661—322.11(103A) Support and anchorage of manufactured homes.

322.11(1) Manufactured homes shall be installed in accordance with one of the following paragraphs, as applicable:

a. Homes manufactured prior to October 20, 2008, shall be installed with support and anchorage as recommended by the manufacturer and as required by 24 CFR Part 3280, Manufactured Home Construction and Safety Standards, as published April 1, 2004; or

b. Homes manufactured on or after October 20, 2008, shall be installed in accordance with 24 CFR Part 3285, Model Manufactured Home Installation Standards, as published October 19, 2007; or

c. With a support and anchorage system designed by a licensed professional engineer; or

d. With a support and anchorage system that complies with subrules 322.11(2) and 322.11(3). This option shall apply only if the manufacturer's instructions are not available or the unit was manufactured before June 15, 1976. "The manufacturer's instructions are not available" means that the installer has requested and been unable to obtain the instructions from the manufacturer or its successor company and has requested and been unable to obtain the instructions from the building code bureau.

EXCEPTION: Minor adjustments in pier locations may be necessary to avoid utility and service lines. Additional supports may be needed to ensure that the maximum allowed distance between supports and anchors is not exceeded.

322.11(2) Requirements for support system installations.

a. Piers placed on foundations shall be installed and centered directly under the main frame longitudinal beams. The piers should not be farther apart than 10 feet on centers for manufactured homes 12 feet wide or less and not more than 8 feet on centers for manufactured homes over 12 feet wide to less than 16 feet wide and no more than 6 feet on centers for manufactured homes 16 feet wide or more. The main frame, front or back, should not extend farther than 2 feet beyond the centerline of the end piers.

NOTE: When making excavations for footings and piers on private property, installers shall take precautions to ensure that no telephone, electrical, plumbing or water lines are contacted. Utility line locations shall be verified with the property owner or property owner's representative.

b. Pier foundations shall be placed below the frostline on level, undisturbed soil, or on controlled fill that is free of grass and organic materials. (A small amount of sand may be of use to provide a level surface.) All pier foundations shall be set level, and piers must be installed plumb. The pier foundation shall be at least a 16″ × 16″ × 4″ solid concrete pad, precast or poured in place, or other approved material. Two nominal 4″ × 8″ × 16″ solid concrete blocks may be used provided that the joint between the blocks is parallel to the main frame longitudinal beam. Concrete used in foundations shall have a 28-day compressive strength of not less than 3,000 pounds per square inch (3,000 psi).

c. Unless otherwise directed by the owner of the site, the soil-bearing capacity of the site may be assumed to be 2,000 pounds per square foot. The acceptable construction under this subrule is based upon a soil-bearing capacity of 2,000 pounds per square foot. Sites with less soil-bearing capacity will require increased-size footings.

EXPLANATION: The permissible footing sizes and pier spacing are based upon a combined live and dead load of 65 pounds per square foot of unit. This assumes that the full snow and internal live load will not be present at the same time.

d. Piers may be constructed of concrete or undamaged nominal 8″ × 8″ × 16″ concrete blocks, open-celled or solid, placed on the pier foundation. All open-celled concrete block shall be installed with the cells of the block in a vertical position. Nominal 2″ × 8″ × 16″ or nominal 4″ × 8″ × 16″ solid concrete blocks may be utilized as needed to achieve the necessary heights of the piers for a particular installation. A nominal 2″ × 8″ × 16″ wood plate, or equivalent, shall be placed on top of each pier, unless there is at least 4 inches of solid block, with shims fitted and driven between the wood plate or solid block and the main frame longitudinal beam. The wood blocking shall not occupy more than a nominal 2 inches of vertical space, and shims shall not occupy more than 1 inch of vertical space. Shims which have a thickness of more than 3/8″ shall be hardwood.

(1) Piers up to 40 inches in height, except corner piers over three blocks high (a nominal 24″), may be of single-block construction and shall be installed transverse (right angle) to the main frame longitudinal beam.

(2) Piers over 40 inches in height but not exceeding 80 inches in height and corner piers over three blocks high shall be of double-block construction with every other course either parallel or transverse (right angle) to the main frame longitudinal beam. These piers shall be capped with a nominal 16″ × 16″ × 4″ solid concrete block or equivalent. Wood blocking and hardwood shims shall be installed accordingly.

(3) Piers over 80 inches in height shall be of reinforced concrete or of double-block construction and installed exactly according to the procedure given in subparagraph (2) above. Only celled concrete blocks shall be used (with open cells vertical) with 3/8″ diameter or larger steel reinforcing rods placed in the pier corners and all cells filled with 3,000 psi concrete. Wood blocking and shims shall be installed accordingly.

322.11(3) Requirements for anchorage systems. When instructions are not provided by the manufacturer, ties shall be attached vertically and diagonally to a system of ground anchors in a manner as illustrated in Figures 4 and 5. The minimum number of ties required are listed in Table 6–A. There shall be a diagonal tie between the ground anchors and the unit at each vertical tie. Additional diagonal ties may be required between vertical ties. The ties shall be as evenly spaced as practicable along the length of the unit with not over 8 feet open on each end.

a. Ties may be either steel cable, steel strapping, or other materials that meet the requirements of 322.11(3)*"f."* Ties are to be fastened to ground anchors and drawn tight with galvanized turnbuckles or yoke-type fasteners and tensioning devices. Turnbuckles shall be ended with jaws of forged or welded eyes (hook ends are not approved).

b. When continuous straps (over-the-top tie-downs) are provided as vertical ties, they should be positioned at rafters and studs to prevent structural damage. Where a vertical tie and diagonal tie are located at the same place, both ties may be connected to a single doublehead ground anchor provided that the anchor used is capable of carrying the combined loads and the anchor is included on a list of approved products maintained by the commissioner.

c. Cable used for ties shall be either galvanized steel or stainless steel and shall have a breaking strength of at least 4,725 pounds. Cable should be either 7/32″ diameter or greater (7 × 7) steel cable or ¼″ diameter or greater (7 × 19) aircraft cable. All cable ends should be secured with at least two I-bolt-type cable clamps or other nationally approved fastening devices.

d. When flat steel straps are used as ties, they shall be type 1, class B, grade 1, 1¼″ wide and 0.035″ thick, conforming with federal standard QQ-S-781-F, with a breaking strength of at least 4,725 pounds. Zinc coating (weather protection) shall be a minimum of 0.30 ounces per square foot of surface. Steel strap ties shall terminate with D-rings, bolts, or other nationally approved fastening devices that will not cause distortion or reduce the breaking strength of the ties.

e. The direction of pull of the diagonal ties should be at a right angle to the main frame longitudinal beam. Connection of the diagonal tie to the main frame longitudinal beam should be in accordance with anchor system instructions for those fastening devices. When steel strap ties are used, care should be exercised that the minimum bending radius is adhered to so the breaking strength is not reduced.

f. The anchorage materials shall be capable of resisting an allowable minimum working load of 3,150 pounds (pullout in a vertical direction) with no more than 2 percent elongation and shall withstand a 50 percent overload. All anchorage materials shall be resistant to weathering deterioration at least equivalent to that provided by a coating of zinc on steel strapping of not less than 0.30 ounces per square foot surface coated. Anchors to reinforced concrete slab or to rock shall be of comparable strength as provided within this paragraph.

Each ground anchor, when installed, shall be capable of resisting an allowable working load at least equal to 3,150 pounds in the direction of the ties plus a 50 percent overload (4,750 pounds total) without failure. Failure shall be considered to have occurred when the point of connection between the tie and anchor moves more than 2 inches at 4,750 pounds in the direction of the vertical tie when anchoring equipment is installed in accordance with the anchorage manufacturer's instructions. Those ground anchors which are designed to be installed so that the loads on the anchor are other than direct withdrawal

shall be designed and installed to resist an applied design load of 3,150 pounds at 45° from horizontal without displacing the anchor more than 4 inches horizontally at the point where the tie attaches to the anchor.

Anchors designed for connection of multiple ties shall be capable of resisting the combined working load and overload consistent with the intent expressed in this paragraph.

g. Ground anchors shall be installed so that the load-carrying portion of the anchor in its final working position is below the frost depth (42 inches), and the anchor head shall be at ground level. Total anchor length shall be more than 42 inches as necessary.

NOTE: When installing ground anchors on private property, installers shall take precautions to ensure that no telephone, electrical, plumbing or water lines are contacted. Utility line locations shall be verified with the property owner or property owner's representative.

TABLE 6–A
MINIMUM NUMBER OF TIEDOWNS
REQUIRED FOR SINGLEWIDE MOBILE HOMES

MOBILE HOME BOX LENGTH NOT EXCEEDING	MINIMUM NUMBER OF TIEDOWNS PER SIDE	
	DIAGONAL TIES	VERTICAL TIES*
40′–0″	3	2
54′–0″	3	2
73′–0″	4	2
84′–0″	5	2

*If more than the minimum number of vertical or diagonal ties have been supplied, they shall all be used.

NOTES:

1. Doublewide mobile homes shall comply with Table 6–A except that no vertical ties are required.
2. Wherever a vertical tie and a diagonal tie lie in a plane that is vertical and transverse to the main longitudinal beam, both ties may be connected to the same ground anchor, providing that particular anchor withstands both loadings.
3. This table shall be used only if there are no manufacturer's approved installation requirements.