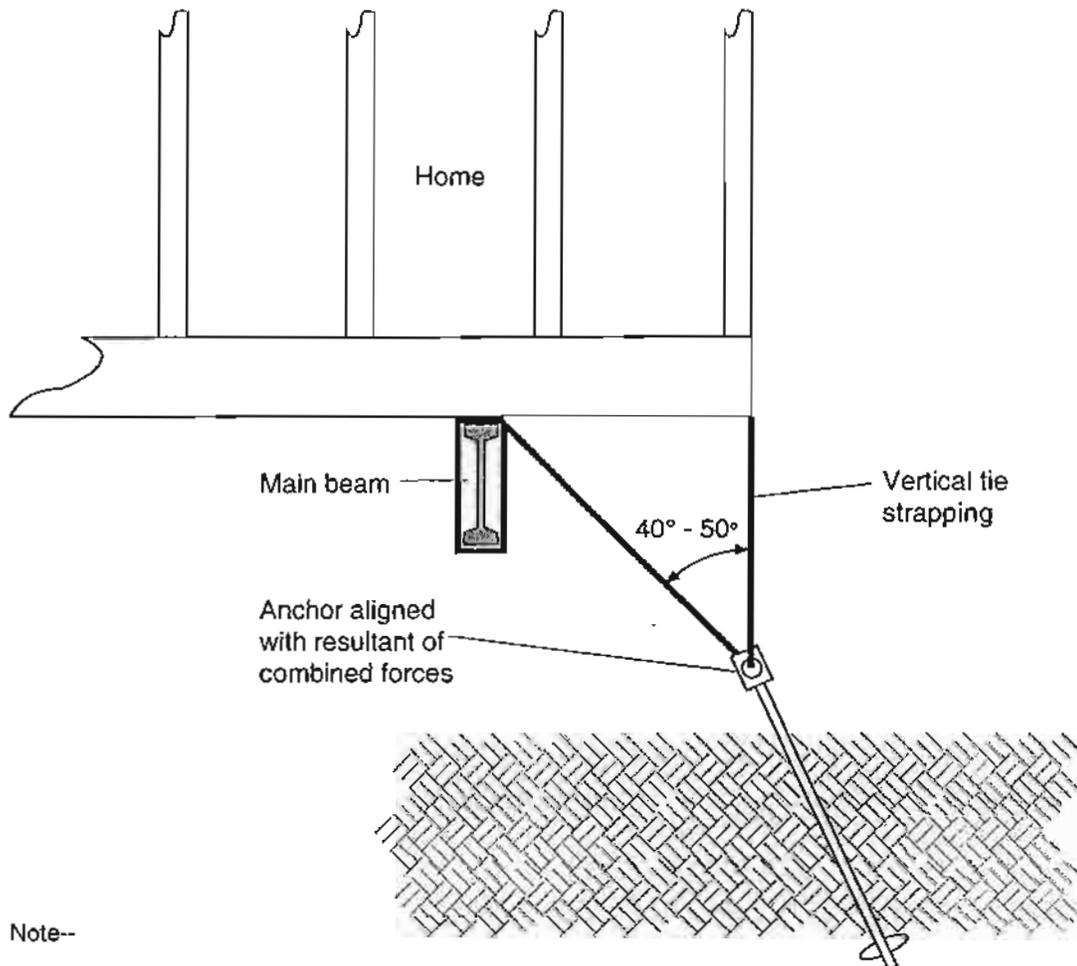


Note --

1. All anchoring parts must be certified to a 4,725-pound capacity.
2. The ground anchors must be sized in accordance with the direction of the load and the type of soil.
3. The ground anchors' augers must be installed below the frost line.
4. Ground anchors may be installed vertically if either a 10-inch x 18-inch (at a minimum) concrete collar or an approved metal stabilizing device is installed.

Figure 5-3 – Proper alignment of straps and anchors

Diagonal and vertical ties



Note--

1. All anchoring parts must be certified to a 4,725-pound capacity.
2. The ground anchors must be sized in accordance with the direction of the load and the type of soil.
3. The ground anchors' augers must be installed below the frost line.
4. Ground anchors may be installed vertically if either a 10-inch x 18-inch (at a minimum) concrete collar or an approved metal stabilizing device is installed.

Figure 5-4 – Proper alignment of straps and anchors

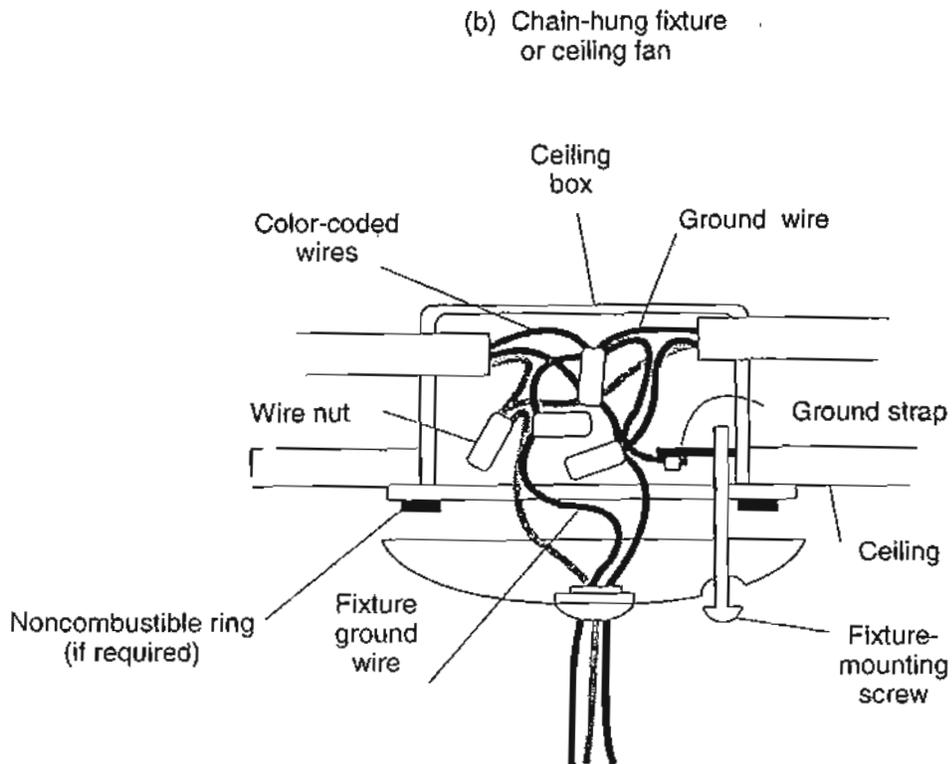
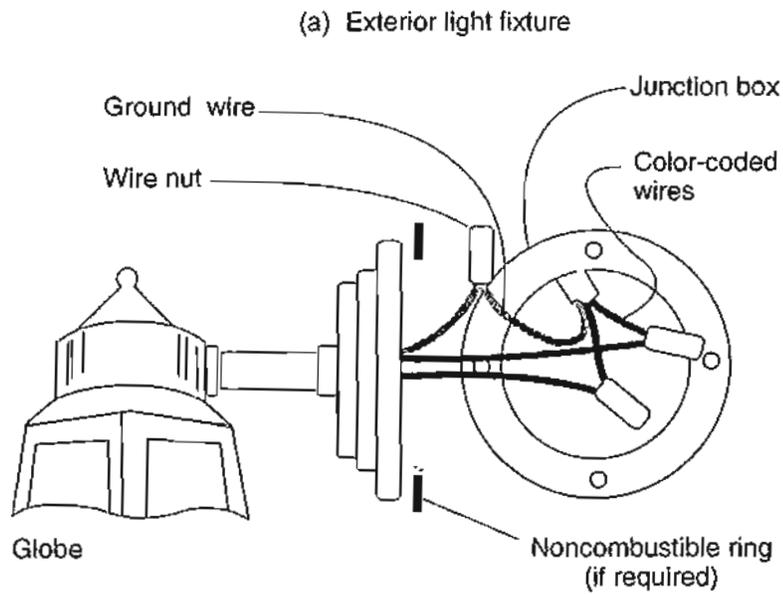


Figure 6-1 -- Installation of exterior lights

Figure 6-2(a) – Paddle fan installation

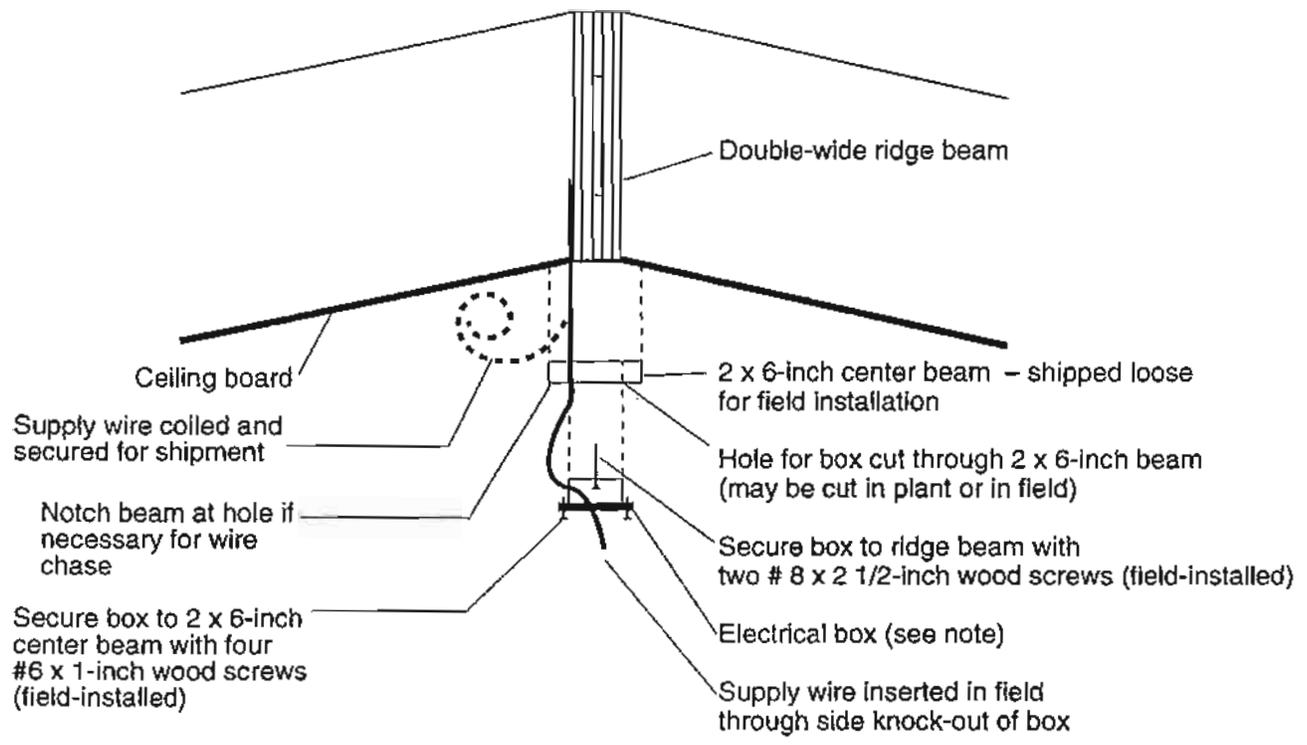
CAUTION: *Before following the step-by-step procedure, be sure that the power to the fan wire is off.*

1. Remove the fan manufacturer's installation instructions from the package and determine the method of attaching the fan to the beam that is to be used.
2. If the center beam (shipped loose) does not contain a precut hole for the electrical box, cut a hole with a hole saw approximately 1/4 inch larger than the box diameter, at the proper location. The center line of the hole should line up with the location of the supply wire through the ceiling. Center the hole in the width of the beam.
3. Install the box in the hole and secure the flange to the center beam with four #6 x 1-inch wood screws.
4. (a) Insert the ceiling wire through a knock-out hole in the side of the electrical box.

NOTE – It may be necessary to cut a notch from the top on the supply-wire side of the center beam hole to allow the supply wire to be inserted into the electrical box without rubbing against the center beam during installation.

(b) Leave approximately 4 inches of wire free in the box.

5. Secure the center beam in place over the center line joint. Be sure that the fan's supply wire is not pinched or penetrated with beam fasteners.
6. Secure the electrical box to the ridge beam with #8 x 2 1/2-inch wood screws through the two holes in the top of the box.
7. Strip about 3/4 inch of insulation from the white and black conductor ends.
8. Position the noncombustible flash ring, which is provided, over the electrical box so that the finished surface (adjacent to the electrical box) that is to be covered by the fan canopy is not exposed.
9. Follow the manufacturer's installation instructions for mounting the fan assembly on the box and for electrical wiring of the fan. Use the electrical connectors that are provided for splicing the wire. Be certain that the fan is grounded as specified in the manufacturer's instructions and that the wires are connected properly (white-to-white and black-to-black).



Note --
 Applicable to U.L.-listed paddle fan with a swivel-type mounting bracket

Figure 6-2(a) – Paddle fan installation

Figure 6-2(b) -- Protruding ridge beam

For proper ceiling fan installation, a prefabricated box has been provided that includes the electrical box containing the spliced wires with their connectors.

The prefabricated box is also designed to conceal the wire that runs through the ceiling where the fan is to be located. **CAUTION:** *Before following this step-by-step procedure, be sure that the power to the fan wire is off.*

1. Remove the fan manufacturer's installation instructions from the package and determine what method of attachment of the fan to the beam will be used.
2. Insert the ceiling wire through a side knock-out hole in the electrical box. Secure the wire in the electrical box clamp at a point that is approximately 4 inches from its end.
3. Place the prefabricated box in its final position

on the beam and secure the box to the beam with the #6 x 2-inch wood screws, which are provided, in the metal corner braces.

4. Strip about 3/4 inch of the insulation from the ends of the white and black conductors.
5. Position the noncombustible flash ring, which is provided, over the electrical box so that the finished surface (adjacent to the electrical box) that is to be covered by the fan canopy is not exposed.
6. Follow the manufacturer's installation instructions for mounting the fan assembly to the box and for electrical wiring of the fan. Use the electrical connectors, which are provided, for splicing wires. Be certain that the fan is grounded as specified in the manufacturer's instructions and that wires are connected properly (white-to-white and black-to-black).

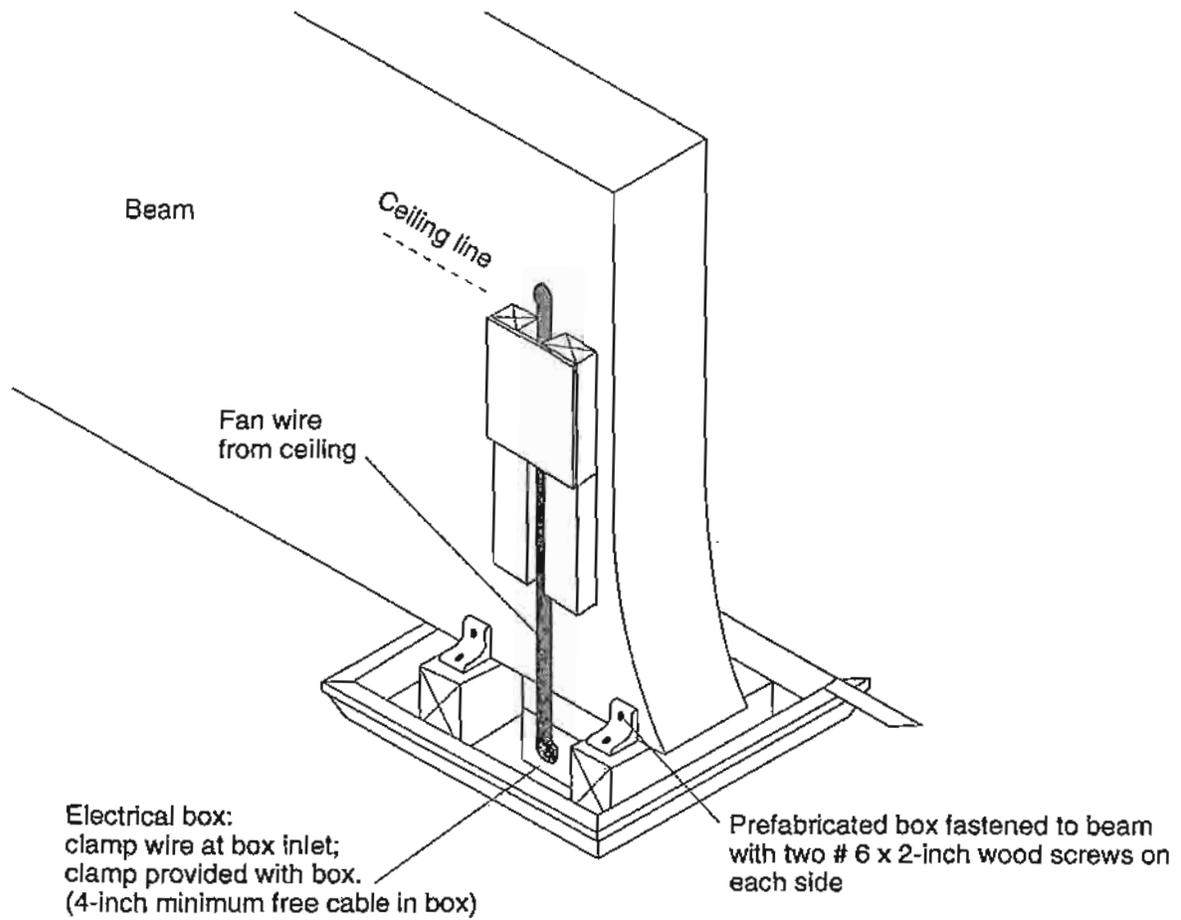


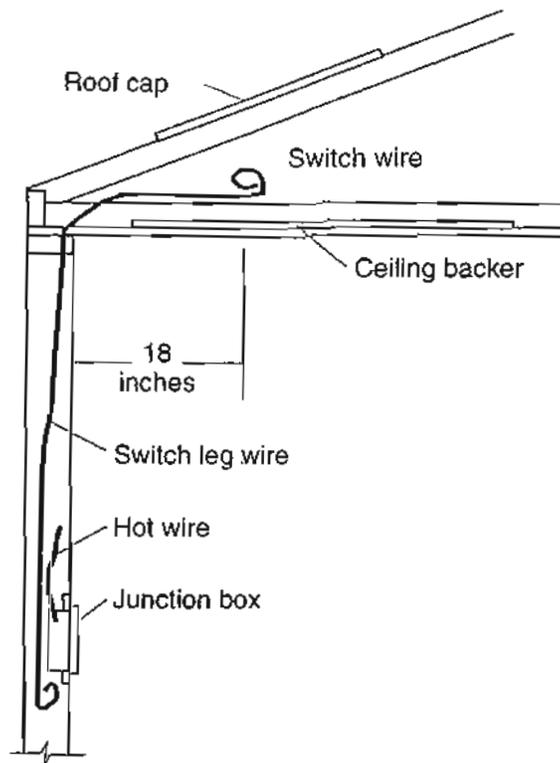
Figure 6-2(b) -- Protruding ridge beam

Figure 6-3 – Ventilation improvement installation

NOTE – The following installation instructions are provided to assist a person who is qualified and experienced with construction and electrical wiring. They are not intended to enable someone unfamiliar with electrical wiring and construction to perform the installation.

1. The ceiling backer for the fan is mounted directly in line with the junction box mounted in the wall of the hallway. Measure approximately 18 inches out from the wall into the hallway for backer center.
2. Cut an 8-inch diameter hole, using the location of step 1 as the center, through the ceiling board and backer.
3. Using a plumb bob, find the center of the hole and mark it on the roof backer. Drill a small hole through the roof backer and roof to mark the center of the opening from the exterior (the roof backer is omitted with a shingle roof).
4. Switch off the main circuit breaker in the panel box. Remove the junction-box cover from the fan. Install a 1/2-inch cable clamp through the hole in the side of the fan.
5. Find the free end of the switch leg wire, located in the roof cavity, to be connected to the fan. Insert the switch leg wire through the cable clamp.
6. All connections are to be properly made with wire nuts. Connect the black wire from the switch leg to the black wires from the fan; the white wire from the switch leg to the white wires from the fan; and the ground wire (bare) from the switch leg to the green ground screw in the fan.
7. Close the fan's junction box with a "C" bracket and secure it with the nut supplied for that purpose.
8. Remove the blank cover from the junction box in the wall. The wire with wire nuts on it is the hot wire.
 - (a) Remove the junction box from the wall.
 - (b) Find the free end of the switch leg wire and insert it into the junction box.
 - (c) Reinstall the junction box in the wall.
9. Connect the hot wire and the switch leg wire as follows:
 - (a) Connect the white wires to each other using a wire nut.
 - (b) Connect the black wires from the hot wire and switches to the terminals on the switch.
 - (c) Connect the ground wires (bare) using a permanent connector. Run a jumper from the ground connection to the ground screw on the switch.
10. Install the switch in the junction box and install the switch cover plate.
11. From the exterior of the home, cut an 8-inch diameter hole through the roof using the hole made in step 3 as the center.
12. Slide the fan up through the hole in the ceiling and secure it with four #8 x 1 1/4-inch (at the minimum) wood screws through the ceiling board and into the ceiling backer.
13. Apply butyl rubber tape to the underside of the predrilled holes or the area where the screws are to be installed. Slip the roof cap down around the fan from the exterior of the home. (Due to changes in roof height, an extension tube may be required.)
14. Screw the roof cap down to the roof and roof backer with #8 x 1-inch sheet-metal screws. Cover the screws and flange ends with roof coating.
15. Install the ceiling-fan cover on the fan. Turn the circuit breaker back on and check the fan for proper operation.
16. The vent is activated by simply flipping the wall switch to the "on" position.

(a) Before



(b) After

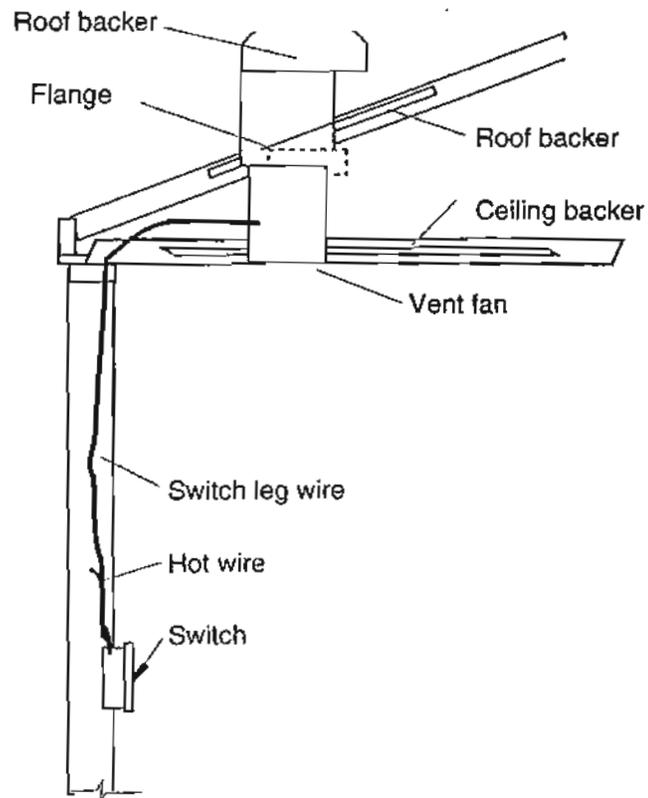
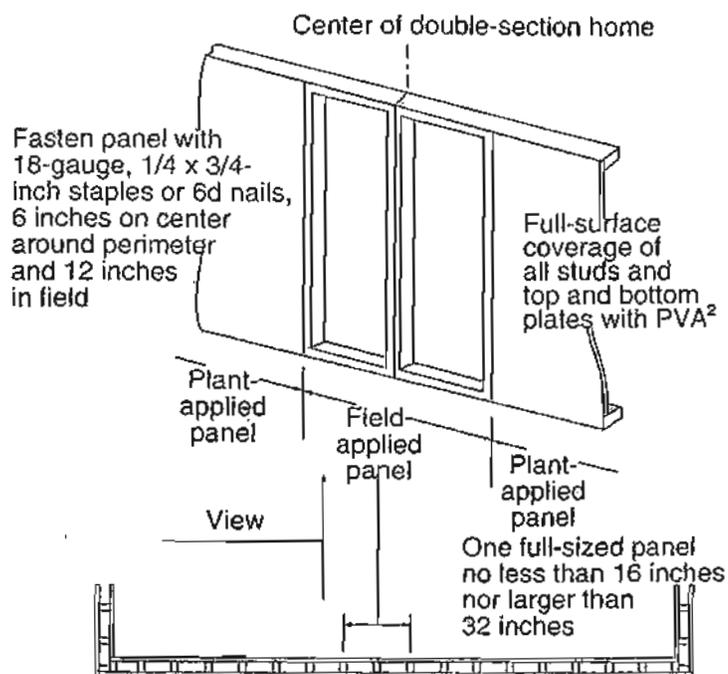


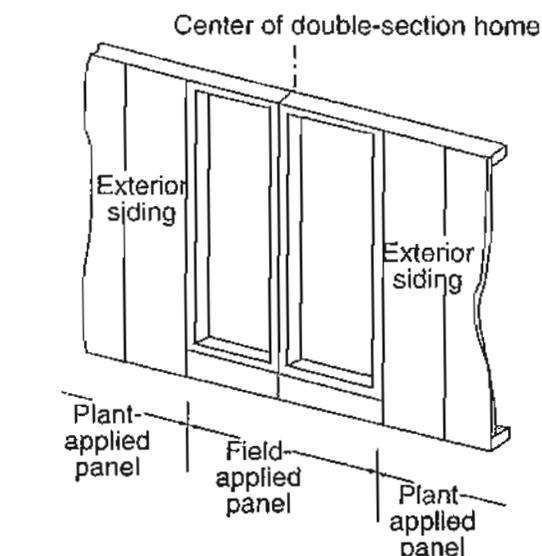
Figure 6-3 – Ventilation improvement installation

(a) Alternative, field-applied, interior end-wall panel

(b) Alternative, field-applied, wood siding at end wall

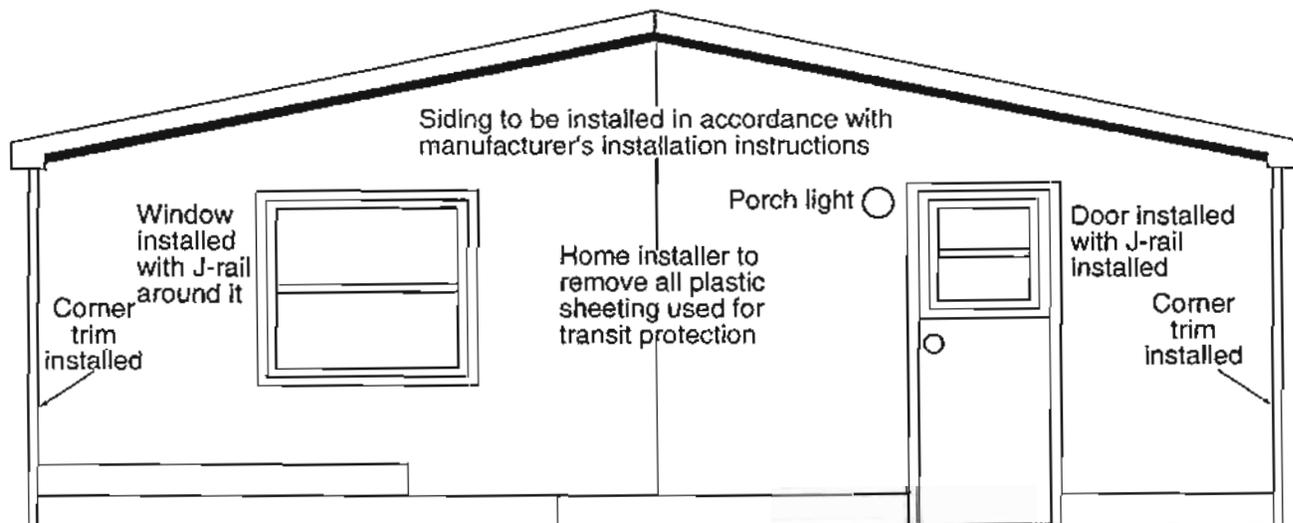


- Note --
1. Specific designs shown must be approved by a DAPIA (Design Approval Primary Inspection Agency)
 2. PVA -- polyvinyl acetate



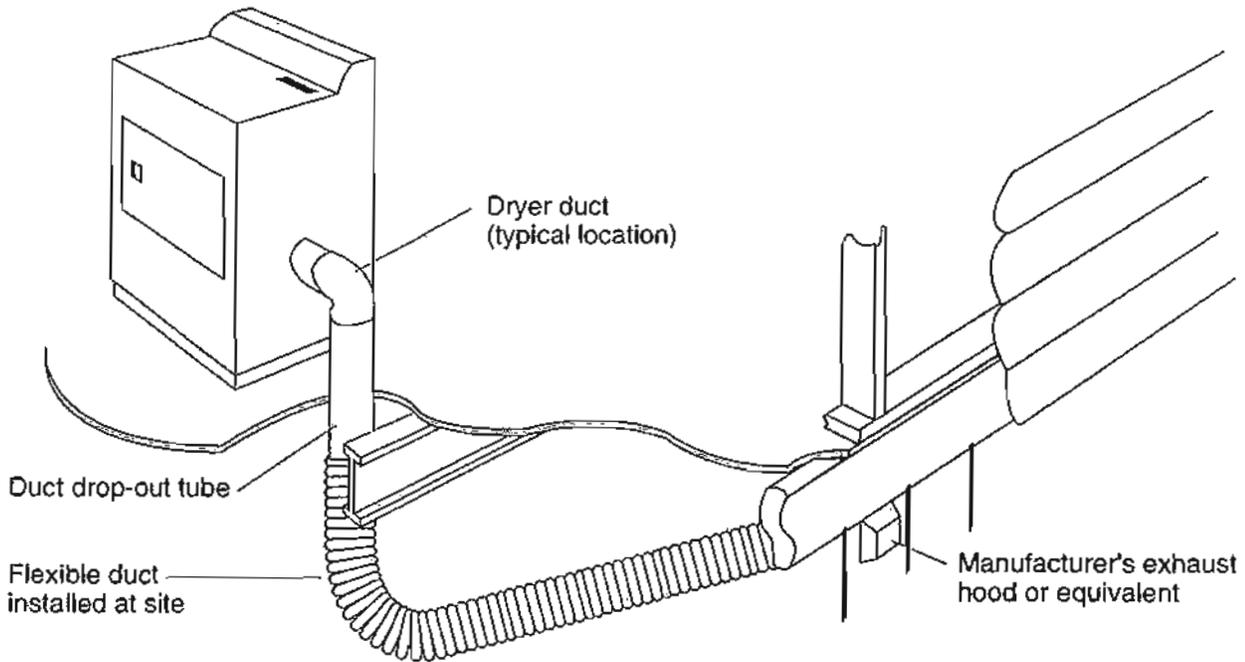
- One full-sized panel no less than 16 inches nor larger than 32 inches
- Fasten exterior panel to the studs in accordance with the siding manufacturer's installation instructions

(c) Alternative, field-applied, horizontal-lap siding



- Note --
1. Double-section homes with horizontal-lap siding may 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 set-up.
 3. Home installer to complete installation after home is set-up, including the installation of roof vents if required.

Figure 6-4 -- Installation of optional panels, siding, and moulding



CAUTION: Installation of the exhaust system must be in accordance with the dryer manufacturer's instructions.

CAUTION: This exhaust system must not terminate under the home.

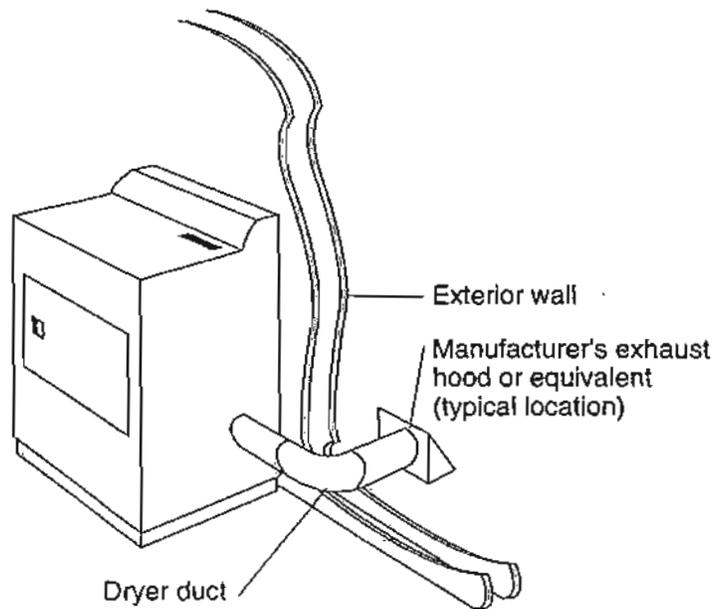


Figure 7-1 – Dryer exhaust system

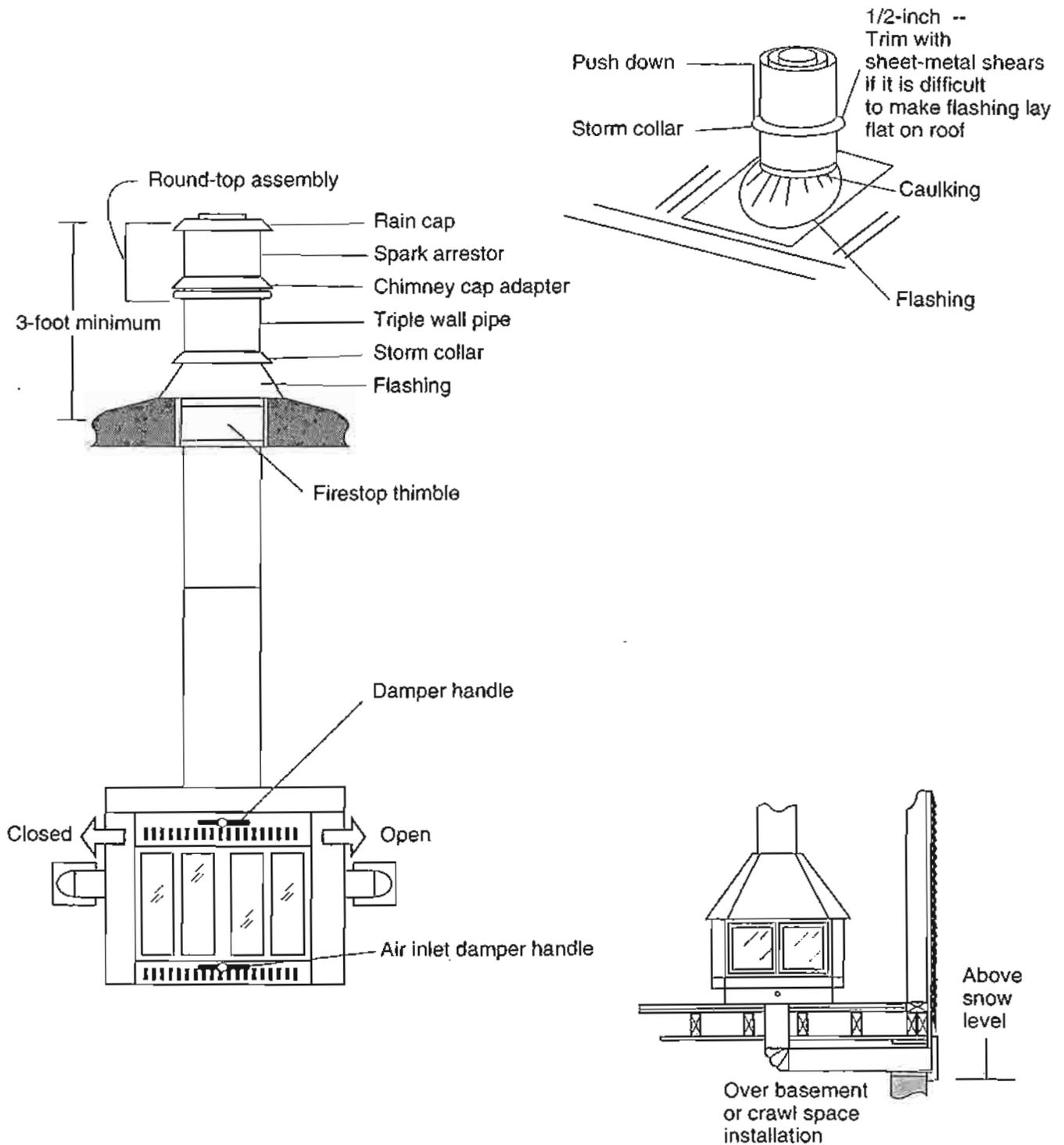


Figure 7-2 – Fireplace or wood stove chimney and air intake installation

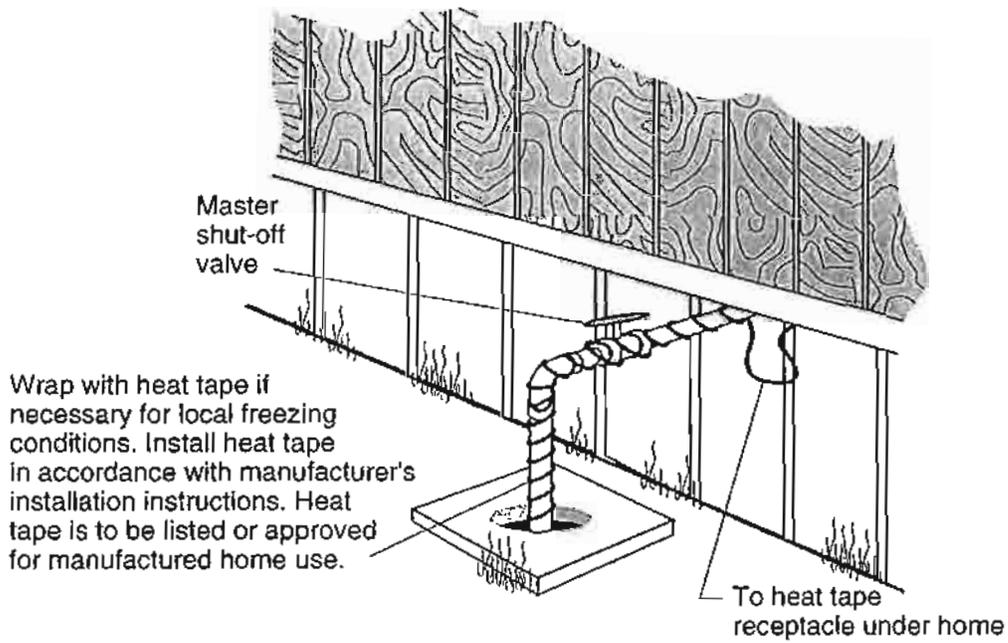
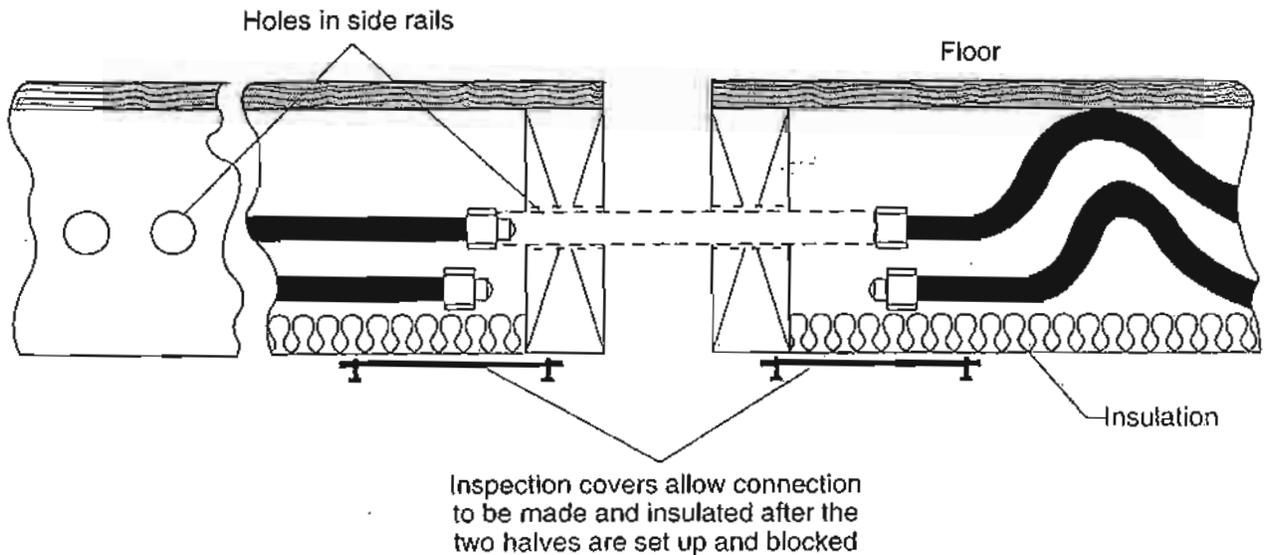


Figure 8-1 – Typical water connection



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

Figure 8-2 – Typical water-line cross-over

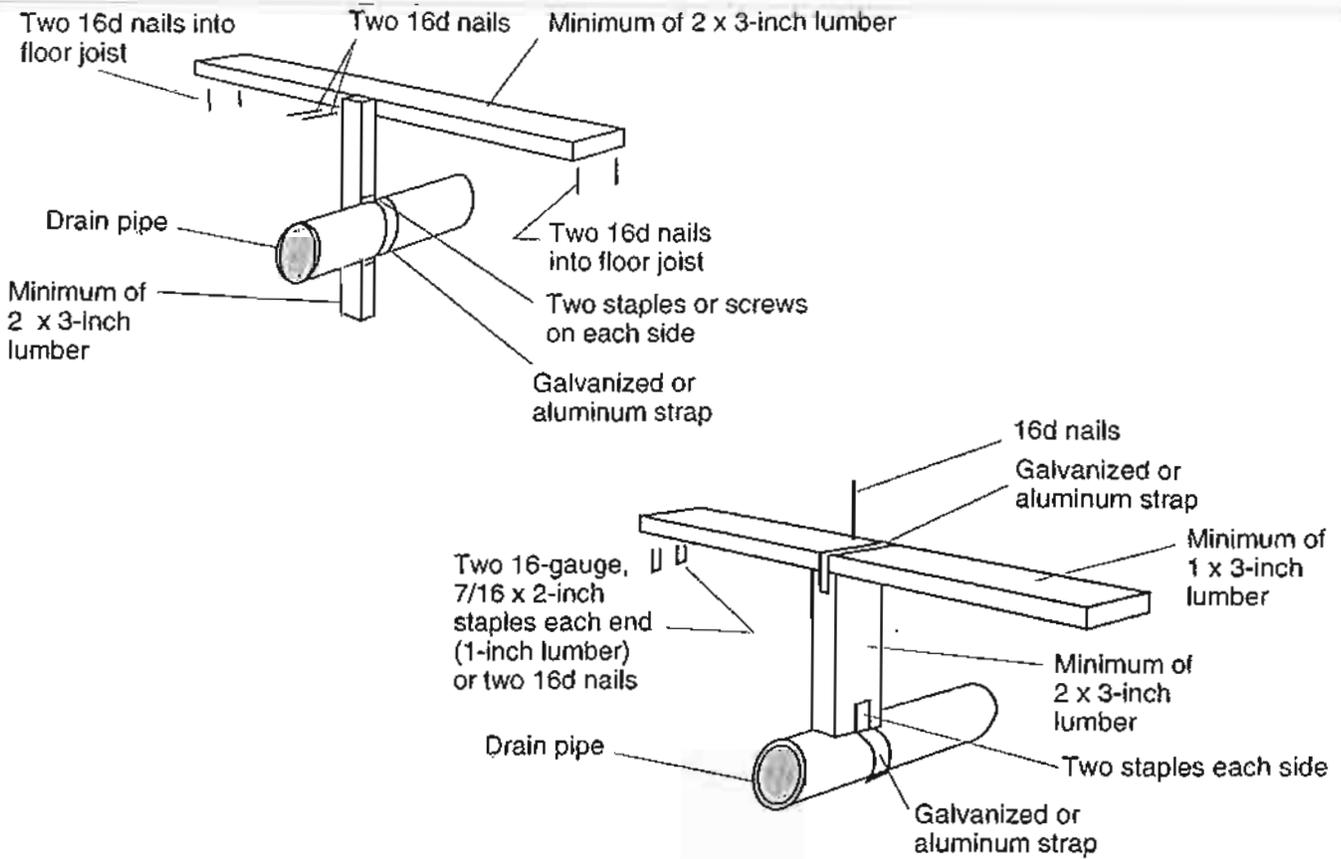


Figure 8-3 -- Drain-pipe support methods

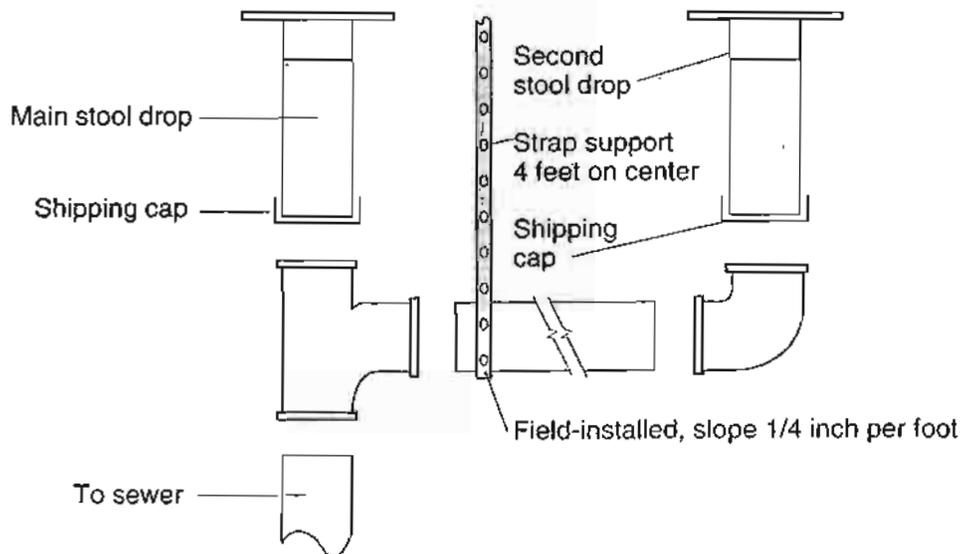
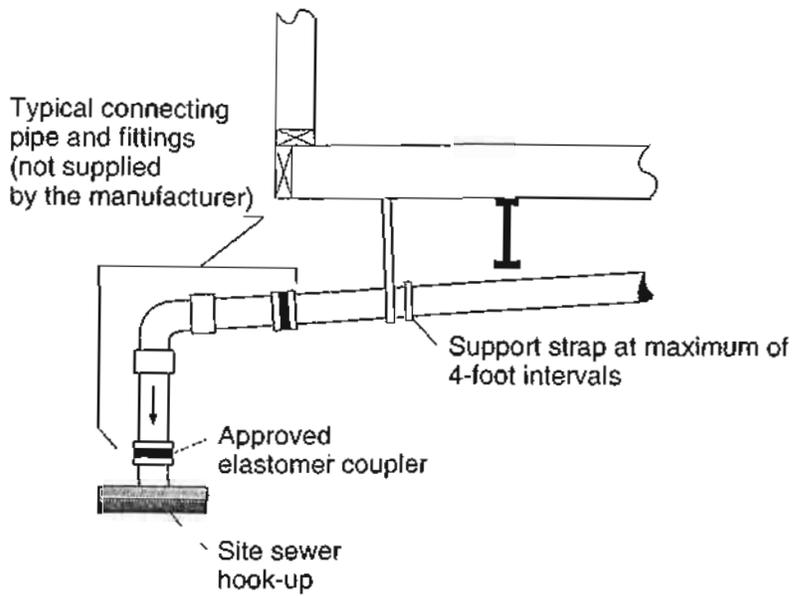


Figure 8-4 -- Drain-pipe slope and connections



Note --

Fittings in the drainage system that are subject to freezing, such as P-traps in the floor, have been protected with insulation by the manufacturer. Insulation must be replaced if it is removed to gain access to the P-trap.

Figure 8-5 -- Connection to site sewer

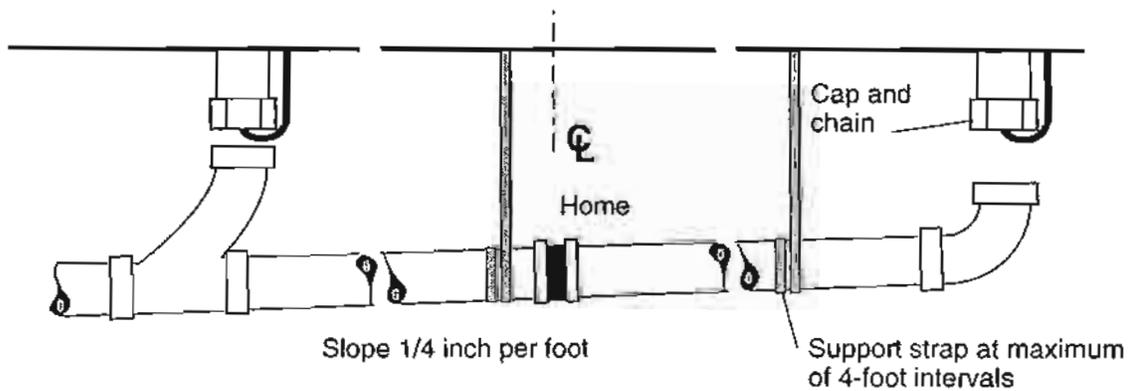


Figure 8-6 -- Drain-line cross-over connection

