

Minnesota Attorney General: Administrative Rules Proceedings

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Joan Volz
Special Assistant
Attorney General

May 16, 1977

- Rules of Building Code Division governing Installation of Mobile Home Support and Tie-Down Systems.

FILING SET #2

(Copies)

Public Hearing

November 30, 1976

State of Minnesota
Department of Administration
Building Code Division
408 Metro Square Building
St. Paul, Minnesota 55101

STATEMENT OF COMPLIANCE WITH

MANUAL OF RULE MAKING PROCEDURES

I, Special Assistant Attorney General Joan Volz, do hereby declare that I have examined the proposed rules and all related documents and that, based on them and my personal familiarity with the applicable procedures, the Manual of Rule Making Procedures has been followed. Any exceptions are noted below.

Joan Volz
Special Assistant Attorney General

Date: 9 Mar 1977

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE BUILDING CODE DIVISION GOVERNING INSTALLATION OF MOBILE HOME SUPPORT AND TIE-DOWN SYSTEMS.

ORDER FOR HEARING

IT IS HEREBY ORDERED that a public hearing on the above-captioned rules be held in the Conference Room of the Building Code Division, 408 Metro Square Building, 7th and Robert Streets, Saint Paul, Minnesota, 55101, on November 30, 1976 commencing at 9:00 a.m. and continuing until all persons have had an opportunity to be heard.

IT IS FURTHER ORDERED that a Notice of Hearing be mailed to all persons or representatives of associations or other interested groups who have registered their names with the Secretary of State for that purpose.

IT IS FURTHER ORDERED that the Notice of Hearing be published in the State Register.

Date: October 13, 1976

Richard L. Brubacher

Richard L. Brubacher
Commissioner of Administration

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

IN THE MATTER OF THE PROPOSED ADOPTION
OF RULES OF THE BUILDING CODE DIVISION
GOVERNING INSTALLATION OF MOBILE HOME
SUPPORT AND TIE-DOWN SYSTEMS.

NOTICE OF HEARING

NOTICE IS HEREBY GIVEN that a public hearing in the above-entitled matter will be held in the Conference Room of the Building Code Division, 408 Metro Square Building, 7th and Robert Streets, St. Paul, Minnesota, 55101, on November 30, 1976 commencing at 9:00 a.m. and continuing until all persons have had an opportunity to be heard.

All interested or affected persons will have an opportunity to participate. Statements may be made orally and written materials may be submitted at the hearing. In addition, written materials may be submitted to Peter C. Erickson, Office of Hearing Examiners, 1745 University Avenue, St. Paul, Minnesota, 296-8100, either before the hearing or within 20 days after the close of the hearing.

The proposed rules, if adopted, would set forth rules for the installation of mobile home support and tie-down systems. These proposed rules are reprinted in part with permission from NFPA 501A "Standard for the Installation of Mobile Homes", Copyrighted 1975, National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts, 02210. These proposed rules were discussed at the Spring 1976 Installers' Seminars.

Copies of the proposed rules are now available and one free copy may be obtained by writing to the Building Code Division, 408 Metro Square Building, 7th and Robert Streets, St. Paul, Minnesota, 55101. Additional copies will be available at the

door on the date of the hearing. The agency's authority to promulgate the proposed rules is contained in Minn. Stat. 327.33 (1975), subd. 3. A "Statement of Need" explaining why the agency feels the proposed rules are necessary and a "Statement of Evidence" outlining the testimony they will be introducing will be filed with the Hearing Examiners Office at least 25 days prior to the hearing and will be available there for public inspection.

Please be advised that pursuant to Minn. Stat. 10A.01, subd. 11 (1974) any individual engaged for pay or other consideration for the purpose of representing persons or associations attempting to influence administrative action, such as the promulgation of these rules, must register with the State Ethics Commission as a lobbyist within five days of the commencement of such activity by the individual.

Date: October 13, 1976

Richard L. Brubacher
Commissioner of Administration

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

In the matter of proposed adoption
of rules of the Building Code Division
governing installation of mobile home
support and tie-down systems.
MoH 100 through MoH 900

STATEMENT OF NEED

The above captioned rules are amendments to existing rules of the Building Code Division. The last time the above captioned rules were amended was September, 1974.

Minn. Stat. 327.31, subd. 6 requires that no person shall install a mobile home support system or ground anchoring system violating rules promulgated by the Commissioner pertaining to such systems. Minn. Stat. 327.33, subd. 3 further states that the Commissioner of Administration may periodically revise the code as deemed necessary to protect the health and safety of the public. Such revisions shall, to the extent practicable, be uniform with those adopted by other states.

The proposed rules, MoH 103, originated from the Standard for the Installation of Mobile Homes, identified as National Fire Prevention Association No. 5-1A-1 (NFPA 501A-1). NFPA 501A-1 was developed by a committee of industry, trade and government representatives and was approved by the National Fire Prevention Association at its 1975 Fall Meeting. Previous editions of the standard have been approved by the American National Standards Institute (ANSI) and the 1975 edition is being submitted to ANSI for approval. When approved, the ANSI designation "ANSI A119.3-(year)" will appear on the cover of the standard.

The adoption of a standard developed by a nationwide group will provide the maximum assurance that the Legislature's desire for uniformity will be met.

Mobile homes are serving as residences for an increasing number of citizens of the State of Minnesota, and continue to increase in numbers. The mobile home is designed to provide adequate living quarters when properly supported and connected to utilities. The proper operation of the drainage system, doors, windows, and some appliances require that the home be installed on a level, stable support system having the strength to resist normal loads without movement.

The rules proposed will provide reasonable assurance that support systems meeting the requirements will provide the mobile home owner with a stable functional residence. The rules proposed for anchoring systems allow the mobile home owner to obtain an anchoring system that will prevent lateral movement, or overturning of the mobile home when the home is exposed to winds of 70 miles per hour or less. The following are points in support of the specific rules which are proposed:
MoH 450A-1.a. and 1.b. Manufacturer's Installation Instructions. Mobile homes are engineered structures and the design is based on the use of a particular means of transferring the dead and live loads acting on the mobile home to the earth beneath the home. To permit subsequent moves and re-installation, the manufacturer's instructions must stay with the home.

The manufacturer of the mobile home cannot specify the size of footers. The size must be determined from the stated load given by the manufacturer and the load bearing ability of the soil at the point of installations.

It is necessary to specify minimum requirements to assure the home owner that the performance of the installed equipment meets the stresses that may be encountered during the normal use of the home. Failure of the stabilizing device may cause serious damage to the mobile home.

MoH 450A-2. Stabilizing System Design. To provide the owner or occupant of a mobile home, constructed prior to the adoption of construction standards, with a reasonable standard for the anchoring of the mobile home, it is necessary to adopt

requirements based on sound engineering judgement. The requirements set forth were arrived at by a committee representing public and private sectors involved in the construction and use of mobile homes.

MoH 450A-2.c. Alternate Method Using Strapping. Baling of mobile homes not provided with specific instructions for anchoring has proven to be an acceptable method of increasing the structural integrity of older mobile homes. The baling straps will transfer the forces caused by strong winds to the main frame members, and through the main frame members to ground ties. This method is particularly useful in areas subject to frost heaving. The connection of the ground anchors to the frame members only will reduce the possibility of damage to the mobile home structure in the event frost action causes the surface of the ground to raise.

MoH 450B. Support Systems. To adequately perform its function, a mobile home must be supported by systems that will transfer the weight of the mobile home and its contents to the earth below the mobile home. The support system must retain its integrity under all conditions that the home is designed to withstand. This includes snow loads, and wind loads as well as the forces due to the occupants and their normal possessions. The support system must be designed to accomplish the support function during normal periods of use and also function in conjunction with the anchoring system if installed, during abnormal conditions such as a wind storm. The 12 inch clearance specified is a recommendation only.

MoH 450B-1. Mobile Homes with Installation Instructions. The mobile home construction code currently in effect and the HUD regulations effective June 15, 1976 require that the manufacturer of the mobile home must include instructions with each mobile home specifying the location and required capacity of stabilizing devices on which the design is based. It is also a general requirement that the home manufacturer's

instructions be followed if the home owner is to receive the maximum benefits afforded by the manufacturer's warranty. The manufacturer's instructions for the set-up of double wide mobile homes specifies the specific location for supports along the mating (center) line of the mobile home. The mating line support locations are required at points of concentrated loads, vary from model to model, and cannot always be determined by visual inspection.

MoH 450B-2. Mobile Homes for which Installation Instructions are not Available. The installation of homes built prior to the imposition of the mobile home construction codes should be controlled to provide the owner or occupant with an adequately supported unit. The requirements given are the result of experience by manufacturers, home owners, park operators, and insurance carriers.

These instructions apply to single wide mobile homes only. Amendment is required to include double wide homes. The proposed amendment will permit the control of double wide installations, thus providing support for the roof structure without overloading other structural members.

MoH 450B-3 and 3.a. Footers. A 65 pound per square foot load figure is a realistic reduction of the theoretical maximum load of approximately 90 pounds per square foot. The 90 pound figure is the sum of the mobile home dead weight plus a 30 pound per square foot snow load plus the 40 pound per square foot floor load capability. The reduction is justified by experience with residential structures of all types, which has shown that the maximum load capability will be utilized in a small portion of the total area.

The use of an average load value is required to assure that support elements will be able to properly support the home during all periods of normal residential use. Inadequate support can result in overloading of portions of the mobile home with the possibility of permenent structural damage to the home. The reference to

concentrated loads will generally apply to double wide homes.

The materials specified are standard products generally available and capable of performing the required function, i.e., spreading the load over an area that will provide adequate support on normal soils. The requirement is a minimum requirement and will support 3,100 pounds on soil having a bearing capacity of 2,000 pounds per square inch.

MoH 405B-4., 4.a., and 4.b. Piers. Piers are the main portions of the load bearing units placed under a mobile home. The requirement allows the use of special devices designed for the function of piers constructed of concrete block. The requirement for attachment to the frame or alternately the requirement that the pier extend six inches from the centerline of the frame member is necessary to allow for small lateral movements of the home during periods of strong winds. The lateral movement can cause the home to slide off of the piers or cause the piers to tip over if not properly constructed.

The details specified assure adequate stability of the installed home when loose stacked concrete blocks are used. The height limitations are based on experience gained in all areas of the country. The use of filled concrete block columns will provide a method of constructing concrete block piers in the event loose stacked blocks cannot provide adequate stability.

MoH 450B-6. Plates and Shims. A means of compensating for variations in the ground surface elevation or variations in frame member sizes must be provided. The wood plate and shim combination will provide the capability of adjustment for spaces too small to permit the use of concrete blocks or cap blocks.

MoH 450C. Anchoring Equipment. This requirement allows the use of standard anchoring components that meet the strength requirement adopted by the mobile home industry, or the use of a special system designed for a specific application.

MoH 450C-1 through 450C-4.a. The detail requirements for anchoring system components will serve as a standard for acceptance by the State of Minnesota until components listed, or approved, by a recognized independent agency are readily available.

MoH 450C-4.b. through 450D. Ties and Ground Anchors. Standard installation procedures are required to assure the mobile home owner or occupant that the installed system will effectively utilize the capabilities of the system components. The load bearing capability of attachments and connections must be equal to the strength of the interconnecting materials. The ground anchor, and its connecting elements must withstand normal loading without failure or excessive displacement.

MoH 450D-1 through 450D-2.a. Ground Anchors. These requirements include design, installation, and performance criteria. The design requirements are in accordance with current and proposed industry standards and will serve as a basis for acceptance by the State of Minnesota until listed or approved anchors are available. The installation requirements are needed to provide inspection standards for field inspection of installed anchoring systems.

The soil classification is a simplified system that covers the types of soils encountered by installers and facilitates the selection of anchors capable of performing in specific locations. Misapplication of anchors can result in reduced holding ability.

MoH 450D-3. Use of Concrete Slabs or Continuous Footers. A means of anchoring mobile homes to concrete slabs or continuous footers is required to provide owners

of homes placed on slabs or continuous footers a means of attaching the home to the concrete. Concrete anchors may also be needed on the patio side of homes in parks providing concrete patio slabs. The reference to concrete deadman anchors identifies the classification and refers to the general performance requirements for anchors.

MoH 450D-4.1, 4.2 and 4.3. Other Anchoring Devices. To permit the proper selection and use of anchors the anchor manufacturer must specify the capability of the anchor. The installer must match the anchor to the soil and install the anchor in an approved manner if the mobile home owner is to receive the protection desired. Failure to select the proper anchor or failure to install the anchor properly may seriously reduce the holding power of the anchor.

MoH 450F, 450F-1.2. and 450F-1.b. Maintaining Anchoring Systems. Mobile homes installed on piers, slabs, or continuous footers resting on the ground surface may move slightly due to the expansion of the soil. This section formally recognizes that such action may occur and places responsibility for such adjustments on the persons nominally in charge of tne mobile home. This is generally the home owner.

Date: October 13, 1976

Richard L. Brubacher
Commissioner of Administration

State of Minnesota

Department of Administration

In the Matter of the Proposed Adoption of Rules of the Building Code Division Governing Installation of Mobile Home Support and Tie-Down Systems

STATEMENT OF EVIDENCE

Richard Hauck, Chief of the Manufactured Structures Section of the Building Code Division, will appear on behalf of the Building Code Division of the Department of Administration at the hearing to be held on November 30, 1976. He will testify regarding the need for and reasonableness of the proposed rules. The substance of his testimony is set forth in the Statement of Need submitted herewith.

Don Pates
Director, Building Code Division

E #7

PROPOSED RULES

Department of Administration Building Code Division

Installation of Mobile Home Support and Tie-Down Systems

Notice of Hearing

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Copies of the proposed rules are now available and one free copy may be obtained by writing to the Building Code Division, 408 Metro Square Building, 7th and Robert Streets, St. Paul, Minnesota, 55101. Additional copies will be available at the door on the date of the hearing. The agency's authority to promulgate the proposed rules is contained in Minn. Stat. § 327.33, subd. 3 (1975). A "Statement of Need" explaining why the agency feels the proposed rules are necessary and a "Statement of Evidence" outlining the testimony they will be introducing will be filed with the Hearing Examiners Office at least 25 days prior to the hearing and will be available there for public inspection.

Please be advised that pursuant to Minn. Stat. § 10A.01, subd. 11 (1974) any individual engaged for pay or other consideration for the purpose of representing persons or associations attempting to influence administrative action, such as the promulgation of these rules, must register with the State Ethics Commission as a lobbyist within five days of the commencement of such activity by the individual.

Richard L. Brubacher
Commissioner of Administration

Rules as Proposed

MoH 103 Definitions. In addition to the definition contained herein, the definitions in ANSI A119.1 or NFPA 501B shall apply.

A. Accessory.

1. A subordinate structure which, when installed, becomes a part of a mobile home.

2. Components which constitute portions or parts of ground support and anchoring systems.

B. Agency, independent inspection. An organization, approved by the Commissioner, qualified to review and approve plans and specifications for mobile homes with respect to model, structural, electrical, mechanical and plumbing requirements and in addition evaluate quality control programs and make inspections.

C. Agency, listing. An agency approved by the Commissioner which is in the business of listing or labeling and which maintains a periodic inspection program on current production of listed products, and which makes available at least an annual published report of such listing in which specific information is included that the product has been tested to approved standards and found safe for use in a specified manner.

D. Agency, evaluation. An organization approved by the Commissioner which is qualified by reason of facilities, personnel, experience and demonstrated reliability to investigate and evaluate mobile homes.

E. Agency, testing. An organization which is:

1. Primarily interested in testing and evaluating equipment and installations;

2. Qualified and equipped for, or to observe experimental testing to approved standards:

3. Not under the jurisdiction or control of any manufacturer or supplier of any industry;

4. Makes available a published report in which specific information is included stating that the equipment

and installations listed or labeled have been tested and found safe for use in a specific manner; and

5. Approved by the Commissioner.

F. Alteration, construction. The replacement, addition, modification or removal of any equipment or installations which may affect the construction, plumbing, heat-producing or electrical system or the functioning thereof of mobile homes subject to the code.

G. Alteration, installation. The replacement, addition, modification or removal of any components of the ground support or ground anchoring systems required under the provisions of these rules.

H. Anchoring equipment. Straps, cables, turnbuckles, and chains, including tensioning devices, which are used with ties to secure a mobile home to ground anchors.

I. Anchoring system. A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist overturning and lateral movement of the mobile home from wind forces.

J. Approved. Means acceptable to the authority having jurisdiction.

K. Authority having jurisdiction. The Commissioner of Administration or his authorized representative.

L. Authorized representative. Authorized representative includes any person, firm or corporation, or employee thereof, approved or recognized by the Commissioner to perform inspection services.

M. Baling. Baling is a method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a mobile home with straps.

N. Code. Code means the standards code promulgated by the American National Standards Institute and identified as ANSI A119.1 or the provisions of the National Fire Protection Association and identified as NFPA 501B, including revisions adopted by the Commissioner.

O. Compliance certificate, construction. The certificate provided by the manufacturer or dealer or both the Commissioner and the owner which warrants that the mobile home complies with the code.

P. Compliance certificate, installation. The certificate provided by the installer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with these rules.

Q. Commissioner. Commissioner means the Commissioner of Administration or his duly authorized representative.

R. Dealer. Dealer means any person, other than a manufacturer who sells three (3) or more mobile homes in any consecutive twelve (12) month period.

S. Diagonal tie. A tie intended to primarily resist horizontal or shear forces and which may secondarily resist vertical, uplift, and overturning forces.

T. Footer. That portion of the support system that transmits loads directly to the soil.

U. Ground anchor. Any device at the mobile home stand designed to transfer mobile home anchoring loads to the ground.

V. Installer. Mobile home installer means any person who, within any consecutive twelve (12) month period, installs for others three (3) mobile homes at site of occupancy by making necessary service connections or attaching support systems or ground anchoring systems.

W. Installation instruction. Those instructions provided by the manufacturer accompanying each mobile home detailing the manufacturer's requirements for ground supports and anchoring systems attachments.

X. Length of mobile homes. The distance measured from the extreme front to the extreme rear of a mobile home (excluding hitch, coupling, tongue and other attachments).

Y. Listed. Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or materials meet nationally recognized standards or has been tested and found suitable for use in a specified manner.

Z. Main frame. The structural component on which is mounted the body of the mobile home.

A_1. Manufacturer. A person who manufactures mobile homes.

KEY: New rules and material proposed to be added to an existing rule are printed in **boldface.** Material proposed to be deleted from an existing rule is printed in [single brackets]. Underlining indicates additions to proposed rules, while [[double brackets]] indicate matter stricken from proposed rules. Existing material is printed in standard type face.

B_1. Mobile home. Mobile home means a factory-built structure or structures equipped with the necessary service connections and made so as to be readily movable as a unit or units on its or their own running gear and designed to be a relocatable structure or structures used for any occupancy without a permanent foundation. The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the mobile home placed thereon will be moved from time to time at the convenience of the owner.

C_1. Model-Group. Two or more manufacturer-designed mobile homes which constitute one model.

D_1. Person. This means a person, partnership, corporation or other legal entity.

E_1. Seal, construction. Seal means a device or insignia issued by the Commissioner to be displayed on the mobile home to evidence compliance with the code with respect to construction.

F_1. Seal, installation. Installation seal means a device or insignia issued by the Commissioner upon application supported by such evidence as the Commissioner deems necessary to establish that the installation seals will be affixed only to those mobile homes where support systems and ground anchoring systems comply with these Rules and the Code.

G_1. Stabilizing devices. All components of the anchoring and support systems such as piers, footers, ties, anchoring equipment, ground anchors and any other equipment which supports the mobile home and secures it to the ground.

H_1. Stabilizing system. A combination of the anchoring system and the support system when properly installed.

I_1. Support system. A combination of footers, piers, caps, and shims that will, when properly installed, support the mobile home.

J_1. Systems, construction. An arrangement or method of construction for structural, plumbing, heat-producing, and electrical installations in mobile homes subject to the code.

K_1. Systems, ground support and anchoring.

1. Support system means any device or combination thereof placed beneath a mobile home at the site of occupancy for the purpose of providing support.

2. Anchoring system means any device or combination thereof connected to a mobile home and designed for the purpose of securing the mobile home to the ground.

L_1. Tie. Strap, cable or securing device used to connect the mobile home to ground anchors.

M_1. Vertical tie. A tie intended to primarily resist the uplifting and overturning forces.

MoH 450 Stabilizing Systems for Mobile Homes.

A. Stabilizing devices. Stabilizing devices when installed at the site of occupancy shall comply with these rules.

1. Manufacturer's installation instructions. Each mobile home shall have its stabilizing system installed in accordance with the mobile home manufacturer's installation instructions. These instructions shall be left with the mobile home following installation.

a. Footers shall be sized to support the loads shown in these instructions.

b. Stabilizing devices not provided with the mobile home shall meet or exceed the design and capacity requirements of the mobile home manufacturer and this standard and shall be installed in accordance with the mobile home manufacturer's installation instructions.

2. Stabilizing system design. Mobile homes not provided with manufacturer's instructions for stabilizing devices and their installation for the zone in which the mobile home is to be installed shall be provided with anchoring and support systems designed by a registered professional engineer or architect or shall comply with the following requirements:

a. Number, spacing, and location of anchoring ties.

(1) Number of ties. The minimum number of ties per side for various lengths of mobile homes in hurricane and non-hurricane zones shall be in accordance with Table 450A.2.a(1).

(2) Spacing of ties. Ties shall be as evenly spaced as practicable along the length of the mobile home with not more than eight feet open-end spacing on each end.

(3) Location of ties. When continuous straps are provided as vertical ties, such ties shall be positioned at rafters and studs. Where a vertical tie and diagonal tie

are located at the same place, both ties may be connected to a single ground anchor, provided that the anchor used is capable of carrying both loadings.

(4) Special ties. Clerestory roofs and add-on sections of expandable mobile homes shall have provisions for vertical ties at the exposed ends.

b. Protection of ties and mobile home roofing and siding. Protection shall be provided at sharp corners where the anchoring system requires the use of external cables or straps. Protection shall also be provided to minimize damage to roofing or siding by the cable or strap.

c. Alternate method using strapping. If the alternate method incorporating baling straps specified in Table A-1 is used, the baling straps shall be wrapped completely around the mobile home passing under the main steel frame, with both ends of each strap fastened together under tension. The straps shall be in accordance with MoH 450C. The method used to connect the ends of the strap shall not reduce the allowable working load and overload.

B. Support systems. Each mobile home shall have a support system as specified herein. A minimum clearance of 12 inches should be maintained beneath the underside of the main frame (I-beam or channel beam) in the area of utility connections.

1. Mobile homes with installation instructions. Individual footers and load-bearing piers or listed supports shall be sized and located to support the loads specified in the manufacturer's installation instructions to assure that the manufacturer's warranty remains valid.

2. Mobile homes for which installation instructions are not available. Unless the entire support system is designed by a registered professional engineer or architect, supports shall be spaced not more than 10 feet apart for mobile homes 12 feet wide or less, and not more than 8 feet apart for mobile homes over 12 feet wide, beginning from the front wall of the mobile home, with not more than 2 feet open-end spacing at the area of the main frame. Supports shall be installed directly under the main frame (or chassis) of the mobile home. Methods other than those specified herein may be approved by the authority having jurisdiction. Double wide mobile homes built with a conventional frame shall have additional supports placed under the center (mating) line at each end wall, and at the support columns located at the sides of center wall openings eight feet in width or greater. The supports shall be constructed to withstand the weight calculated by multiplying one half the width of the opening (in feet) times one half the width of the home (in feet) multiplied by 35 pounds per square foot. (30 pounds snow load and 5 pound roof load).

3. Footers. The required load-bearing capacity of individual load-bearing supports and their footers shall be calculated at not less than a combined live and dead load of 55 PSF for the Middle Zone or 65 PSF for the North and Hurricane Zones. Footers shall be adequate in size to withstand the tributary live and dead loads of the mobilehome and any concentrated loads.

a. Footers shall be at least 16-inch by 16-inch by 4-inch solid concrete blocks or other product approved for the use intended. As an alternate, two 8-inch by 16-inch by 4-inch solid concrete blocks can be used as footers provided the joint between the blocks is parallel to the steel I-beam frame.

b. Footers or pier foundations, when required, shall be placed level on firm undisturbed soil or on controlled fill which is free of grass and organic materials, compacted to a minimum load-bearing capacity of 2,000 PSF (unless otherwise approved by a registered professional engineer). Where unusual soil conditions exist as determined by the authority having jurisdiction, footings shall be designed specifically for such conditions. NOTE: In areas subject to frost heave, see Paragraph F.1.

4. Piers. Piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member. Load-bearing supports or devices shall be listed and labeled, shall be designed by a Registered Professional Engineer or Architect, shall be approved for the use intended, or piers shall be constructed as follows:

a. Piers less than 40 inches in height shall be constructed of open or closed cell, 8-inch by 8-inch by 16-inch concrete blocks (with open cells vertically placed upon the footer). Single-stacked block piers shall be installed with the 16-inch dimension perpendicular to the main (I-beam) frame. The piers shall be covered with a two inch by eight inch by sixteen inch wood or concrete cap. (See Figure A-2).

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b. Subject to the limitations of MoH 450B.5., piers between 40 and 80 inches in height and all corner piers over three blocks high shall be double blocked with blocks interlocked and capped with a four inch by sixteen inch by sixteen inch solid concrete block, or equivalent. (See Figure A-3).

c. Subject to the limitations of B.5, piers over 80 inches in height shall be constructed as per B.4.b., and they shall be laid in concrete mortar and steel reinforcing bars inserted in block cells with the block cells filled with concrete. (See Figures A-4 and A-5).

5. Plates and shims. A cushion of wood plate not exceeding two inches in thickness and shims not exceeding one inch in thickness may be used to fill any gap between the top of the pier and the main frame. Two inch or four inch solid concrete blocks may be used to fill the remainder of any gap. Shims shall be at least four inches wide and six inches long and shall be fitted and driven tight between the wood plate or pier and main frame.

C. Anchoring equipment. Anchoring equipment, when installed, shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the mobile home. When the stabilizing system is designed by a qualified Registered Professional Engineer or Architect, alternative working loads may be used providing the anchoring equipment is capable of withstanding a 50 percent overload.

1. Resistance to weather deterioration. Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 ounces per square foot on each side of the surface coated (0.0005 inches thick)[1] as determined by ASTM Standard Methods of Test for Weight of Coating on Zinc-coated (galvanized) Iron or Steel Articles (ASTM A90-69(1973)). NOTE: Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

2. Permanency of connections. Anchoring equipment shall be designed to prevent self-disconnection when ties are slack. Hook ends shall not be used in any part of the anchoring system.

3. Tensioning device design. Tensioning devices such as turnbuckles or yoke-type fasteners shall be ended with clevis or forged or welded eyes.

[1] This coating shall be 0.625 ounces per square foot on each side of surface coated, effective January 1, 1977.

4. Ties. Cable or strapping or other approved methods or materials shall be used for ties. All ties shall be fastened to ground anchors and drawn tight with turnbuckles or other adjustable tensioning devices or devices listed with the ground anchor.

a. Tie materials shall be capable of resisting an allowable working load of 3,150 pounds with no more than 2 percent elongation and shall withstand a 50 percent overload (4,725 pounds total). Ties shall comply with the weathering requirements of Paragraph C.1. NOTE: Type 1, Class B, Grade 1 steel strapping, 1¼ inches wide and 0.035 inch thick, conforming with Federal Specification QQ-S-781G, is capable of meeting the working load and 50 percent overload specified herein.

b. Ties shall connect the ground anchor and the main structural steel frame (I-beam or other shape) which runs lengthwise under the mobile home. Ties shall not connect to steel outrigger beams which fasten to and intersect the main structural frame unless specifically stated in the manufacturer's installation instructions.

c. Connection of the cable frame tie to the mobile home I-beam or equivalent main structural frame member shall be by a ⅝-inch drop forged closed eye bolt through a hole drilled in the center of the I-beam web or other approved methods. The web shall be reinforced if necessary to maintain the I-beam strength.

d. Cable ends shall be secured with at least three U-bolt type cable clamps with the U portion of the clamp installed on the short (dead) end of the cable to assure strength at least equal to that required by MoH 450 C.4.a.

D. Ground anchors. Ground anchors, including means for attaching ties, shall be located to effectively match the anchoring system instructions provided by the mobile home manufacturer, or, if there are no instructions, in accordance with the requirements of MoH 450A herein, and shall be designed and installed to transfer the anchoring loads to the ground.

1. Capacity of anchors. 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 tie plus a 50 percent overload (4,725 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 4,725 pounds in the direction of the vertical tie when the anchoring equipment is installed in accordance with the 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 herein.

2. Anchor design and installation. Each manufactured ground anchor shall be listed and installed in accordance with the terms of its listing and the anchor manufacturer's instructions and shall include means of attachment of ties meeting the requirements of MoH 450C.4. Ground anchor manufacturer's installation instructions shall include the amount of preload required, the methods of adjustment after installation, and the load capacity in various types of soils. These instructions shall include tensioning adjustments which may be needed to prevent damage to the mobile home, particularly damage that can be caused by frost heave.

a. Each ground anchor shall have the manufacturer's identification and listed model identification number marked thereon so that the number is visible after installation. Instructions shall accompany each listed ground anchor specifying the types of soil for which the anchor is suitable under the requirements of Paragraph D.1. NOTE: The following data gives information relative to soil types with blow counts and torque values:

Types of Soils	Blow Count (ASTM D1586)	Test Probe[2] Torque Value[3]
Sound hard rock	NA	NA
Very-dense and/or cemented sands, coarse gravel and cobbles, preloaded silts, clays, and corals	40-up	more than 550 lbs. inch
Medium-dense coarse sands, sandy gravels, very-stiff silts and clays	24-39	350-549 lbs. inch
Loose to medium dense sands, firm to stiff clays and silts, alluvian fill	14-23[4]	200 to 349 lbs. inch

3. Use of concrete slabs or continuous footers. If concrete slabs or continuous footers are used to transfer the anchoring loads to the ground, the following shall be required:

a. Steel rods cast in concrete shall be capable of resisting loads as specified in Paragraph D.1.

b. Deadman concrete anchors may be used in place of listed anchors if they meet the requirements of MoH 450D.1.

c. Concrete slabs may be used in place of ground anchors provided the slab is so constructed that it provides holding strength equal to the requirements of Paragraph D.1.

4. Other anchoring devices. Other anchoring devices meeting the requirements of this section shall be permitted if acceptable to the authority having jurisdiction.

E. Anchor installation.

1. Specifications for anchors. Each type anchor suitable for this purpose shall have specification data showing the soil classification(s) for which it qualifies.

2. Selection of anchors. Anchor selection shall be based on a determination of the soil class at the depth the anchor helical plate will be installed.

3. Depth of anchors. All anchors shall be installed to the full depth shown in the anchor manufacturer's installation instructions.

F. Maintaining anchoring systems. Tie tension should be checked and adjusted when necessary to prevent

[2] The test probe is a device for measuring the torque value of soils to assist in evaluating the holding capability of the soils in which the anchor is placed. The test probe has a helix on it. The overall length of the helical section is 10.75 inches; the major diameter is 1.25 inches; the minor diameter is 0.81 inches; the pitch is 1.75 inches. The shaft must be of suitable length for anchor depth.

[3] A measure synonymous with moment of a force when distributed around the shaft of the test probe.

[4] Below these values, a professional engineer should be consulted.

KEY: New rules and material proposed to be added to an existing rule are printed in **boldface**. Material proposed to be deleted from an existing rule is printed in [single brackets]. Underlining indicates additions to proposed rules, while [[double brackets]] indicate matter stricken from proposed rules. Existing material is printed in standard type face.

damage to the mobilehome from settling or other unforeseen movements (such as frost heave).

1. Frost heave. Frost heave can have an adverse effect on the mobile home through displacement of the mobile home anchoring and blocking systems. If a mobile home is located in an area subjected to frost heave, one of the following additional steps should be considered:

a. Footers and the load-carrying portion of the ground anchors should extend below the frost line, or

b. The mobile home should be placed on a reinforced concrete pad as specified in MoH 450D.3.c.

Figure A-1. Load Zone Map of the United States.

1. This map is a generalization of the load zones in the continental United States that may be useful in applying the principles set forth in MoH 450A.2.a(1) and 450B.3.

2. Shown along the Gulf and Atlantic coastline is the Hurricane Zone where mobile homes "Designed for Hurricane Zones" should be used in compliance with Paragraph 6.3.2 of NFPA No. 501B. It is not feasible to show all the other areas subject to high winds in the United States, but the dash lines outline areas where recurrent winds up to 80 miles per hour have been experienced according to information now available.

3. The North Zone follows state lines in the Northern tier of states so that those states can adopt a uniform policy within their borders, mostly to safeguard against snow loads, although in many cases border states may have areas in both the Middle and North Zones. Also shown are the rough outlines of the three major mountain ranges in the United States which can affect load criteria.

4. As implied, determination of required loads for any given mobile home installation can only really be made by the local authority having jurisdiction and requires engineering judgement. Mobile home owners must be made aware of these factors for their own protection.

TABLE 450 A.2.a(1)
Number of Ties Required Per Side of Single Wide[1] Mobile Homes[2]
This table is based on a minimum working load per anchor of 3,150 pounds with a 50 percent overload (4,725 pounds total).

1	2	3	4	5	6	7	8	9
	Hurricane Resistive				Nonhurricane Resistive			
			Alternate Method[4]				Alternate Method[4]	
Length of[3] Mobile Home (Feet)	No. of Vertical Ties	No. of Diagonal Ties[5]	No. of Baling Straps	No. of Diagonal Ties[6]	No. of Vertical Ties	No. of Diagonal Ties[5]	No. of Baling Straps	No. of Diagonal Ties[6]
up to 40	2	4	2	5	2	3	2	3
40–46	2	4	2	6	2	3	2	3
46–49	2	5	2	6	2	3	2	3
49–54	3	5	3	7	2	3	2	3
54–58	3	5	3	7	2	4	2	4
58–64	3	6	3	8	2	4	2	4
64–70	3	6	3	9	2	4	2	5
70–73	3	7	3	9	2	4	2	5
73–84	4	7	4	10	2	5	2	5

[1] Double-wide mobile homes require only the diagonal ties specified in column 3 or 7, and these shall be placed along the outer side walls.

[2] Except when the anchoring system is designed and approved by a registered professional engineer or architect.

[3] Length of mobile home (as used in this Table) means length excluding draw bar.

[4] Alternate Method. When this method is used, an approved reinforcement means shall be provided. If baling is used to accomplish this reinforcement, the provisions of MoH 450A.2.a(1).

[5] Diagonal ties in this method shall deviate at least 40° from a vertical direction.

[6] Diagonal ties in this method shall be 45° ± 5° from vertical and shall be attached to the nearest main frame member.

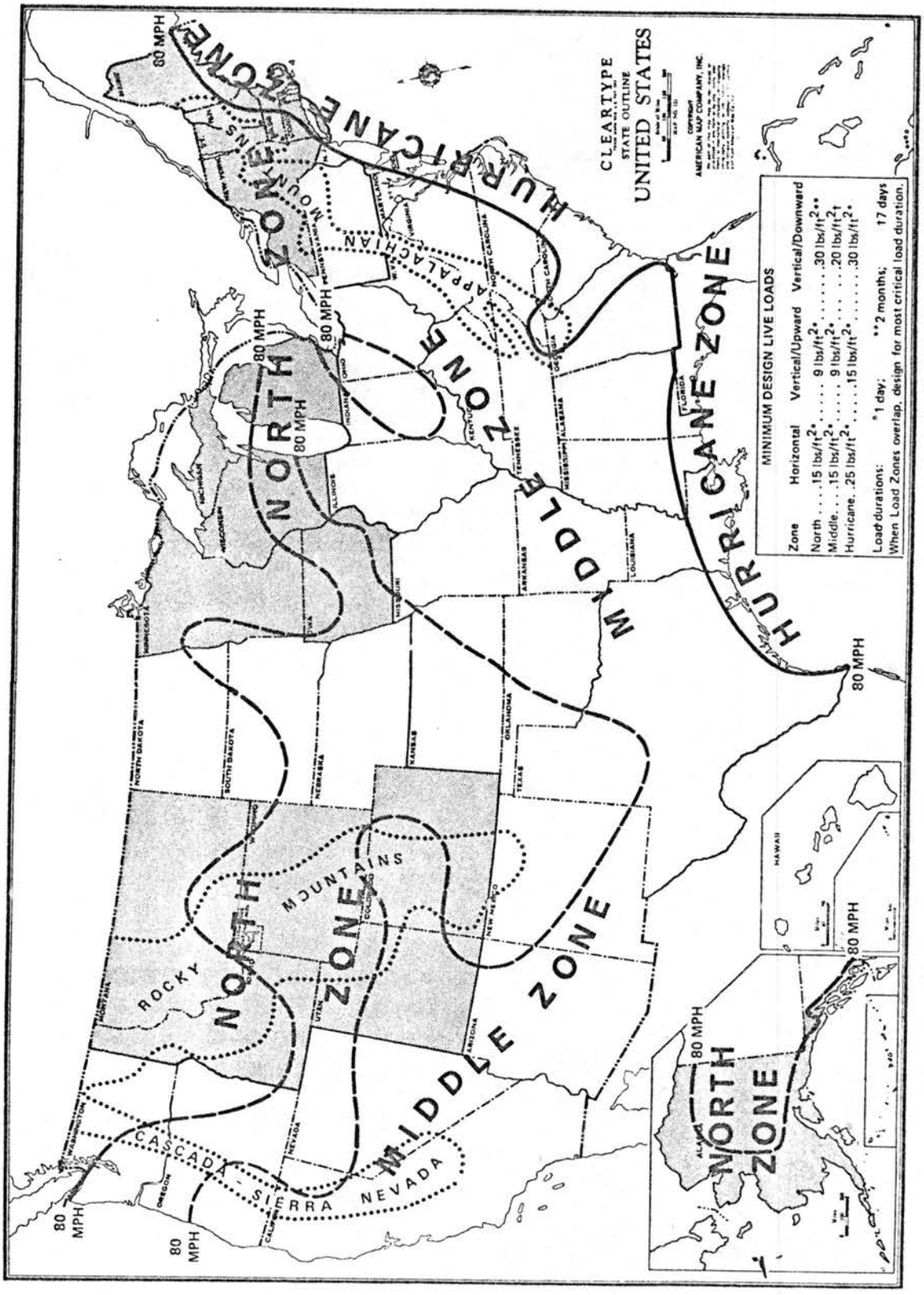
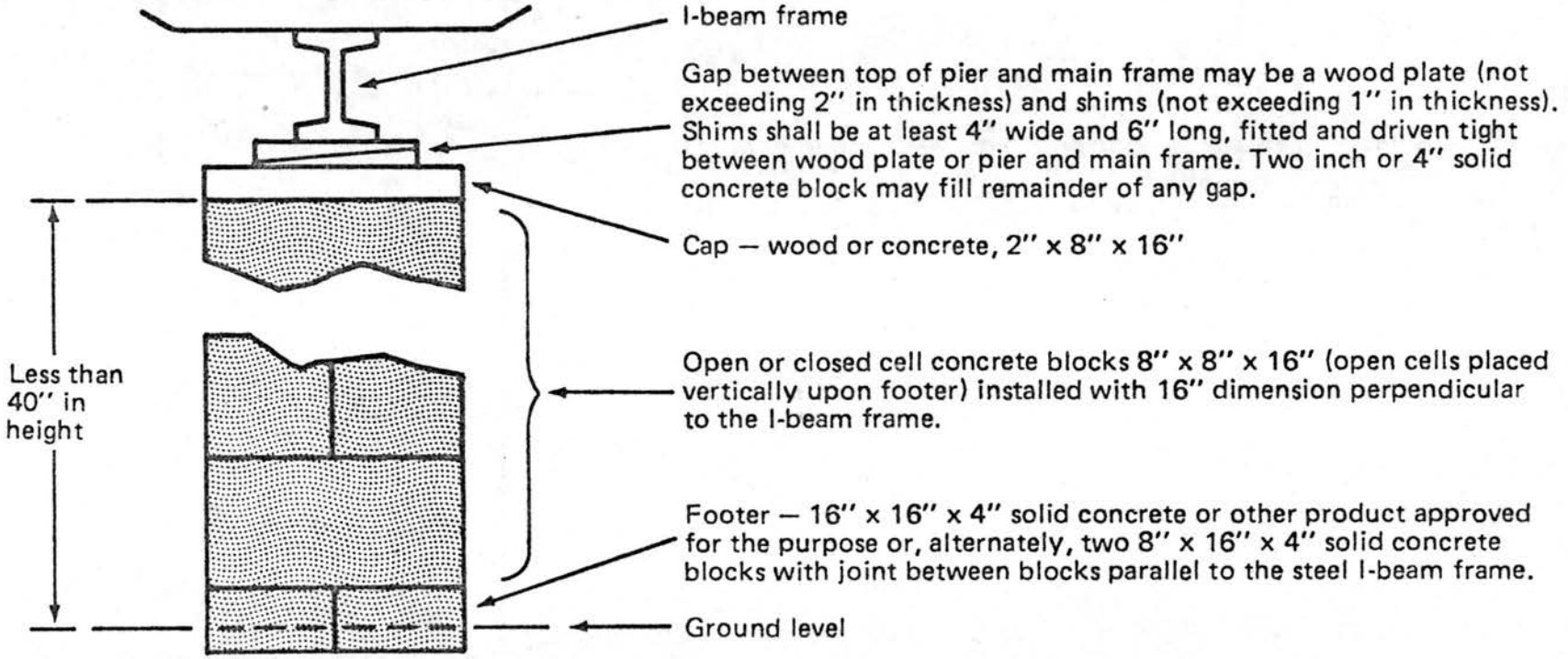


Figure A-1. Load Zone Map of U.S.A., see caption on opposite page.

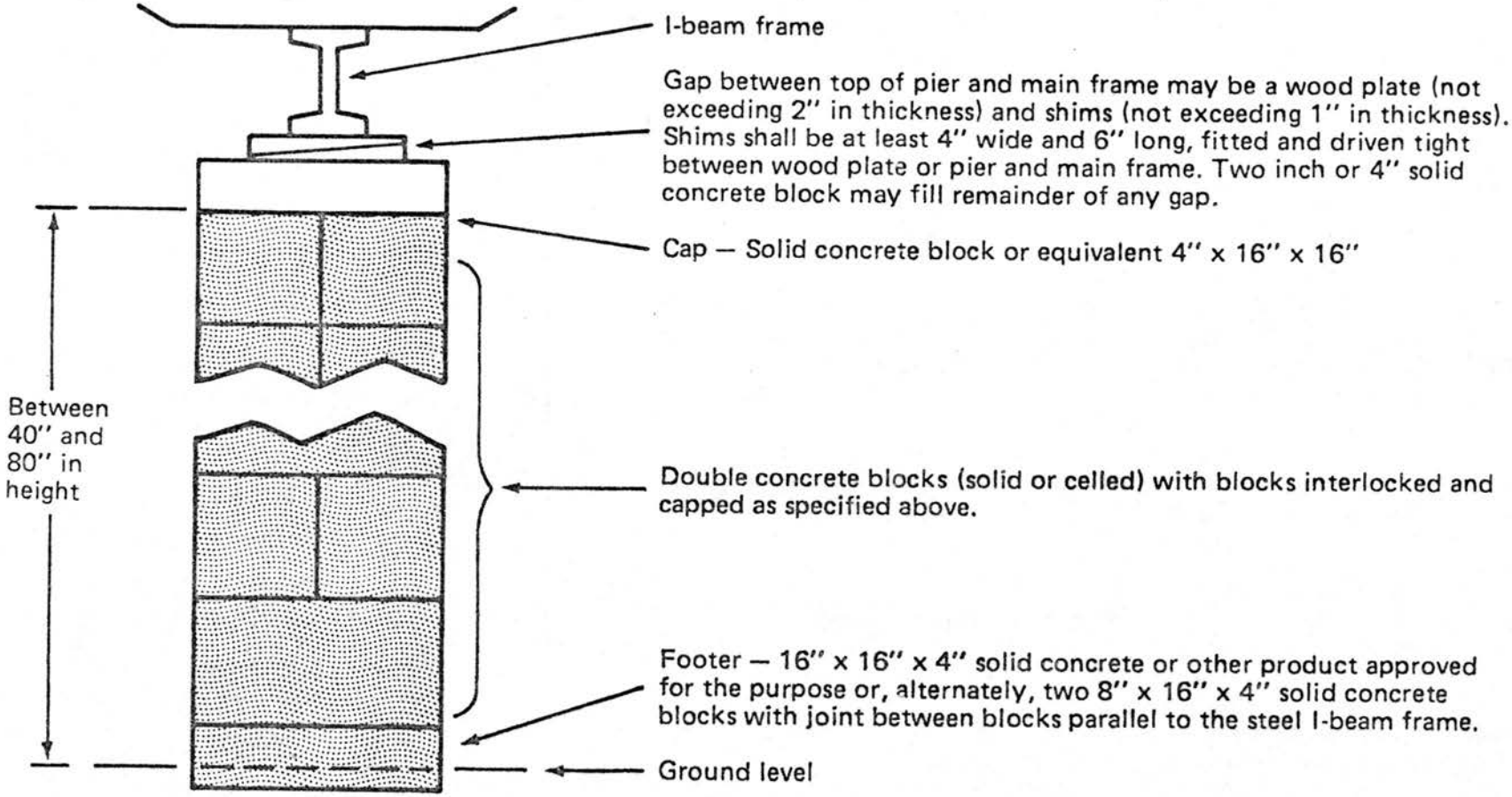
NOTE: In areas subject to frost heave, see MoH 450F.1



Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-2. For piers less than 40 inches in height (except corner piers over 3 blocks high). Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

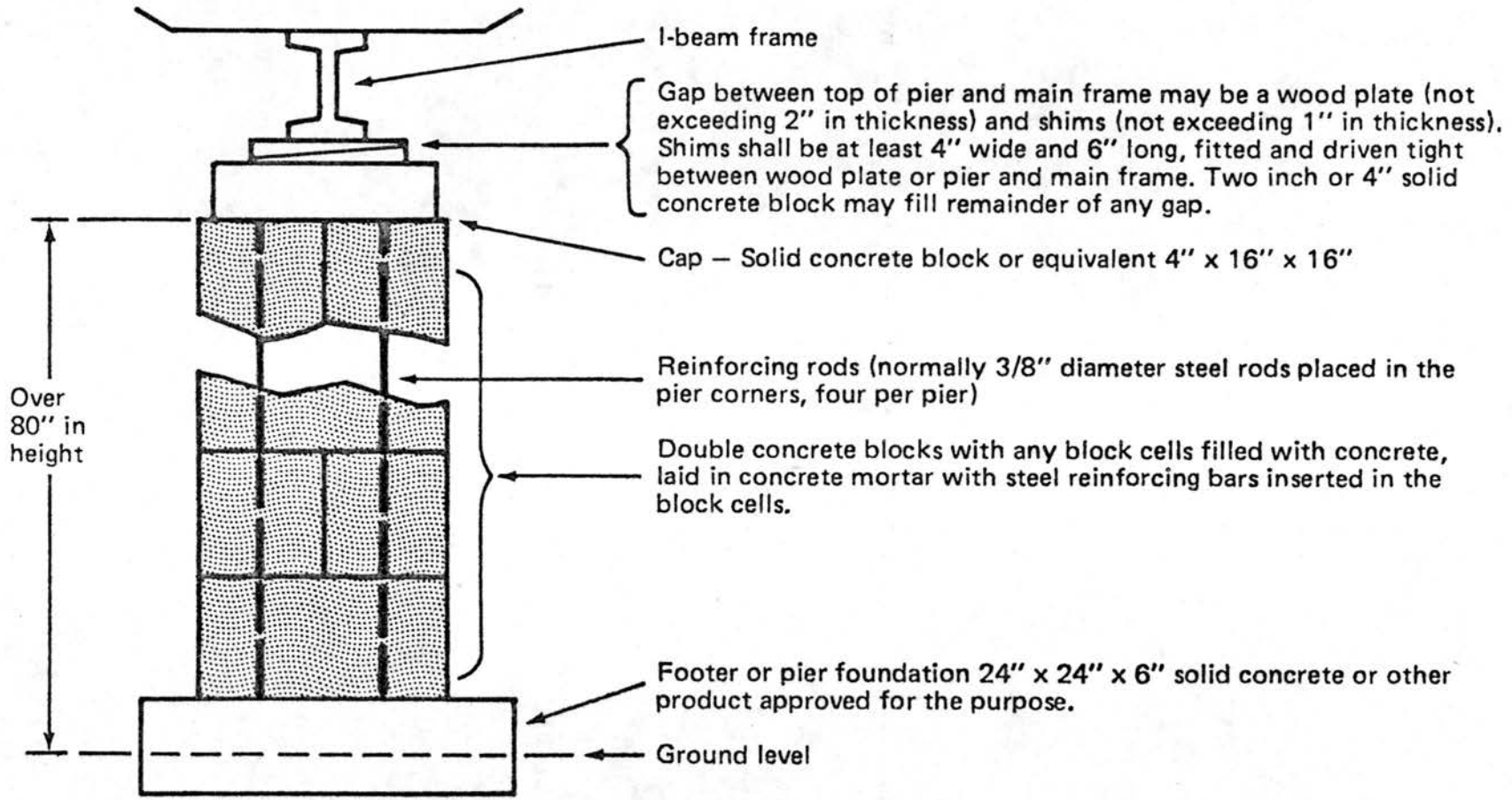
NOTE: In areas subject to frost heave, see MoH 450F.1



Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-3. For piers 40 inches to 80 inches in height and all corner piers over 3 blocks high. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

NOTE: In areas subject to frost heave, see MoH 450F.1



Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-4 **For piers exceeding 80 inches in height. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.**

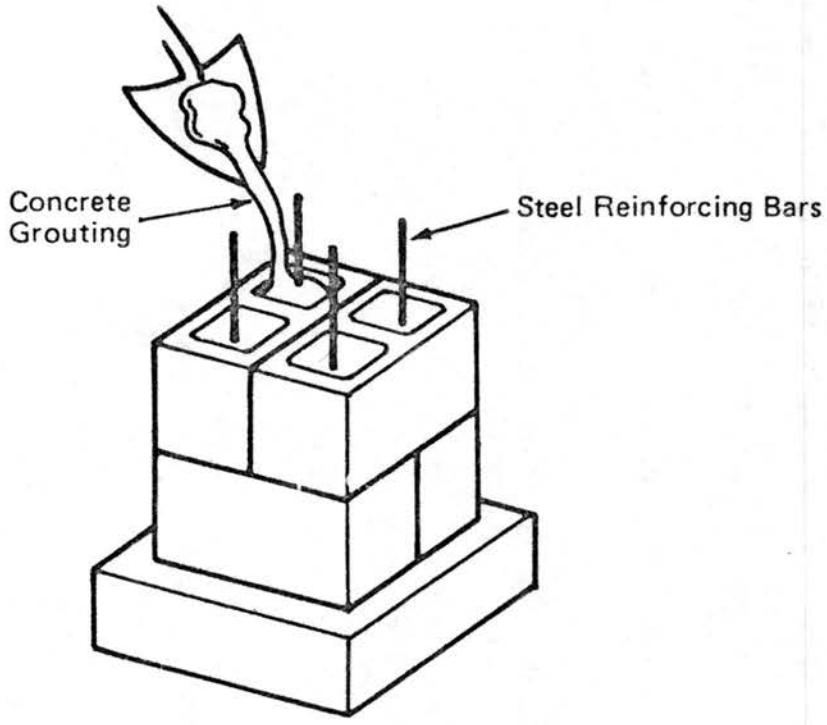


Figure A-5. For piers exceeding 80 inches in height the concrete blocks must be filled with concrete grouting and steel reinforcing rods utilized.

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE BUILDING CODE DIVISION GOVERNING INSTALLATION OF MOBILE HOME SUPPORT AND TIE-DOWN SYSTEMS.

CERTIFICATE OF DELIVERY

SECRETARY

OF STATE LIST

I hereby certify that the attached 503 labels & 4 sheets constitute the complete list of persons, associations, and other interested groups who as of 11:15 o'clock a m., this 21st day of October, 1976, have requested pursuant to M.S. 1974, Sec. 15.0412, that their names be placed on file with the Secretary of State for the prupose of receiving notice of public hearing on proposed rules on the subject captioned above.

SECRETARY OF STATE

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By: Gail Dicus

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HILL JIM ASSOC.MILK PROD
7850 METRO PARKWAY
MINNEAPOLIS MN
55420

HOPKINS WM.B. DIR.MISCCA
3915 GOLDEN VALLEY ROAD
GOLDEN VALLEY MN
55422

HOULE MELVIN
881 W HWY 96
SHOREVIEW MN
55112

55415

FURLONG DR JOHN
RT 1
BOVEY MN
55709

GEBERT K L
220 GRAIN EXCH
MPLS MN
55415

GIEL DAVID
RM B-28 STATE CAPITOL
ST PAUL MN
55155

GRAHAM THOS H
854 MIDLAND BK BLDG
MPLS MN
55401

GREEN JANET
9773 N SHORE DR
DULUTH MN
55804

H B FULLER CO
2400 KASOTA AVE
ST PAUL MN
55108

HARVEY MICHAEL
1390 W M HAHA PKWY
MPLS MN
55409

HESS DONALD MIDWEST PLANNING
2101 HENN BLDG
MPLS MN
55405

HEINTZ MARY ELLEN
PO BOX 599
CINCINNATI OH
45201

HINRICHSEN PATRICK
MANKATO FREE PRESS
MANKATO MN
56001

55802

F W WOOLWORTH CO
3316 W 66TH ST
EDINA MN
55424

GENERAL MILLS INC-CORP ENG
9000 PLYMOUTH AVE N
MPLS MN
55427

GLEESON MICHAEL
909 SOC SC BLDG U OF M
MPLS MN
55455

GRANATH MARVIN -HONEYWELL
2701 4TH AVE SO
MPLS MN
55408

GUSTAFSON DAN-LABOR TEMPLE
312 CENTRAL
MPLS MN
55414

HANFT PHILIP M
1200 ALWORTH BLDG
DULUTH MN
55802

HALLBERG LEE & MCCABE
4927 34TH AVE S
MPLS MN
55417

HART PATRICK V
112 E LIBERTY BOX 3271
MANKATO MN
56001

HEISENFELT WM
BOX 516
BEMIDJI MN
56601

HOLDAHL SCOTT
380 N BLDG GRAIN EXCH
MPLS MN
55415

INGEBRIGTSEN DR K H
SE 4TH ST
MPLS MN
55414

IUOE LOC 49 CHAS SWENSON
2580 UNIV AVE
ST PAUL MN
55101

IVERSON DR JOS DEPT ED
ST OLAF COLLEGE
NORTHFIELD MN
55057

JACKMAN DONALD G
4023 E LAKE ST
MPLS MN
55406

JENOS INC
525 LAKE AVE SO
DULUTH MN
55801

JOHNSON M.D. FRUNDT & FRUNDT

BLUE EARTH MN
56013

JOHNSON LANCE J
265 S LAFAYETTE RD
ST PAUL MN
55107

KEABLE MIKE
909 6TH AVE N
ST CLOUD MN
56301

KEENAN RICHARD J
4444 IDS BLDG
MPLS MN
55402

KLOSTER MARION PEAVEY CO
730 2ND AVE S
MPLS MN
55402

KLUZ STEVEN J
1910 1ST NATL BK BLDG
MPLS MN
55402

KNUTSON R N GRANNIS ETAL
F J SCHULT BLDG
ST ST PAUL MN
55075

KOLLER MR & MRS ERWIN A
1568 DULUTH ST
ST PAUL MN
55108

KRONLOKKEN J E
10048 NORD RD
BLOOMINGTON MN
55437

LANGVIN DAVID
7500 80TH ST S
COTTAGE GROVE MN
55016

LANSING & OAKES
400 SIBLEY ST
ST PAUL MN
55101

LARSON HANS P DIV HOSP SERV
717 DELAWARE ST SE
MPLS MN
55440

LEAGUE MN MUNIC
300 HANOVER 480 CEDAR
ST PAUL MN
55101

LINDALL & JONATHAN DEVELOP.
VILLAGE ONE CENTER
CHASKA MN

LOCKNER GARY
R R 1 BOX 23

ASSN

LL

NTHAL

SON

VES

D

MANTHEY T J PICKANDS MATHER
1100 SUPERIOR AVE
CLEVELAND OH
44114

MECCA
867 GRAND AVE
ST PAUL MN
55105

METROPOLITAN COUNCIL LIBRARY
300 METRO SQUARE
ST PAUL MN
55155

MPLS CHAMBER COMM TRANSP DPT
15 S 5TH ST
MPLS MN
55402

MIDLAND GLASS-HD SPURLING
PO BOX 69
SHAKOPEE MN
55379

MINN AFL-CIO, L O LA SHOMB
414 AUDITORIUM ST
ST PAUL MN
55102

MINN. ASSN. PET RETAILERS
1115 2ND AVE. SO.
MINNEAPOLIS MN
55403

MINN COMMUNITY DEVELOP SERV
512 ROSSMOR BLDG
ST PAUL MN
55101

MINN ELECTRICAL ASSN INC
525 SO 7TH
MPLS MN
55415

MINN HERSEDDR L L SOMMER

MALON[redacted] I COMM LABOR & I
444 LAFAYETTE RD 5TH FL
ST PAUL MN
55101

MASTOR & MATTSON LTD
315 PEAVEY BLDG
MPLS MN
55402

MEIEROTTO, JOAN
1794 SO LEXINGTON
ST PAUL MN
55118

MIDLAND GLASS- HD SPURLIN
PO BOX 69
SHAKOPEE MN
55379

MPLS CITY ATTORNEY
325M CITY HALL
MPLS MN
55415

MILLER PAUL J PHARMACY SE
ST MARYS HOSP
ROCHESTER MN
55901

MINN ASPHALT PAVEMENT ASS
555 WABASHA RM 209
ST PAUL MN
55102

MINN ASSN WATERSHED DIST'

ADA MN
56510

MINN COUNCIL STATE EMP NO
475 RICE ST
ST PAUL MN
55103

MINN ENV LAW INST INC
PO BOX 15076 COMM STA
MPLS MN
55415

MINN. HOTEL & MTR. ASSN

MCKIBBON MRS SHIRLEY
11 EVERGREEN LN
BABBITT MN
55706

MCMILLAN LARKIN
215 ADM BLDG ST CAPITOL
ST PAUL MN
55101

MANKATO STAT STUDENT SENATE
CENTENNIAL STUDENT UN
MANKATO MN
56001

MANKATO STATE STUDENT ASSN
BOX 58 MANKATO COLLEGE
MANKATO MN
56001

MAUL WARREN E
320 S 4TH ST
MPLS MN
55415

MAYO FOUNDATION G ORWOLL
200 FIRST AVE NW
ROCHESTER MN
55901

MERRITT GRANT POLLUTION CONT
1935 W CO RD 32
ROSEVILLE MN
55113

MET TFR MEN ASSN A ROSENTHAL
1821 UNIV AVE
ST PAUL MN
55104

MILLER RICHARD A
1020 PLYMOUTH BLDG
MPLS MN
55402

MILLER TOM
2311 PILLSBURY AVE S
MPLS MN
55404

MPLS STAR PRESS ROOM
STATE CAPITOL
ST PAUL MN
55101

MPLS TRIBUNE CITY DESK
425 PORTLAND AVE
MPLS MN
55415

MINN APT ASSN
GRIGGS-MIDWAY BLDG
ST PAUL MN
55104

MN. ASN.C&IND H.D.PETERSON
480 CEDAR ST.
ST.PAUL MN
55101

MINN ASSN COOPERATIVES
55 SHERBURNE AVE
ST PAUL MN
55103

MINN ASSN ELEC COOPERATIVES
4901 W 77TH ST
MPLS MN
55435

MINN AUTOMOBILE DEALERS ASSN
GRIGGS MIDWAY BLDG
ST PAUL MN
55104

MINN COMM FOR HANDICAPPED
METRO SQ 492 7TH & ROBT
ST PAUL MN
55101

MINN DEPT HEALTH J C MCKASY
717 DELAWARE S E
MPLS MN
55440

MINN DENTAL HYGIENISTS
5041 YVONNE TERRACE
MPLS MN
55436

MINN FARMERS UNION PRES JEF
1275 UNIV AVE

MINN FOOD RETAILERS ASSN
555 WABASHA

MINN RESTAURANT ASSN
2001 UNIVERSITY AVE.
ST PAUL MN 5
104

MINN RETAIL FEDERATION
7600 PARKLAWN STE 457
MPLS MN
55435

MINN SOCIETY ARCHITECTS AIA
NW NATL BK BLDG
ST PAUL MN
55101

MINN SOC CERTIFIED PUB AC
1102 WESLEY TEMPLE BLDG
MPLS MN
55403

MINN STATE CAPITOL EMP UNION
PO BOX 3215
ST PAUL MN
55165

MINN STATE MED ASSN
375 JACKSON ST
ST PAUL MN
55101

MINN TBR PRODUCERS ASSN
200 CHRISTIE BLDG
DULUTH MN
55802

MINN.TURKEY GROWERS ASSN
2383 UNIV AVE
ST PAUL MN
55114

MINN-WISC BOUNDARY AREA COMM
600 2ND ST
HUDSON WI
54016

MN PUB INT RESEARCH GROUP
3036 UNIV AVE SE
MPLS MN
55414

MOONEY, MICHAEL A.
BOX 903, ST.JOHN'S UNIV
COLLEGEVILLE MN
56321

MORTON BUILDINGS INC
R #1
FOLEY MN
56329

NASS GEO V HENN CO GEN HO
5TH AND PORTLAND AVE
MPLS MN
55415

NATL FAMILY INS CO
2147 UNIV AVE
ST PAUL MN
55114

NAT'L SOLID WASTES-R. GRA
1730 RHODE ISLAND AV.NW
WASHINGTON DC
20036

NEDELL HAROLD - MEINEKE
6300 W LOOP S SUITE 200
BELLAIRE TX
77401

NESBITT JOHN
7851 METRO PKWY S 118
MPLS MN
55420

NO SUB MONTESSORI-S SADDLER
2487 HELEN COURT
NO ST PAUL MN
55109

NORTH CENTRAL ELEC ASSN
PO BOX 202
BATTLE LAKE MN
56515

3000 HUDSON PK S 100
ST PAUL MN
55119

MINN RETAIL HARDWARE ASSN
3033 EXCELSIOR BLVD 313
MPLS MN
55416

MINN STATE BAR ASSN
100 MINN FED BLDG
MPLS MN
55402

MINN STATE RETIREMENT SYSTEM
529 JACKSON ST
ST PAUL MN
55101

MINN VETERANS MED ASSN
24 S 6TH ST
MPLS MN
55402

MOFFITT R.C. DIR.ENV.CONTROL
MPLS.CITY HALL RM 301M
MPLS MN
55415

MPIRG
BOX 45 ST MARYS COLLEGE
WINONA MN
55987

NATL CAR RENTAL ATT D MITZEL
5501 GREEN VALLEY DR
MPLS MN
55437

NCEC INC C/O DR DAHLBERG
CONCORDIA COLLEGE
MOORHEAD MN
56560

NEUMAN RALPH W
RT 2 BOX 125
EMBARRASS MN
55732

MINN.MTR.TR[illegible] .DENN
1821 UNIV.
.PAUL
55104

MN REP STATE [illegible] COMM
555 WABASHA
ST PAUL
55102

MINN SCH BUS [illegible]S ASSN
FARIBAULT
55021

MINN ST BD [illegible] GRUSSING
1965 FORD PKWY
ST PAUL
55116

MINN TEAMSTERS CREDIT UNION
2021 HENN AVE E
MPLS
55413

MINN WATER RESOURCES BD
RM 206 555 WABASHA ST
ST PAUL
55102

MOOD R BLOOMINGTON HLTH DEPT
10200 PENN SO
BLOOMINGTON MN
55431

MUELLER SHIRLEY A
787 W COTTAGE AVE
ST PAUL MN
55117

NATL COUNCIL JEWISH WOMEN
4330 CEDAR LK RD
MPLS MN
55416

NELSON DONALD E NSP CO
414 NICOLLET AVE
MPLS MN
55401

NIELSEN STOCK & BLACKBURN
415 730 BLDG
MPLS

DCONNOR GREEN THOMAS ET AL
845 NW BANK BL
MPLS MN
55402

OFFICE OF THE GOVERNOR
130 ST E CAPITOL
ST PAUL MN
55101

OTTER TAIL POWER CO.
215 S. CASCADE ST.
FERGUS FALLS MN
56537

PAYNE WM B
2400 FIRST NATL BK BLDG
MPLS MN
55402

PETERSON JOHN W
510 NW BK BLDG
ST PAUL MN
55101

PHAR MFGRS ASSN WM D PATTON
1155 15TH ST NW
WASHINGTON DC DC
20005

PHILLIPS LEGISLATIVE SERV
459 RICE ST
ST PAUL MN
55103

PORT AUTH CITY OF ST PAUL
330 MINNESOTA BLDG
ST PAUL MN
55101

POSS DONALD G
6301 SHINGLE CREEK PKWY
BROOKLYN CTR MN
55430

PULSCHER RBT SPRINGSTED INC
813 OSBORN BLDG
ST PAUL MN
55102

RADMAN RICHARD-LABOR TEMPLE
418 AUDITORIUM
ST PAUL MN
55102

RANALLO CLARENCE
800 CENTRAL AVE N E
MPLS MN
55413

REID DAVID H
5633 WASHBURN AVE S
MPLS MN
55410

RENNER R.H. ST PAUL AREA
300 OSBORN BLDG.
ST PAUL MN
55102

RICHARDS MONTGOMERY ET AL
1430 RAND TOWER
MPLS MN
55402

ROE DAVID
175 AURORA
ST PAUL MN
55103

ROSS ALFRED
6356 HARE RD
LINO LAKES MN
55014

RUDY FLOYD
118 AVE C
CLOQUET MN
55720

SANFORD SID
7000 PORTLAND AVE
RICHFIELD MN

SATHRE, HARVEY
375 MARION STREET

NYQUIST DEAN
3707 53RD PL
BROOKLYN CTR MN
55429

OLD COLONY GAS & OIL COMPANY
17TH AVE N AT 2ND ST
MPLS MN
55411

PATTISON ORVIS
BOX 645
WILLMAR MN
56201

PETERSON GARY
854 MIDLAND BK BLDG
MPLS MN
55401

POPOVICH PETER S
314 MINN BLDG
ST PAUL MN
55101

POYZER ROBT
BOX 675
FERGUS FALLS MN
56357

QUIRIN E W
408 HWY BLDG
ST PAUL MN
55155

RAUENHORST CORP-C ANDERSON
7900 XERXES S. S-2200
MPLS MN
55431

RAMSEY CO MEDICAL SOCIETY
1500 LOWRY MEDICAL BLDG
ST PAUL MN
55102

ROBBIE JOSEPH
904 CARGILL BLDG NO CTR
MPLS MN
55402

O'BRIEN J.DENNIS
1100 1ST NATL.BANK BLDG
MINNEAPOLIS MN
55402

OSTRUM DONALD E
10213 PIERCE ST NE
BLAINE MN
55434

PAYNE COL ALVIN

DEGRAFF MN
56233

PFEIFER AND SHULTZ, INC
1433 UTICA AVE S
MPLS MN
55416

PORTER LYLE O

TRACY MN
56175

PRAUSE JOS.C.
2220 105TH AVE.N.W.
COON RAPIDS MN
55433

RED OWL STORES INC
215 E EXCELSIOR AVE
HOPKINS MN
55343

RICHARDSON THOS
7851 METRO PKWY S 103
MPLS MN
55420

ROBERTS DAVID E
1260 NW NATL BK BLDG
ST PAUL MN
55101

SAN SIMEON DEVELOP CORP

SCHUTZ LINDA
RM 328 CAPITOL BLDG
ST PAUL MN
55155

SCHNEIDER & NEESER
706 1ST ST SO PO BX 876
WILLMAR MN
56201

SENATE GOV OP COMM
RM 303 STATE CAPITOL
ST PAUL MN
55155

SHELL OIL CO. W.A. ROQUET
ONE SHELL PLAZA BX 2463
HOUSTON TX
77001

SMERIKA WN.
BOISE CASCADE PAPERS
INTL FALLS MN
56649

STANSFIELD ARLENE LAND DLKS
PO BOX 116
MPLS MN
55440

STEELWORKERS CREDIT UNION
BOX 250
BABBITT MN
55706

STUPKA & MOREM
MIDTOWN BLDG
AUSTIN MN
55912

SWANSON BURT E
W-2162 1ST NATL BK BLDG
ST PAUL MN
55101

SCHWARTAU NEAL METH HOSP
201 W CENTER ST
ROCHESTER MN
55901

SCHROEDER ALFRED H
2172 CARROLL AVE
ST PAUL MN
55104

SHABATURA EUGENE H
2833 LAKE AVE SO
DULUTH MN
55811

SITE ENGINEERS INC
900 REDWELL LANE
APPLE VALLEY MN
55124

SNELL LYN
BOX 314
EDEN VALLEY MN
55329

STATE BD.BARBER EXAMINERS
555 WABASHA
ST PAUL MN
55102

STENSLAND M.E. PRES. MVMA
203 NW 22ND ST.
AUSTIN MN
55912

SULLIVAN J KIRK
PO BOX 200
BOISE ID
83701

SWANSON DALE
P O BOX 339
FOREST LAKE MN
55025

TATE VERN 3M CO
3M CENTER 220/6W
ST PAUL MN
55101

SCARBOROUGH WILLIAM
DIV.ED. U.M.
MORRIS MN
56267

SCHLICHT REV ROBT
611 MAIN ST
BELLE PLAINE MN
56011

SCHMIDT LARRY WCCO-TV NEWS
50 S 9TH ST
MPLS MN
55402

SCHNEIDER MAHLON
GREEN GIANT
LESUEUR MN
56058

SCHWERMAN EARL JR
1535 8TH AVE SE
ROCHESTER MN
55901

SCHWINN ROBT.P.
1400 SOO LINE BLDG.
MPLS. MN
55402

SENATE COUN OFF J ST MARIE
STATE CAPITOL
ST PAUL MN
55101

SENATE FINANCE COMMITTEE
113 STATE CAPITOL
ST PAUL MN
55101

SHARP BOB
4125 HIGHWOOD RD
ST LOUIS PK MN
55416

SHAW ROBERT M
616 MOBIL OIL BLDG
MPLS MN
55402

SKELLY OIL CO R R WELLINGTON
PO BOX 436
KANSAS CITY MO

SLOCUM CHARLES A
1203 IDS TOWER
MPLS MN
55402

SNYDER ROBERT W
248 CD B U OF M
ST PAUL MN
55101

SODERMAN ANTHONY
152 S PLAZA BLDG
MPLS MN
55416

STATE BD VETERINARY EXAMINER
C/O DR A C SPANNAUS DVM
WACONIA MN

STD AM LIFE & ANNUITY CO
3801 W 50TH ST
MPLS MN
55410

STROBEL LOUIS
RM 1180 176 E 5TH ST
ST PAUL MN
55101

STOLPESTAD BROWN & SMITH
1550 NW BK BLDG
ST PAUL MN
55101

SUMMIT NATL BANK D L MORRILL
205 AURORA AVE
ST PAUL MN
55103

SUSSEL CO.ATTN:TED SCHWENKER
1850 COMO AVE.
ST PAUL MN
55108

SWANSON GERALD H
212 CITY HALL

SWITZER R L HONEYWELL INC
2701 4TH AVE S

2388 UNIV AVE
ST PAUL MN
55104

VAN CLEVE JOHN H
2101 HENN AVE
MPLS MN
55405

VAN DRAKE STEPHEN R
BOX 353
PELICAN RAPID MN
56572

VILLAGE OF WOODBURY-F.STRONG
561 TOWER DRIVE
NEWPORT MN
55055

VOLDNESS PERRY
IDS 8TH & MARQUETTE
MPLS MN
55402

WALD JEAN
5746 SANDER DR
MPLS MN
55417

WANQUIST ALLEN
RM 252 FEDERAL BLDG
ST PAUL MN
55101

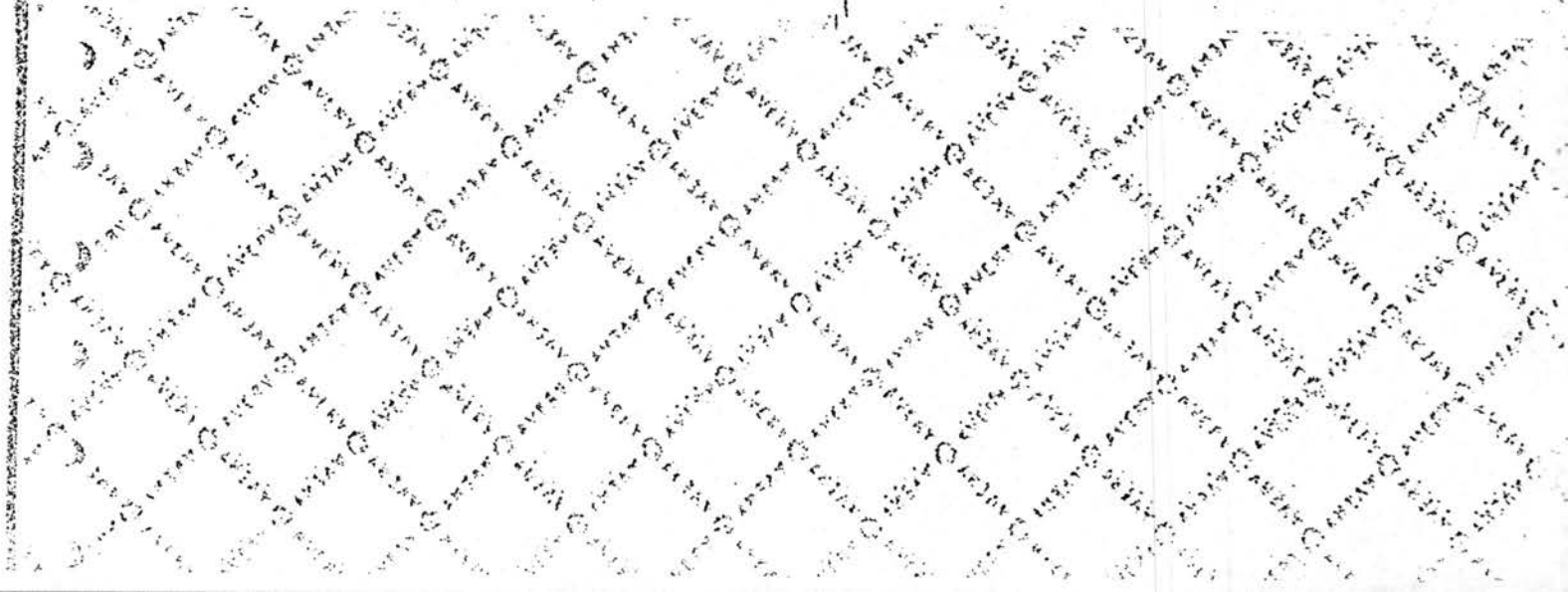
WELK G V NORTHERN STATES
414 NICOLLET MALL
MPLS MN
55401

WM.MITCHEL COLLEGE LAW LIB.
2100 SUMMIT AVE.
ST.PAUL MN
55105

WILEY ENTERPRISES
101 5TH AVE SE
OSSEO MN
55369

WOLKERSTORTER THEODORE
676 17TH AVE NW
NEW BRIGHTON MN
55112

WOZNIAK D D
401 FIRST FED BLDG
ST PAUL MN
55101



STATE BUILDING CODE DIVISION
ADM. DEPT.

Allegheny Ludlum Steel Corp., 5217 Wayzata Blvd., Mpls. 55416

American Lumber Co., Att: Marv Wilker, 3842 Washington Ave. N., Mpls. 55411

Anderson, Corp., R.A. Dahlin, Bayport 55003

Anderson, Harlyn E. NSP, 825 Rice St., St. Paul, 55117

Anderson Robt E., 333 Sibley St., St. Paul. 55101

Arch Design Group, 205 S. Clark St., Forest City, Iowa 50436

Arther G. McKee & Co., 2729 13th Ave. E. Hibbing, 55746

Axelson Engineering, Inc., 14407 Excelsior Blvd., P.O. Box 1059, Minnetonka

Bean, Robert, Bean & Hill, Inc. 2002 London Rd, Duluth 55812
Bins, Richard H., 217 100 First Ave., Bldg., Rochester, 55901
Bergquist, Robert E., Citation Homes, PO Drawer AF, Spirit Lake, Ia. 51360
Bluhm, Gordon H., Code Enforcement Div., 1421 3rd Ave. SE, Rochester 55901

Bor-Son Construction, Inc., Ibb Agvald, 1550 E. 78th St., Richfield 55423

Bragonier, James W., 304 E. 2nd St., Northfield 55057

Brennan, Richard B, 511 Ryan Ave. W., Roseville 55113

Buege, Gerald, LaMoille, 55948

Building Inspection Co., Inc., 4620 W. 77th St., Mpls. 55435

Buresh, Robert J., 4801 W. 50th St., Edina, 55424

Burke, Donald A., 6700 Portland S., Richfield 55423

Buth, Wm. St. Paul BOMA, 330 N. Federal Bldg., St. Paul 55101

Butler Mfg. Co., BMA Tower, Penn Valley Pk., Kansas City, Miss. 64141

Cameron -Sullivan & Ass., Inc., Red Lake Falls, 56750

Campbell, Donald C., 715 Florida Ave. S., Mpls. 55426

Cardinal Insulated Glass Co., 6700 Excelsior Blvd., Mpls. 55428

Carney & Ass., Inc., P.O. Box 1237, Mankato 56001

Central Minnesota Ass., of Home Bldrs., P.O. Box 96, St. Cloud 56301

Close Associates, Inc., A. Boies, 3101 E. Franklin Ave., Mpls. 55406

Clubb, James P., MPS, 807 NE Broadway, Mpls. 55413

Dan J. Brutger, Inc., Att: David F. Gaida, 10- 14th Ave. S., St. Cloud 56301

DeBoom, Leroy H., 3945 Zarthan Ave., St. Louis Park 55416

Dept. Inspection, City Albert Lea, 221 E. Clark St., Albert Lea, 56007

Eeyereisen & Boughton Inc., 2361 W. Hwy. 36, St. Paul 55112

Ellerbe Architects, Inc., One Appletree Square, Bloomington 55420

Engineering Ass., P.C., 1407 12th Ave. S., Grand Forks, N.D., 58201

[redacted]

Erdman, Anthony, Associates, 242 Andrews St., Rochester, N.Y., 14604
Erickson, Glenn A., 445 City Hall, St. Paul, 55012

Ernst, Jerry, Wick Homes, Box 30, Fairmont, 56031

[redacted]

Fire Protection Technology, 1704 65th Ave., N., Mpls., 55430

Foss, Engelstad & Foss, Box 306, Moorehead, 56560

Harris-Billings Co., 4933 Boone Ave., N., Mpls., 55428

Highway Construction, 9150 Central Ave., NE, Mpls., 55434

Hochbein, Terry, Twin Cities Area Met. Transit Comm., 330, Metro Sq. Bldg. St. Paul, 55101

Housing & Redevelopment Authority, 55 E. 5th St., St. Paul 55101

Hove, Donald E., Fire Chief, 1616 Humboldt Ave., West St. Paul, 55118

Hydro Air Engineering, Inc., P.O. Box 7359, St. Louis, Mo. 63177

[redacted]

Jacobson, Dean, ORD Corp., Box 358, Pelican Rapids, 56572
Jacobson, Judd, Box 382, Owatonna 55060
Johnson, Richard L., Metro Metals, Inc., 4345 Lyndale N., RM. 2, Mpls., 55412

Johnson. Ronald W., 929 Washington Ave. S., Mpls. 55415

Jones & Haugh Inc. P.O. Box 648, Albert Lea, 56007

Kane, Harry, MN Electrical Ass., Inc., 3100 Humbolt Ave. S., Mpls., 55408

~~Kleinbeck, Alvin, 221 E. Clark St., Albert Lea, 56007~~

Knutson, Development Co., Att: G.P. Uttley, 17 Wash., Ave. N., Mpls., 55401

Lucas, Mrs. Russel, 3264 N. Victoria St., St. Paul, 55112

Mac Arthur Co., Att: R.L. Lockwood, 936 Raymond Ave., St. Paul, 55114

Marshfield Homes, Mr. Berg, P.O. Box 530, 2301 E. 4th St., Marshfield, Wisconsin 55449

McDonagh, James R., R.R. 2, Salem Road, Rochester 55901

McLean, Pat, % Clark R. Gibb Co., 1311 W. 25th St., Mpls., 55405

Mertz, Orville N., MN State Fire Chiefs, 521 S. Bdwy., Rochester 55901

Mill-Craft Housing Corp., Box 27A, Tower Rd., Waupaca, Wisc., 54981

Miller HWB Architects Inc.Attn W.J.Berger,Butler Sq. Su.300,100 No.6th Str.Mpls. 55403

Miller, Alvin, %Hussmann, North Central,6100 Wayzata Blvd.,Mpls.,Mn.55416

MN Lathing & Plastering Bur., 796 Raymond Ave., St. Paul, 55114

MN State Bd. of Electricity, 1954 Univ. Ave., St. Paul, 55104

Nelson, Alfred J., 1312 IDS Bldg., 777 Nicollet Mall, Mpls. 55402

Nelson-Zepper, 9150 Central Ave NE, Blaine, 55434

Niebling, Richard L., 7777 Bon Homme Ave., RM 2108, St. Louis, MO. 63105

Northern States Power Company, F.O. Anderson, 414 Nicollet Mall, Mpls., 55401

Northwestern Lumbermen, Inc., 5309 Vernon Ave. S., Mpls., 55436
Northwestern Bell Tele. Co. Bldg. Industry Consulting Ser., Att: G.B. Fletcher, 2701 E. 80th Street, Minneapolis, Minnesota 55420

Olofson, Arthur W., 927 Soo Line Bldg., Mpls., 55402

Otis Elevator, Att: W.R. Wilson, 2101 M'haha Ave., Mpls., 55404

Owatonna Builders, 206 West Rose Street, Owatonna, Mn. 55060

Peil, Eugene, United Sprinkler Co., 1700 65th Ave. N., Mpls., 55430

Pemton, Inc., Att: R.W. Anderson, 8200 Humboldt Ave. S., Bloomington, 55431

Plastics Pipe Institute, Att: R. Durazo, 250 Park Ave., N.Y., N.Y., 10017

Plumber & Gasfitters Loc. #34, Frank Horak, 418 Auditorium, Suite 205, St. Paul 55102

Ramsdell, Gerald G., SMARCA of Mn.,Inc., 2929 University Ave. S.E., Mpls. 55414

R & O Elevator Co., Inc., 6045 Pillsbury Ave. S., Mpls., 55419

Regional Comm. #15, Nat'l Automatic Sprinkler & FCA, 325 Roosevelt St. NE, Mpls. 55413

Rich, Philip W., 900 Bush Ave., Bldg.42-2W, 3M. Co., St.Paul, Mn. 55106

Ryden, Bruce E., Fire Marshall, 2701 N. Lexington, Roseville, 55113

Saxrud, Art, Honeywell, Inc., 7400 Metro Blvd., Mpls., 55435

Schuller, Karl, Metal Bldg., Dealers Ass., 117 N. Broadway, Rochester, 55901

Scheffler, Gustave L., Univ. Health Service, U of M, Mpls., 55455

Sievert, Sandra J., Industrial Coatings, Inc. , Rt. 2 Box 63 C Rogers,Mn.55374

Skenzich & Warn, Eveleth Area Vocational-Technical Inst., Eveleth, 55734

Sieckert, Frank, 5809 Excelsior Blvd., St. Louis Park 55416

Stewart, William F., 13 West MN St., Savage, 55378

Stordahl, Conrad, 6613 Portland Ave. S., Richfield, 55422

Summers, Joseph P., 630 Osborn Bldg., St. Paul, 55102
Swenson, Harvey G.,5705 Mt. Normandale Dr., Bloomington 55437

Tegan, James, Brin Glass Co.,600 Washington Ave.,No., Mpls.,55401
Tibbits, Robert Lester's, Lester Prairie, 55354

Tilly, Stan, M.L. Gordon Sash & Door Co., 7201 W. Lake St., Mpls., 55426

T .R. Arnold & Associates, Inc., 401 W. Bristol St., Elkhart, Ind., 46514

Underwriters Laboratories Inc., Att: W.J. Smith, 333 Pfingsten Rd., Northbrook Ill., 60062

Walton, Kenneth, Wick Homes, Box 158, Menomenie, Wisc., 53560

Warnes, Jack, Chief Bldg. Official City Hall, St. Cloud, 56301

Wausau Metals Corporation, Att: L. Niederhofer, 1415 W. St., Box 1305, Wausau, Wisconsin, 54401

Wees, Donald J., City Bldg. & Safety Dept., 1421 3rd Ave. SE, Rochester, 55901

Weis, J.C., P.O. Box 319, Rochester, 55901
Wherry Const.Co., W. Stephen Wherry, 7324 Cornelia Drive, Edina, Mn. 55435
Wick Bldg. Systems, Inc., I & S Div., Att: J.L. Poehlman, P.O. Box 205
Middleton, Wisconsin, 53562
Whitney, Granger B., Langer Const. Co. 54 E. Moreland, W. St. Paul 55118
Wisconsin Bridge & Iron Co., 5023 North 35th St., Milwaukee, Wisc. 53209

Wolverton Engineering Co., 3710 Central Ave. NE, Columbia Heights, 55421

Young, Spencer L., Mpls. Gas Co., 700 Linden Ave. N., Mpls., 55403

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

In the Matter of the Proposed Adoption of Rules of the Building Code Division Governing Installation of Mobile Home Support and Tie-Down Systems.

AFFIDAVIT OF MAILING

Kathleen Durkee, being first duly sworn, deposes and says:

That on the 26th day of October, 1976, at the City of St. Paul, County of Ramsey, State of Minnesota, she served the attached Notice of Hearing by depositing in the United States mail at said City of St. Paul, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations at the addresses listed on the attached Certificate of the Secretary of State.

Kathleen Durkee

Kathleen Durkee
Building Code Division

Subscribed and sworn to before me this 26th day of October, 1976.

Cynthia L. Clarson

CYNTHIA L. CLARSON
NOTARY PUBLIC - MINNESOTA
RAMSEY COUNTY
My Commission Expires Feb. 23, 1982

BEFORE THE OFFICE OF HEARING EXAMINERS

OF THE STATE OF MINNESOTA

IN THE MATTER OF PROPOSED ADOPTION OF RULES OF THE BUILDING CODE DIVISION GOVERNING INSTALLATION OF MOBILE HOME SUPPORT AND TIE-DOWN SYSTEMS. MoH 100 THROUGH MoH 900.	)))))	H.E.DOCKET NO. BCD-77-001-PE

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408 Metro Square Building
St. Paul, Minnesota
Tuesday, November 30, 1976

Met, pursuant to Notice, at nine o'clock in the forenoon.

BEFORE:

PETER ERICKSON, Hearings Examiner

BUILDING CODE DIVISION REPRESENTATIVES:

Don Pates, Director of the Building Code Division

Bob Rogers, Assistant Director of the Building Code Division

Richard Hauck, Section Chief, Building Code Division

Raymond W. Karnuth, Inspector, Mobile Home Section

I N D E X

QUESTIONS OR STATEMENTS PRESENTED BY PUBLIC:

Herbert W. Meyer, retired, representing himself.... 20

Kevin Dickinson, owner and operator, Revolution Homes, St. Cloud, Minnesota..... 21

Thomas Walters, Director, Minnesota Manufactured Housing Association..... 24

EXHIBITS

	Marked	Received
1 - 8	3	8
9 - 10	20	21

P R O C E E D I N G S

(Exhibits 1 through 8 marked for identification.)

EXAM. ERICKSON: This hearing is called to order at 9:00 a.m. on Tuesday, November 30th, 1976, Room 408 of the Metro Square Building, St. Paul, Minnesota. This is a hearing in the matter of the proposed adoption of rules of the Building Code Division governing installation of mobile home support and tie-down systems.

My name is Peter Erickson and I am an independent Hearing Examiner appointed by the Chief Hearing Examiner to hear this matter. My job is to preside over the hearing and submit proposed Findings of Fact, Conclusions and Recommendations to the Agency prior to the Agency's decision whether to adopt, modify or reject the proposed rules.

Will those representing the Building Code Division please note their appearances for the record? Please state and spell your name.

MR. KARNUTH: Raymond W. Karnuth, K-a-r-n-u-t-h.

MR. HAUCK: Richard Hauck, H-a-u-c-k.

EXAM. ERICKSON: Mr. Karnuth, what is your position?

MR. KARNUTH: I am an inspector in the Mobile Home Section.

MR. HAUCK: Section Chief, Building Code Division.

MR. ROGERS: Bob Rogers, R-o-g-e-r-s, Assistant

Director, Building Code Division.

MR. PATES: Don Pates, P-a-t-e-s, Director of the Building Code Division.

EXAM. ERICKSON: This hearing is being held pursuant to a Notice of Hearing signed by Richard Brubacher, Commissioner of the Department of Administration. The Notice is accompanied by a duly executed Affidavit of Mailing stating such Notice was mailed on October 26, 1976. A registration form may be found on the table in the back of the room. Everyone attending the hearing and intending to present evidence or ask questions is required to register prior to their presentation of evidence or asking questions by completing the information requested on the registration form. An Agenda and Guidelines for the hearing is also located on the back table. I will dispense with reading that aloud, however I would like to point out the following things on the Guidelines.

Number 9 states it should be noted that anyone who desires to submit a written brief or other written comments bearing upon the proposed rules may do so within twenty days of the close of this hearing. Such materials should be submitted to Peter Erickson, Office of Hearing Examiners, Room 300, 1745 University Avenue, St. Paul, Minnesota 55104. The materials must be received within the twenty-day period to be considered.

10 states you are advised under Minn. Stat. Section 10A.01, Subdivision 11, 1974, any individual representing persons or associations attempting to influence administrative action, such as the promulgation of these rules, must register with the State Ethics Commission as a lobbyist within five days of the commencement of such activity by the individual.

This hearing will be conducted pursuant to the Rules of the Office of Hearing Examiners, Chapter 1, HE 101 through 109. If there are no more preliminary matters, the Building Code Division may proceed. Mr. Hauck.

MR. HAUCK: At this time I would like to enter the following exhibits as part of the record. Exhibit Number 1 is the Order for Hearing. Exhibit Number 2 is the Notice of Hearing. Exhibit Number 3, Certificate of Delivery of the Secretary of State's List. Exhibit Number 4, Affidavit of Mailing. Exhibit Number 5, Statement of Evidence. Exhibit Number 6, Statement of Need. Exhibit Number 7, Proposed Rules, and Exhibit Number 8, certain corrections to the proposed rules. There are copies of these corrections, the Exhibit Number 8, located on the back table, if anyone cares to refer to the typed copy.

To start, we will go through these briefly to outline where the corrections are to be made.

EXAM. ERICKSON: Mr. Hauck, the correction

sheet refers to page numbers which are on the copies of the Proposed Rules on the back table, is that correct?

MR. HAUCK: They are xeroxed copies of the publication that was in the State Register.

On page 641, Section 450A.2.c., the reference to Table A-1 should refer to Table 450A.2.a(1). Also on page 641, Section 450B.3.b, the reference to paragraph F.1 should refer to MoH 450F.1.

On page 643, Section 450D.2.a, the reference to paragraph D-1 should refer to MoH 450D.1. Section 450D.3.a, the reference to paragraph D-1 should refer to MoH 450D.1. Section 450D.3.c, the reference to paragraph D-1 should refer to MoH 450D.1.

EXAM. ERICKSON: Okay, is everybody following along okay? Mr. Hauck.

MR. HAUCK: Page 644, Table 450A.2.a(1), Footnote 4 references to MoH 450A.2.a(1) and it should refer to MoH 450A.2.c.

Page 645, the caption on the bottom of the map states, "See caption on opposite page". That should be deleted, so it should read, "Figure A-1. Load Zone Map of U.S.A."

EXAM. ERICKSON: Just in reference to that, there is a caption that is referring to, instead of being on the opposite page, it is on the flip side, just so when the rules

are finally printed, that doesn't confuse -- they are just striking that language so that it is not confusing to those who read the rules, where in fact the caption is, but the caption is still in the body of the rules. You may proceed, Mr. Hauck.

MR. HAUCK: Then on page 642, the upper lefthand corner of the page, there is a section b. and c. and we wish to add a section d. entitled, "Elevated Mobile Homes." When more than one-fourth of the area of a mobile home is installed so that the bottom of the main frame members are more than 3 feet above ground level, the mobile home stabilizing system shall be designed by a qualified Registered Professional Engineer or Architect and the installation shall be approved."

EXAM. ERICKSON: Does everyone see where that fits into the body of the rules? Okay.

MR. HAUCK: And then to reference the new paragraph, we have to change 450B.4.b. at the top of page 642 again, where it says, "Subject to the limitations of MoH 450B.5.", it should read, "Subject to the limitations of MoH 450B.4.d. Then the same is true for Section c. below it, where it reads, "Subject to the limitations of B.5.", it should read, "Subject to the limitations of Moh 450B.4.d." which is the new section that was added, so both sections b. and c. will refer to the new section d,

"Elevated Mobile Homes".

EXAM. ERICKSON: Does anyone have any questions about the proposed amendments or where they fit into the body of the rules? Mr. Hauck, then you are offering Exhibits 1 through 8 into the record?

MR. HAUCK: That is correct.

EXAM. ERICKSON: Exhibits 1 through 8 are received.

(Exhibits 1 through 8 received in evidence.)

EXAM. ERICKSON: You may proceed with your presentation, Mr. Hauck.

MR. HAUCK: At this time then I would like to read the Statement of Need.

Minn. Stat. 327.31, subd. 6 requires that no person shall install a mobile home support system or ground anchoring system violating rules promulgated by the Commissioner pertaining to such systems. Minn. Stat. 327.33, subd. 3 further states that the Commissioner of Administration may periodically revise the code as deemed necessary to protect the health and safety of the public. Such revisions shall, to the extent practicable, be uniform with those adopted by other states.

The proposed rules, MoH 103, originated from the Standard for the Installation of Mobile Homes, identified

as National Fire Prevention Association No. 5-1A-1 (NFPA 501A-1). NFPA 501A-1 was developed by a committee of industry, trade and government representatives and was approved by the National Fire Prevention Association at its 1975 Fall Meeting. Previous editions of the standard have been approved by the American National Standards Institute (ANSI) and the 1975 edition is being submitted to ANSI for approval. When approved, the ANSI designation will appear on the cover of the standard.

The adoption of a standard developed by a nationwide group will provide the maximum assurance that the Legislature's desire for uniformity will be met.

Mobile homes are serving as residences for an increasing number of citizens of the State of Minnesota, and continue to increase in numbers. The mobile home is designed to provide adequate living quarters when properly supported and connected to utilities. The proper operation of the drainage system, doors, windows, and some appliances require that the home be installed on a level, stable support system having the strength to resist normal loads without movement.

The rules proposed will provide reasonable assurance that support systems meeting the requirements will provide the mobile home owner with a stable functional residence. The rules proposed for anchoring systems allow

the mobile home owner to obtain an anchoring system that will prevent lateral movement, or overturning of the mobile home when the home is exposed to winds of 70 miles per hour or less. The following are points in support of the specific rules which are proposed: MoH 450A-1.a. and 1.b. Manufacturer's Installation Instructions. Mobile homes are engineered structures and the design is based on the use of a particular means of transferring the dead and live loads acting on the mobile home to the earth beneath the home. To permit subsequent moves and re-installation, the manufacturer's instructions must stay with the home.

The manufacturer of the mobile home cannot specify the size of footers. The size must be determined from the stated load given by the manufacturer and the load bearing ability of the soil at the point of installations.

It is necessary to specify minimum requirements to assure the home owner that the performance of the installed equipment meets the stresses that may be encountered during the normal use of the home. Failure of the stabilizing device may cause serious damage to the mobile home.

MoH 450A-2. Stabilizing System Design. To provide the owner or occupant of a mobile home, constructed prior to the adoption of construction standards, with a

reasonable standard for the anchoring of the mobile home, it is necessary to adopt requirements based on sound engineering judgment. The requirements set forth were arrived at by a committee representing public and private sectors involved in the construction and use of mobile homes.

MoH 450A-2.c. Alternate Method Using Strapping. Baling of mobile homes not provided with specific instructions for anchoring has proven to be an acceptable method of increasing the structural integrity of older mobile homes. The baling straps will transfer the forces caused by strong winds to the main frame members, and through the main frame members to ground ties. This method is particularly useful in areas subject to frost heaving. The connection of the ground anchors to the frame members only will reduce the possibility of damage to the mobile home structure in the event frost action causes the surface of the ground to raise.

MoH 450B. Support Systems. To adequately perform its function, a mobile home must be supported by systems that will transfer the weight of the mobile home and its contents to the earth below the mobile home. The support system must retain its integrity under all conditions that the home is designed to withstand. This includes snow loads, and wind loads as well as the forces

due to the occupants and their normal possessions. The support system must be designed to accomplish the support function during normal periods of use and also function in conjunction with the anchoring system if installed, during abnormal conditions such as a wind storm. The 12 inch clearance specified is a recommendation only.

MoH 450B-1. Mobile Homes with Installation Instructions. The mobile home construction code currently in effect and the HUD regulations effective June 15, 1976 require that the manufacturer of the mobile home must include instructions with each mobile home specifying the location and required capacity of stabilizing devices on which the design is based. It is also a general requirement that the home manufacturer's instructions be followed if the home owner is to receive the maximum benefits afforded by the manufacturer's warranty. The manufacturer's instructions for the set-up of double wide mobile homes specifies the specific location for supports along the mating or center line of the mobile home. The mating line support locations are required at points of concentrated loads, vary from model to model, and cannot always be determined by visual inspection.

MoH 450B-2. Mobile Homes for which Installation Instructions are not Available. The installation of homes built prior to the imposition of the mobile home construction

codes should be controlled to provide the owner or occupant with an adequately supported unit. The requirements given are the result of experience by manufacturers, home owners, park operators, and insurance carriers.

These instructions apply to single wide mobile homes only. Amendment is required to include double wide homes. The proposed amendment will permit the control of double wide installations, thus providing support for the roof structure without overloading other structural members.

MoH 450B-3 and 3.a. Footers. A 65 pound per square foot load figure is a realistic reduction of the theoretical maximum load of approximately 90 pounds per square foot. The 90 pound figure is the sum of the mobile home dead weight plus a 30 pound per square foot snow load plus the 40 pound per square foot floor load capability. The reduction is justified by experience with residential structures of all types, which has shown that the maximum load capability will be utilized in a small portion of the total area.

The use of an average load value is required to assure that support elements will be able to properly support the home during all periods of normal residential use. Inadequate support can result in overloading of portions of the mobile home with the possibility of per-

manent structural damage to the home. The reference to concentrated loads will generally apply to double wide homes.

The materials specified are standard products generally available and capable of performing the required function, and that is spreading the load over an area that will provide adequate support on normal soils. The requirement is a minimum requirement and will support 3,100 pounds on soil having a bearing capacity of 2,000 pounds per square inch.

MoH 450B-4., 4.a., and 4.b. Piers. Piers are the main portions of the load bearing units placed under a mobile home. The requirement allows the use of special devices designed for the function of piers constructed of concrete block. The requirement for attachment to the frame or alternately the requirement that the pier extend six inches from the centerline of the frame member is necessary to allow for small lateral movements of the home during periods of strong winds. The lateral movement can cause the home to slide off of the piers or cause the piers to tip over if not properly constructed.

EXAM. ERICKSON: Do you have a comment?

MR. ROGERS: Yes, Mr. Hearing Officer, Mr. Hauck, on page 5, where you were reciting the bearing capacity of soil, I wonder if there isn't some errata with respect

to 2,000 pounds per square inch. Should that not be per square foot?

MR. HAUCK: Yes.

MR. ROGERS: I suggest that that be corrected.

MR. HAUCK: Yes, we should correct that.

EXAM. ERICKSON: You may proceed.

MR. HAUCK: The details specified assure adequate stability of the installed home when loose stacked concrete blocks are used. The height limitations are based on experience gained in all areas of the country. The use of filled concrete block columns will provide a method of constructing concrete block piers in the event loose stacked blocks cannot provide adequate stability.

MoH 450B-6. Plates and Shims. A means of compensating for variations in the ground surface elevation or variations in frame member sizes must be provided. The wood plate and shim combination will provide the capability of adjustment for spaces too small to permit the use of concrete blocks or cap blocks.

MoH 450C. Anchoring Equipment. This requirement allows the use of standard anchoring components that meet the strength requirement adopted by the mobile home industry, or the use of a special system designed for a specific application.

MoH 450C-1 through 450C-4.a. The detail require-

ments for anchoring system components will serve as a standard for acceptance by the State of Minnesota until components listed, or approved, by a recognized independent agency are readily available.

MoH 450C-4.b. through 450D. Ties and Ground Anchors. Standard installation procedures are required to assure the mobile home owner or occupant that the installed system will effectively utilize the capabilities of the system components. The load bearing capability of attachments and connections must be equal to the strength of the interconnecting materials. The ground anchor, and its connecting elements must withstand normal loading without failure or excessive displacement.

MoH 450D-1 through 450D-2.a. Ground Anchors. These requirements include design, installation, and performance criteria. The design requirements are in accordance with current and proposed industry standards and will serve as a basis for acceptance by the State of Minnesota until listed or approved anchors are available. The installation requirements are needed to provide inspection standards for field inspection of installed anchoring systems.

The soil classification is a simplified system that covers the types of soils encountered by installers and facilitates the selection of anchors capable of

performing in specific locations. Misapplication of anchors can result in reduced holding ability.

MoH 450D-3. Use of Concrete Slabs or Continuous Footers. A means of anchoring mobile homes to concrete slabs or continuous footers is required to provide owners of homes placed on slabs or continuous footers a means of attaching the home to the concrete. Concrete anchors may also be needed on the patio side of homes in parks providing concrete patio slabs. The reference to concrete deadman anchors identifies the classification and refers to the general performance requirements for anchors.

MoH 450D-4.1, 4.2 and 4.3. Other Anchoring Devices. To permit the proper selection and use of anchors the anchor manufacturer must specify the capability of the anchor. The installer must match the anchor to the soil and install the anchor in an approved manner if the mobile home owner is to receive the protection desired. Failure to select the proper anchor or failure to install the anchor properly may seriously reduce the holding power of the anchor.

MoH 450F, 450F-1.2. and 450F-1.b. Maintaining Anchoring Systems. Mobile homes installed on piers, slabs, or continuous footers resting on the ground surface may move slightly due to the expansion of the soil. This section formally recognizes that such action may occur and places

responsibility for such adjustments on the persons nominally in charge of the mobile home. This is generally the home owner.

EXAM. ERICKSON: Mr. Hauck, could you please state why the paragraph was added to 450B.4., what its purpose is?

MR. HAUCK: Okay, the purpose of that paragraph that was added, Elevated Mobile Homes, provides protection when a mobile home is placed on a sloping site, and when more than one-fourth of the home, and that would be to the bottom of the main frame, is more than 3 feet above the ground, special consideration must be given since the home may lose its stable -- its position of being stable without a special foundation being installed, so in order to cover this in the code -- this section is in NFPA, and was left out of the printing and should have been included in there. It just covers those situations where homes are installed on steeply sloping sites, and the NFPA Committee felt, and I did talk with the person that was on the Committee at the time this was approved, that it was necessary to have this in there so that where homes are installed on steep sloping sites, that adequate foundation could be designed or should be designed by architects rather than rely on loose piers such as typically are installed on mobile homes.

EXAM. ERICKSON: Then is the main body of this rule -- these rules then, is that taken from the NFPA Standards?

MR. HAUCK: Yes, it is.

MR. PATES: Mr. Hearing Officer, if I may, the last sentence of d, in fact the last words, stating "shall be approved", the last three of that paragraph, I submit that perhaps a better definition, "shall be submitted for approval". The inference here can be any time an architect or engineer designs it, it would be approved, and I don't think that is what the intent is, is that --

EXAM. ERICKSON: Mr. Hauck?

MR. HAUCK: Yes, the intent is that the Division would approve the design.

MR. PATES: I would suggest it be "submitted to the proper Agency for approval."

EXAM. ERICKSON: Do you think that would clarify the intent of the language, Mr. Hauck?

MR. HAUCK: Yes.

EXAM. ERICKSON: Let's amend then the amendment to paragraph d., and change the last line to read, "shall be submitted for approval".

MR. PATES: Fine.

EXAM. ERICKSON: Mr. Meyer, state your name and spell it and give your position.

MR. MEYER: My name is Herbert W. Meyer, retired, representing myself, but I want to point out that the reference on page 5 of the Statement of Need to MoH 450B-6 should be 450B-5. There is no 6 in the printed version of the rules, if you look on 642.

EXAM. ERICKSON: You are on page 5 of the Statement of Need?

MR. MEYER: Yes.

EXAM. ERICKSON: And which paragraph?

MR. MEYER: The last paragraph on the page, MoH 450B-6, Plates and Shims.

EXAM. ERICKSON: Should be "-5"?

MR. MEYER: Should be "-5".

EXAM. ERICKSON: Okay. Off the record.

(Off-the-record discussion.)

(Exhibits 9 and 10 were marked for identification.)

EXAM. ERICKSON: Mr. Hauck would like to offer two more exhibits into the record.

MR. HAUCK: At this time we would like to offer the Mobile Home Code which was adopted by reference by the State of Minnesota, September 1, 1974. It is ANSI A119.1-1974, as Exhibit Number 9, and then we would also like to offer as Exhibit Number 10, NFPA No. 501A, 1975, titled, "Standards for the Installation of Mobile Homes", and it was from

this that most of our text was taken.

EXAM. ERICKSON: Okay, Exhibit Numbers 9 and 10 are received.

(Exhibits 9 and 10 received in evidence.)

EXAM. ERICKSON: Mr. Hauck, then in the body of the proposed rules, when it refers to the Code, without a more specific name, is the Code that is being referred to in the rules this Standard for Mobile Homes, ANSI A119.1-1974?

MR. HAUCK: Yes.

EXAM. ERICKSON: Does anyone have any comments or questions on the proposed rules?

MR. DICKINSON: Kevin Dickinson, St. Cloud, Minnesota.

EXAM. ERICKSON: Please spell your last name.

MR. DICKINSON: D-i-c-k-i-n-s-o-n. I am owner and operator of Revolution Homes in St. Cloud, Minnesota. The difficulty, gentlemen, that I see with some of the proposed rules and regulations, first of all, maintaining that I have worked with the State of Minnesota, the Building Codes, on installations since its inception in the installation program. Some of the difficulties I see, as being both in sales and service on the proposed rules, namely, at the time that we sell, and at the time that the

consumer purchases a mobile home from our business, he is basically asked questions as far as location, land Gradiance and things like this. People are not aware of what a 70 foot span is on a land with a six or eight inch drop per foot. The problems I see, gentlemen, in my business with the new rules is who is -- who is correct or who pays or who foots the bill, for example, for let's say piers or the field of blocks, things like this, at the time that that home is set up. I am sure that I, as a dealer, asking most of my consumers, they will say, well, the land is at that time pretty level, until you get a 70 foot home out there and find out that the front of the home may be more than 36 inches from the bottom of the main I-beam to the ground and things like that. I foresee problems, gentlemen, in -- on a dealer-consumer level as far as adhering to some of these proposals in regards to who finances it. I am sure that anybody in sales and service can also tell you that in 98 percent of the cases most people at that time will tell you that their land is level and this is the main problem I foresee in this. In the past we have not had near the problem that we have had previous to, like 1974, with the piers not holding the home, as far as -- we have had fewer problems with door warping, things like this, caused by loose soil. That is all. Thank you.

EXAM. ERICKSON: Thank you. Mr. Hauck, do you have any response to his questions in regard to who pays for it?

MR. HAUCK: Well, I guess that really isn't the concern of the regulations. I can understand the problem, if the dealer has not inspected the site or doesn't have knowledge of the exact site where the mobile home is going to be installed, but I could think there could be some sort of clause in the agreement for installation that the site is reasonably level and if these other regulations come into effect, that I assume that the home owner would have to bear the cost. I assume that he ends up paying for the installation of the home one way or another.

EXAM. ERICKSON: Is it correct to assume then that when a consumer buys a mobile home from a dealer, such as Mr. Dickinson, that the dealer then will come out and set that mobile home up in compliance with the rules that are being proposed today?

MR. HAUCK: I think generally it has been typical that installation is provided with the purchase of the home, included in the cost, I believe.

EXAM. ERICKSON: Mr. Dickinson, is that correct, is that what you do?

MR. DICKINSON: That is correct, at the present

time. I see that these proposed regulations could change this.

EXAM. ERICKSON: How would they change it do you think?

MR. DICKINSON: Basically,sir, we would definitely have to add something to our purchase agreements with the consumer, that any additional cost incurred would be borne by them. You know, I think -- on my standpoint, sir, it opens up an entirely brand new problem area because at that time then we have a collection problem, I am sure, because there will be some hassle with that consumer, you know, after the fact, you are putting an additional charge on that man.

EXAM. ERICKSON: Okay. It seems to me that it shouldn't be too difficult to get somebody to draft a clause in your contract stating that any installation costs as required by Minnesota Rules shall be borne by the purchaser. Okay. Sir, you have got a comment? Please state and spell your name.

MR. WALTERS: Let me talk off the record a minute.

EXAM. ERICKSON: Off the record.

(Off-the-record discussion.)

MR. WALTERS: My name is Thomas Walters, and I am the Director of the Minnesota Mobile Home Association -- formerly the Minnesota Mobile Home Association, now the

Minnesota Manufactured Housing Association. Our Board met last month and our Board consists of members from the manufacturing industry, from the marketing and dealership, from the parks, from the suppliers, from the set-up people, from the insurance and finance industry, and the Board took action concurring with the hearing, subject to the proposed amendments, of which we didn't know at that time, but I would take the liberty for speaking for the Board, our intent was they become consistent with the proposed National standards and of course that is what you are doing here today and this is what we need.

To talk just a minute about what Mr. Dickinson had to say, we see the Federal Trades Commission coming down with Rules and Regulations that would permit a mobile home owner to assume the responsibility for installation. We also see HUD and we see the Minnesota Warranty Law holding the dealer liable, you know, to be sure that the home was installed as per manufacturer's specs. We end up with a conflict there.

With this hearing and with the publicity it was given through the Register, where it implied that we now have mobile home tie-down legislation, I think we will see more communities want to adopt mandatory tie-down regulations and we think probably that is okay. The question I think though is how good a job can we do on

inspection to insure.

And another question comes up I think related to installation, but not spoken to specifically, and that is how long can we make inspections and ignore the utility connections? This is a void that, you know, needs to be filled. We have talked with the Board of Health. They disclaim any authority to make an inspection to be sure that the utility connections are proper. Our law here doesn't speak specifically to it, although I think the law does state that no communities shall adopt ordinances or regulations with regards to heating, plumbing, etc. When I refer to utilities, I speak specifically I think about the problems of fire damage. We have had a couple more burn outs caused primarily by faulty heat tapes just in the last couple of months. I spoke to Mr. Hauck about one, suggested we go out and take a look at it, out in one of the suburban parks. On the one hand we state that the Division cannot make a full and complete inspection, that is to say including the utility connections and on the other hand the State UCC Code and the State Warranty Law seems to imply that we deliver everything so that the consumer knows that they have a functional and operative -- you know, a home that operates and performs in the manner in which the dealer sold it and we hold the dealer or the marketing end of our industry responsible and

yet we do not provide support to that marketing end by providing proper inspection, at the point of installation, whether the consumer makes the installation or whether the dealer or whether someone who is involved primarily in installation only makes it.

My purpose of course of being here is to go on record to show that we do have this void. The question might come up, can the Division go to making utility inspections, issuing corrective notices where possible. We have talked this over many times. I guess that would be it.

EXAM. ERICKSON: Okay, let's go off the record.

(Off-the-record discussion.)

EXAM. ERICKSON: Back on the record. Mr. Walters.

MR. WALTERS: Okay, I realize that we are addressing ourselves specifically to the mobile home support and tie-down systems here today, and I am here because I want to go on record to state that to provide for inspection of 10 or 20 percent of the total job doesn't do justice to the Minnesota consumer. Thank you.

EXAM. ERICKSON: Thank you.

MR. ROGERS: Mr. Walters, I wonder if you could clarify a previous statement that you made with respect to fire in a mobile home that was occasioned by a faulty heat tape, if I remember your comment, to clarify the matter,

was a determination made that the heat tape was faulty or the method of installation was faulty?

MR. WALTERS: I am sorry, I don't know. I talked with the investigators from the General Adjustment Bureau and they just used the term heat tape. I would state that from personal experience we have to assume that installation was not proper.

MR. ROGERS: Thank you.

MR. WALTERS: May I comment on -- you know, we have talked about heat tapes before. We have talked about whether they are UL approved or not and previous testimony at one of the legislative hearings did refer to the fact that the component parts of the heat tape were each individually UL approved, so we assume that we have an approved or accepted heat tape. We have to go to the improper installation as the cause of fire.

EXAM. ERICKSON: Any more questions of Mr. Walters? Thank you. Any more comments or questions on the proposed rules? Okay, let me remind you that you have got twenty days in which to submit written comments to me in regard to the proposed rules. Those will go into the record and I will consider those when I write my recommendation. If there is nothing further, this hearing is adjourned.

(Whereupon the hearing adjourned.)

REPORTER'S CERTIFICATE

I, Nancy J. Duehn, do hereby certify that I recorded in stenotypy the proceedings had in the foregoing matter on the 30th day of November, 1976, at St. Paul, Minnesota, before Peter C. Erickson, Hearings Examiner;

I further certify that I thereafter transcribed into typewriting the foregoing transcript;

I further certify that said transcript of said hearing constitutes a full, true and correct transcript of the proceedings to the best of my ability.

Dated this 2nd day of December, 1976.

Nancy J. Duehn

Nancy J. Duehn
Court Reporter
3729 - 39th Avenue South
Minneapolis, Minnesota 55406
Phone: 729-9528

STATE OF MINNESOTA
OFFICE OF HEARING EXAMINERS

FOR THE DEPARTMENT OF ADMINISTRATION

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE BUILDING CODE DIVISION GOVERNING INSTALLATION OF MOBILE HOME SUPPORT AND TIE-DOWN SYSTEMS.

REPORT OF HEARING EXAMINER

The above-entitled matter came on for hearing before Hearing Examiner Peter C. Erickson of the Minn. Office of Hearing Examiners at 9:00 a.m. on Tuesday, November 30, 1976, in Room 408 of the Metro Square Building, St. Paul, Minnesota.

Richard I. Hauck, section cheif, Building Division, appeared and testified on behalf of the Building Code Division. The hearing continued until all interested groups or person had an opportunity to be heard concerning the adoption of the proposed rules.

Pursuant to Minn. Stat. § 15,052, subd. 3 (1975 Supp.), this Report will include Findings of Fact, Conclusions and Recommendations. The Agency shall make a copy of this Report available for review to any interested person upon request. Copies of the Report will be furnished at a nominal cost by the Office of Hearing Examiners.

The Building Code Division (hereafter BCD) shall, if it proposes to adopt the rules as originally proposed or amended, submit the complete hearing record to the Chief Hearing Examiner no earlier than ten days subsequent to the receipt of this Report. It shall include the rules as originally proposed, and the rules as proposed for adoption in final form.

The submission to the Chief Hearing Examiner shall precede review by the Attorney General. The Chief Hearing Examiner shall complete his review and submit his report to the BCD on the issue of substantial changes in the rule within ten calendar days. The BCD shall be responsible for filing the rules with the Attorney General.

Based upon the proceedings herein, the Examiner makes the following:

FINDINGS OF FACT

1. On October 5, 1976, the BCD filed the following documents with the Chief Hearing Examiner:

(a) A Proposed Order for Hearing;
(b) A Proposed Notice of Hearing with the Proposed Rules attached; and
(c) A statement of the number of persons expected to attend and estimated length of hearing.

2. On October 26, 1976, the Department mailed the Notice of Hearing to all persons and assocaitions who had registered their names with the Secretary of State for the purpose of receiving such notice, to all persons and associations on a list maintained by the BCD, and to all members of the Legislature. The Examiner takes administrative notice that the proposed rules were published in the state register on October 26, 1976.

3. On November 4, 1976, the BCD filed with the Office of Hearing Examiners the following documents:

(a) The Order for Hearing;
(b) The Notice of Hearing as mailed;
(c) The affidavit of receipt of the Secretary of State's list;
(d) The Affidavit of Mailing;
(e) The Statement of Need;
(f) The affidavit of mailing of a notice pursuant to Minn. Stat. § 15.0412, subd. 6, a copy of the Notice and material received pursuant to the Notice;
(g) The names of Department personnel who will represent the agency;
(h) A summary of evidence.

The documents were available for inspection at the Office of Hearing Examiners from the date of filing to the date of the hearing.

4. The record was closed after allowing 20 days for submission of written comments at the end of the day on December 20, 1976.

5. Statutory authority to promulgate the proposed rules is found in Minn. Stat. § 327.31 subd. 6 (1974) and Minn. Stat. § 327.33 subd. 3 (1974). Those sections read:

> Subd. 6. After September 1, 1974, no person shall install or connect to any mobile home a support system or ground anchoring system which is in violation of any rules and regulations promulgated by the commissioner which pertain to support systems and ground anchoring systems. The commissioner shall issue installation seals to any dealer or mobile home installer upon application supported by such evidence as the commissioner deems necessary to establish that the seals will be affixed only to those mobile homes where the support system and ground anchoring system comply with the commissioner's rules and regulations.

Subd. 3. The commissioner may adopt such other rules as may be necessary to administer and enforce sections 327.31 to 327.34, including such periodic revisions of the code as he may deem necessary to protect the health and safety of the public. Revisions shall, to the extent practicable, be uniform with those adopted by other states. All rules shall be adopted in the manner prescribed by Minnesota Statutes 1969, Sections 15,0411 to 15,0417.

Minn, Stat, 327.31, subd, 6 requires that no person shall install a mobile home support system or ground anchoring system violating rules promulgated by the Commissioner pertaining to such systems. Minn. Stat. 327.33, subd, 3 further states that the Commissioner of Administration may periodically revise the code as deemed necessary to protect the health and safety of the public. Such revisions shall, to the extent practicable, be uniform with those adopted by other states.

The proposed rules originated from the Standard for the Installation of Mobile Homes, identified as National Fire Prevention Association No. 5-1A-1 (NFPA 501A-1). NFPA 501A-1 was developed by a committee of industry, trade and government representatives and was approved by the National Fire Prevention Association at its 1975 Fall Meeting. Previous editions of the standard have been approved by the American National Standards Institute (ANSI) and the 1975 edition is being submitted to ANSI for approval. When approved, the ANSI designation "ANSI A119.3-(year)" will appear on the cover of the standard.

The adoption of a standard developed by a nationwide group will provide assurance that the Legislature's desire for uniformity will be met.

6. Mobile homes are serving as residences for an increasing number of citizens of the State of Minnesota, and continue to increase in numbers. The mobile home is designed to provide adequate living quarters when properly supported and connected to utilities. The proper operation of the drainage system, doors, windows, and some appliances require that the home be installed on a level, stable support system having the strength to resist normal loads without movement.

The rules proposed will provide reasonable assurance that support systems meeting requirements will provide the mobile home owner with a stable functional residence. The rules proposed for anchoring system that will prevent lateral movement, or overturning

of the mobile home when the home is exposed to winds of 70 miles per hour or less.

7. The proposed amendments of MoH 103, Definitions, are necessary to define the terms used in the proposed new rule, MoH 450, Stabilizing Systems for Mobile Homes.

(a) The Skyline Corporation proposed amendments to the unchanged portions of MoH 103. As the purpose of the present proceeding is to consider the proposed amendments to MoH 103 and new MoH 450, Skylines proposals in regard to MoH 103 are inappropriate at this time. However, the BCD is encouraged to look at these comments as a basis for a future rules hearing.

8. Proposed MoH 450 A. is needed to set out the required stabilizing devices which are to be used when mobile homes are installed.

(a) Herbert Meyer proposed to amend A. 1. b. by deleting the words "this standard" and substituting in place thereof the words these rules. Minn. Stat. § 327.32 subd. 6 specifically refers to rules or regulations promulgated by the commissioner, not standards.

(b) The BCD proposed to amend A. 2. a(1) by deleting the words "in hurricane and non-hurricane zones". This change is made to comply with a proposed amendment to the table referred to in that section.

(c) Skyline proposed to amend A. 1. and 2. as follows:

A. Stabilizing System

1. When approved installation instructions are supplied by the manufacturer of the mobile home:
   a. Footings and stabilizing devices shall be located in accordance with the provided instructions.
   b. Stabilizing devices shall be selected in accordance with the capacities noted in the provided instructions.
   c. Stabilizing devices shall be installed in accordance with the instructions provided with the devices.
   d. Footings shall be constructed with capacities sufficient to carry the loads noted in the approved installation instructions, using the methods in Paragraph 3. b. of these rules.
   e. The approved installation instructions shall be left with the owner of the mobile home.
2. If approved installation insturctions are not available from the manufacturer of the mobile home:
   a. The stabilizing system shall either be designed in conformance to the code by a registered professional engineer or shall comply with the following requirements:

Skyline stated that:

"Very briefly we suggest that the new Minnesota regulations properly recognize that the Federal Mobile Home Construction and Safety Standards control the design and construction of all mobile homes built after June 15, 1976. Homes built to the Federal Standard must have installation instructions supplied with the home. These instructions are required to include the necessary capacities and locations of stabilizing devices. It is also necessary to include drawings and specifications for an acceptable system of tie-down straps or cables. It should be made clear to the installer that the alternate provisions of the Minnesota rules for tie-down load determination should be used only when the instructions are not available from the manufacturer. Actually we should expect that the alternate provisions be invoked only for reinstallation of home built prior to June 15, 1976."

(d) The BCD proposed to correct a typographical error in A. 2. C. by changing the reference made to "Table A-1" to Table A. 2. a(1).

9. Proposed MoH 450 B. is necessary to specify the required type of support system that must be used when mobile homes are installed.

(a) The BCD proposed to amend B. Support Systems by deleting the word "should" and substituting in place thereof the word shall. This change makes mandatory the twelve-inch clearance beneath the frame which is necessary to service the utility connections.

(b) Skyline proposed that B.1. be amended by deleting the language, "to assure that the manufacturer's warranty remains valid".

(c) Mr. Meyer suggested that the "Methods other than those specified herein . . . " language in B. 2. is unclear and indefinite as to how or when approval is required. He stated that approval should be required before installation and the rule "should clearly delineate how and when such approval can be secured".

(d) The BCD proposed to amend B. 3. by deleting the unnecessary language "55 PSF for the Middle Zone or" and "for the North and Hurricane Zones".

(e) The BCD proposed to amend B. 3. b. by deleting the language "NOTE: In areas subject to frost heave, see Paragraph F. 1." This change is made to comply with an amendment proposed to paragraph F.

(f) Herb Meyer stated in regard to B. 4. that:

"In the sixth line, the word 'labeled' is used. Nowhere in the definitions or other parts of the proposed rules is labeled defined or what kind of label is required or acceptable to the State of Minnesota. Present requirement cannot be complied with unless clarifying language or an

additional rule established. In the eighth line, the words 'shall be approved for the use intended' are used. Again, nowhere in the rules are there requirements as to how and when such approval is to be obtained."

10. Proposed MoH 450 C. is needed to set out the requirements for anchoring equipment.

(a) The BCD proposed to amend C. 1. by changing "0.30" to 0.625 and deleting "(0.0005 inches thick)" and the footnote at the bottom of the first column. They contend that these changes "will clarify the rules and eliminate unnecessary verbiage".

(b) Skyline questioned the statutory authority to change the amount of zinc coating from .0005 inches thick to 0.625 ounces per square foot on January 1, 1977.

(c) The BCD proposed an editorial amendment to C. 4. a. to change the reference to "Paragraph C. 1." to MoH 450 C. 1. for the sake of clarity.

11. Proposed MoH 450 D. is necessary to specify the requirements for ground anchoring devices.

(a) The BCD proposed that the references to "Paragraph D. 1. "in D. 2. a., D. 3. a. and D. 3. c. be changed to MoH 450 D. 1. for the sake of clarity.

(b) Mr. Meyer observed that D. 4. allows alternate anchoring devices but there is no provision for when or how the approval of those devices takes place.

12. Proposed MoH 450 E. is needed to specify the type of anchor to be used and how it is to be installed.

13. Proposed MoH 450 F. is needed to further specify how the anchoring system is to be installed and maintained.

(a) The BCD proposed that F. be deleted in its entirety and replaced with the following language:

F. Design Loads. The following minumum design live loads shall be applicable in all areas of the State of Minnesota.
1. Horizontal 15 lbs/ft^2
2. Vertical/upward 9 lbs/ft^2
3. Vertical/downward 30 lbs/ft^2

The agency contends that deletion of all of F. will eliminate the reference to non-mandatory recommendations. That because mobile homes are designed to be moved from time to time, the intent is not to require permanent foundations extending below the

frost depth. The new section F. specifies design loads from Minnesota only which are taken from Figure A-1.

14. The BCD proposed to amend Table 450 A. 2. a (1) by: (1) deleting columns 2, 3, 4, and 5; (2) changing the numbering fo columns 6, 7, 8, and 9 to 2, 3, 4, and 5; (3) deleting "non-hurricane resistive"; (4) deleting "or 7" in footnote 1; (5) changing the reference to "MoH 450 A. 2. a (1)" in footnote 4 to MoH 450 A. 2. c.; and (6) changing "from a vertical direction" to from vertical in footnote 5. These deletions eliminate unnecessary language which refers to other areas of the United States besides Minnesota.

15. The BCD proposed to delete the Figure A-1 Load Zone Map entirely and all of the language which describes the Map. The information contained on this map has been placed in the proposed amended version of MoH 450 F.

16. The BCD proposed to delete the language, "Note: In areas subject to frost heave, see MoH 450 F. 1.", on pages 646, 647, and 648 of the proposed rules, because all of F. 1. that pertains to frost heave was proposed to be deleted by the agency.

17. Herb Meyer stated that:

> "The Building Code Division believes that their present experience does not indicate the need for frost footings under Mobile Homes, especially when the homes have skirting installed around the home. If frost heave is not to be considered in Minnesota, then the rules should require skirting in order to assure the owner that his mobile home is afforded some protection from damage by frost heave."

18. The BCD proposed that the vertical line in the pier in Figure A-2 be deleted to clarify that intent of the drawing.

CONCLUSIONS

1. Due, timely and adequate legal notice of the hearing was properly served and filed by the Building Code Division. All other substantive and procedural requirements of statute or rule have been complied with.

2. The Examiner concludes that proposed MoH 450 A. be amended as set out in Findings 8(a), 8(b), and 8(d) for the reasons stated therein. The proposal made by Skyline merely restates what is already contained in the rule.

3. The Examiner concludes that proposed MoH 450 B. be amended as set out in Findings 9(a), 9(b), 9(c), 9(d), and 9(e).

The Examiner agrees with Skyline that the "warranty validity" language in B. 1. is unnecessary and confusing. Mr. Meyer's comments in regard to the "approval" procedures in B. 2. and B. 4. are well taken. The Examiner suggests that some clarifying language be inserted in those two paragraphs which specifies how and when the approval shall be secured. As it reads now, the language is far too ambiguous and open-ended. If the "authority having jurisdiction" does want to retain this descretionary power of approval, applicants should be afforded the opportunity to contest non-approval by way of a Chapter 15 contested case proceeding. The Examiner feels that the labeling requirement in B. 4. is clear enough as to not require revision at this point.

4. The Examiner concludes that proposed MoH 450 C. be amended as set out in Findings 10(a) and 10(c) for the reasons stated therein. Skyline is reminded of the statutory authority vested in the commissioner pursuant to Minn. Stat. §§327.32 and 327.33 and the fact that the NFPA requirements have been upgraded in the same manner as of January 1, 1977.

5. The Examiner concludes that proposed MoH 450 D. be amended as set out in Finding 11(a). Also, language should be added to D. 4. specifying how and when the approval of alternate anchoring devices shall be secured, along with a right to a Chapter 15 hearing if non-acceptance by the "authority having jurisdiction" is contested.

6. The Examiner concludes that proposed MoH 450 F. be amended as set out in Finding 13(a) for the reasons specified therein.

7. The Examiner concludes that the Tables and Figures be amended as set out in Finding 14, 15, 16, and 18 for the reasons stated therein.

8. The Examiner suggests that the BCD examine the concerns raised by Mr. Meyer in regard to frost heave (see Finding 17) and, if necessary, include language to deal with the problem.

9. The Examiner concludes that the Building Code Division ahs documented its statutory authority to promulgate the proposed tules and has demonstrated, by a affirmative presentation of facts, the need for and reasonableness of the rules.

10. The Examiner concludes that the amendments he is rec-

ommending to the proposed rules make them more reasonable and do not constitute substantial changes.

RECOMMENDATION

That the proposed rules, as recommended to be amended in this report, be adopted by the Building Code Division of the Department of Administration.

Dated this 13 day of January, 1977.

Peter C. Erickson

PETER C. ERICKSON
Hearing Examiner

STATE OF MINNESOTA
OFFICE OF HEARING EXAMINERS

FOR THE DEPARTMENT OF ADMINISTRATION

IN THE MATTER OF THE PROPOSED ADOPTION)
OF RULES OF THE BUILDING CODE DIVISION)
GOVERNING INSTALLATION OF MOBILE HOME)
SUPPORT AND TIE-DOWN SYSTEMS.)

REPORT OF THE
CHIEF HEARING EXAMINER

WHEREAS, a hearing was held on November 30, 1976, before Peter C. Erickson, a Hearing Examiner of the State Office of Hearing Examiners, on the above-entitled matter in compliance with Minn. Stat. §15.0412, Subd. 4; and

WHEREAS, the Report of Hearing Examiner made pursuant to Minn. Stat. §15.052, Subd. 3, was issued to the Building Code Division on January 13, 1977; and

WHEREAS, the Building Code Division has now determined to adopt rules pursuant to Minn. Stat. §15.0412, Subd. 4; and

WHEREAS, the Building Code Division has submitted said rules to the Chief Hearing Examiner for review pursuant to Minn. Stat. §15.052, Subd. 4, and Rule HE 107; and

WHEREAS, the Chief Hearing Examiner finds that the final proposed rules are not substantially different from those proposed at the public hearing and that the Building Code Division has met all requirements of Minn. Stat. §15.0412, Subd. 4.

NOW, THEREFORE, upon receipt of this Report, the Building Code Division has the responsibility of submitting the complete hearing record and the rules as adopted by the Division to the Attorney General and to publish in the State Register, all pursuant to Minn. Stat. §15.0412, Subd. 4.

Dated this 15th day
of February, 1977.

Duane R. Harves
DUANE R. HARVES
Chief Hearing Examiner

State of Minnesota

Department of Administration

In the Matter of the Proposed Adoption of Rules of the Building Code Division Governing Installation of Mobile Home Support and Tie-Down Systems.

FINDINGS OF FACT

The Building Code Division, Department of Administration, hereby adopts the report of the Hearing Examiner by reference with the following exceptions:

1. In the Hearing Examiner's report, pages 7 and 8, Conclusion 3, the Hearing Examiner suggests that some clarifying language be inserted in MoH 450B.2. and B.4 to specify how and when the approval of methods of mobile home support other than those specified in the rules and regulations shall be secured. This suggestion of the Hearing Examiner was not implemented because application for approval of alternate methods is already covered in MoH 306.

2. In the Hearing Examiner's report, page 8, Conclusion 3, the Hearing Examiner states "If the authority having jurisdiction does want to retain this discretionary power of approval, applicants should be afforded the opportunity to contest non-approval by way of a Chapter 15 contested case proceeding." Appeals are already covered in MoH 802.

Date: March 8, 1977

Richard Brubacher

Richard L. Brubacher
Commissioner of Administration

STATE OF MINNESOTA

DEPARTMENT OF ADMINISTRATION

In the Matter of the Proposed Adoption of Rules of the Building Code Division Governing Installation of Mobile Home Support and Tie-Down Systems.

ORDER ADOPTING RULES

The above-entitled matter came on for hearing before the Commissioner of Administration of the State of Minnesota on the 30th day of November, 1976, at 9:00 a.m. in the Conference Room of the Building Code Division, 408 Metro Square Building, 7th and Robert Streets, St. Paul, Minnesota, after proper notice required by Minn. Stat. 1974, Section 15.0412 was served upon all persons, associations and other interested groups registered with the Secretary of State for that purpose.

After affording interested persons an opportunity to present written and oral data, statements and arguments, having heard all of the testimony, having considered all of the evidence adduced and upon the records, files and proceedings herein, and applicable statutory standards or criteria, and having confirmed the need for the above captioned rules and the reasonableness thereof,

NOW, THEREFORE, IT IS ORDERED that the rules attached hereto and identified as MoH 103, Definitions, and MoH 450, Stabilizing Systems for Mobile Homes, are hereby adopted this 8th day of March, 1977, pursuant to authority vested in me by Minn. Stat. 327.33, subd. 3 (1974).

Richard L. Brubacher

Richard L. Brubacher
Commissioner of Administration

MoH 103 Definitions. In addition to the definition contained herein, the definitions in ANSI A119.1 or NFPA 501B shall apply.

A. Accessory

1. A subordinate structure which, when installed, becomes a part of a mobile home.

2. Components which constitute portions or parts of ground support and anchoring systems.

B. Agency, Independent Inspection. An organization, approved by the Commissioner, qualified to review and approve plans and specifications for mobile homes with respect to model, structural, electrical, mechanical and plumbing requirements and in addition evaluate quality control programs and make inspections.

C. Agency, Listing. An agency approved by the Commissioner which is in the business of listing or labeling and which maintains a periodic inspection program on current production of listed products, and which makes available at least an annual published report of such listing in which specific information is included that the product has been tested to approved standards and found safe for use in a specified manner.

D. Agency, Evaluation. An organization approved by the Commissioner which is qualified by reason of facilities, personnel, experience and demonstrated reliability to investigate and evaluate mobile homes.

E. Agency, Testing. An organization which is:

1. Primarily interested in testing and evaluating equipment and installations;

2. Qualified and equipped for, or to observe experimental testing to approved standards;

3. Not under the jurisdiction or control of any manufacturer or supplier of any industry;

4. Makes available a published report in which specific information is included stating that the equipment and installations listed or labeled have been tested and found safe for use in a specific manner; and

5. Approved by the Commissioner.

F. Alteration, Construction. The replacement, addition, modification or removal of any equipment or installations which may affect the construction, plumbing, heat-producing or electrical system or the functioning thereof of mobile homes subject to the code.

G. Alteration, Installation. The replacement, addition, modification or removal of any components of the ground support or ground anchoring systems required under the provisions of these rules.

H. Anchoring Equipment. Straps, cables, turnbuckles, and chains, including tensioning devices, which are used with ties to secure a mobile home to ground anchors.

I. Anchoring System. A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist overturning and lateral movement of the mobile home from wind forces.

J. Approved. Means acceptable to the authority having jurisdiction.

K. Authority Having Jurisdiction. The Commissioner of Administration or his authorized representative.

L. Authorized Representative. Authorized representative includes any person, firm or corporation, or employee thereof, approved or recognized by the Commissioner to perform inspection services.

M. Baling. Baling is a method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a mobile home with straps.

N. Code. Code means the standards code promulgated by the American National Standards Institute and identified as ANSI A119.1 or the provisions of the National Fire Protection Association and identified as NFPA 501B, including revisions adopted by the Commissioner.

O. Compliance Certificate,Construction. The certificate provided by the manufacturer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with the code.

P. Compliance Certificate, Installation. The certificate provided by the installer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with these rules.

Q. Commissioner. Commissioner means the Commissioner of Administration or his duly authorized representative.

R. Dealer. Dealer means any person, other than a manufacturer who sells three (3) or more mobile homes in any consecutive twelve (12) month period.

S. Diagonal Tie. A tie intended to primarily resist horizontal or shear forces and which may secondarily resist vertical, uplift, and overturning forces.

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

U. Ground Anchor. Any device at the mobile home stand designed to transfer mobile home anchoring loads to the ground.

V. Installer. Mobile Home installer means any person who, within any consecutive twelve (12) month period, installs for others three (3) mobile homes at site of occupancy by making necessary service connections or attaching support systems or ground anchoring systems.

W. Installation Instructions. Those instructions provided by the manufacturer accompanying each mobile home detailing the manufacturer's requirements for ground supports and anchoring systems attachments.

X. Length of Mobile Homes. The distance measured from the extreme front to the extreme rear of a mobile home (excluding hitch, coupling, tongue and other attachments).

Y. Listed. Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

Z. Main Frame. The structural component on which is mounted the body of the mobile home.

A_1. Manufacturer. A person who manufactures mobile homes.

B_1. Mobile Home. Mobile home means a factory-built structure or structures equipped with the necessary service connections and made so as to be readily movable as a unit or units on its or their own running gear and designed to be a relocatable structure or structures used for any occupancy without a permanent foundation. The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the mobile home placed thereon will be moved from time to time at the convenience of the owner.

C_1. Model-Group. Two or more manufacturer-designed mobile homes which constitute one model.

D_1. Person. This means a person, partnership, corporation or other legal entity.

E_1. Seal, Construction. Seal means a device or insignia issued by the Commissioner to be displayed on the mobile home to evidence compliance with the code with respect to construction.

F_1. Seal, Installation. Installation seal means a device or insignia issued by the Commissioner upon application supported by such evidence as the Commissioner deems necessary to establish that the installation seals will be affixed only to those mobile homes where support systems and ground anchoring systems comply with these Rules and the Code.

G_1. Stabilizing Devices. All components of the anchoring and support systems such as piers,footings, ties, anchoring equipment, ground anchors and any other equipment which supports the mobile home and secures it to the ground.

H_1. Stabilizing System. A combination of the anchoring system and the support system when properly installed.

I_1. Support System. A combination of footings,piers, caps, and shims that will, when properly installed, support the mobile home.

J_1. Systems, Construction. An arrangement or method of construction for structural, plumbing, heat-producing, and electrical installations in mobile homes subject to the code.

K_1. Systems, Ground Support and Anchoring.

1. Support system means any device or combination thereof placed beneath a mobile home at the site of occupancy for the purpose of providing support.

2. Anchoring system means any device or combination thereof connected to a mobile home and designed for the purpose of securing the mobile home to the ground.

L_1. Tie. Strap, cable or securing device used to connect the mobile home to ground anchors.

M_1. Vertical Tie. A tie intended to primarily resist the uplifting and overturning forces.

Mon 450 Stabilizing Systems for Mobile Homes.

A. Stabilizing Devices. Stabilizing devices when installed at the site of occupancy shall comply with these rules.

1. Manufacturer's Installation Instructions. Each mobile home shall have its stabilizing system installed in accordance with the mobile home manufacturer's installation instructions. These instructions shall be left with the mobile home following installation.

a. Footings shall be sized to support the loads shown in these instructions.

b. Stabilizing devices not provided with the mobile home shall meet or exceed the design and capacity requirements of the mobile home manufacturer and these Rules and shall be installed in accordance with the mobile home manufacturer's installation instructions.

2. Stabilizing system design. Mobile homes manufactured prior to September 1974 not provided with manufacturer's instructions for stabilizing devices and their installation shall be provided with anchoring and support systems designed by a registered professional engineer or architect or shall comply with the following requirements:

a. Number, Spacing, and Location of Anchoring Ties.

(1) Number of ties. The minimum number of ties per side for various lengths of mobile homes shall be in accordance with Table 450A.2.a(1).

(2) Spacing of Ties. Ties shall be as evenly spaced as practicable along the length of the mobile home with not more than eight feet open-end spacing on each end.

(3) Location of Ties. When continuous straps are provided as vertical ties, such ties shall be positioned at rafters and studs. Where a vertical tie and diagonal tie are located at the same place, both ties may be connected to a single ground anchor, provided that the anchor used is capable of carrying both loadings.

(4) Special Ties. Clerestory roofs and add-on sections of expandable mobile homes shall have provisions for vertical ties at the exposed ends.

b. Protection of Ties and Mobile Home Roofing and Siding. Protection shall be provided at sharp corners where the anchoring system requires the use of external cables or straps. Protection shall also be provided to minimize damage to roofing or siding by the cable or strap.

c. Alternate method using strapping. If the alternate method incorporating baling straps specified in Table 450A.2.a(1) is used, the baling straps shall be wrapped completely around the mobile home passing under the main steel frame, with both ends of each strap fastened together under tension. The straps shall be in accordance with MoH 450C. The method used to connect the ends of the strap shall not reduce the allowable working load and overload.

B. Support systems. Each mobile home shall have a support system as specified herein. A minimum clearance of 12 inches shall be maintained beneath the underside of the main frame (I-beam or channel beam) in the area of utility connections.

1. Mobile Homes with Installation Instructions. Individual footings and load-bearing piers or listed supports shall be sized and located to support the loads specified in the manufacturer's installation instructions to assure that the manufacturer's warranty remains valid.

2. Mobile Homes for Which Installation Instructions Are Not Available. Unless the entire support system is designed by a registered professional engineer or architect, supports shall be spaced not more than 10 feet apart for mobile homes 12 feet wide or less, and not more than 8 feet apart for mobile homes over 12 feet wide, beginning from the front wall of the mobile home, with not more than 2 feet open-end spacing at the area of the main frame. Supports shall be installed directly under the main frame (or chassis) of the mobile home. Methods other than those specified herein shall be approved prior to installation by the authority having jurisdiction. Double wide mobile homes built with a conventional frame shall have additional

supports placed under the center (mating) line at each end wall, and at the support columns located at the sides of center wall openings eight feet in width or greater. The supports shall be constructed to withstand the weight calculated by multiplying one half the width of the opening (in feet) times one half the width of the home (in feet) multiplied by 35 pounds per square foot. (30 pound snow load and 5 pound roof load).

3. Footings. The required load-bearing capacity of individual load-bearing supports and their footings shall be calculated at not less than a combined live and dead load of 65 PSF. Footings shall be adequate in size to withstand the tributary live and dead loads of the mobile home and any concentrated loads.

a. Footings shall be at least 16-inch by 16-inch by 4-inch solid concrete blocks or other product approved for the use intended. As an alternate, two 8-inch by 16-inch by 4-inch solid concrete blocks can be used as footings provided the joint between the blocks is parallel to the steel I-beam frame.

b. Footings or pier foundations, when required, shall be placed level on firm undisturbed soil or on controlled fill which is free of grass and organic materials, compacted to a minimum load-bearing capacity of 2,000 PSF (unless otherwide approved by a registered professional engineer). Where unusual soil conditions exist as determined by the authority having jurisdiction, footings shall be designed specifically for such conditions.

4. Piers. Piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member. Load-bearing supports or devices shall be listed and labeled, shall be designed by a Registered Professional Engineer or Architect, shall be approved for the use intended, or piers shall be constructed as follows:

a. Piers less than 40 inches in height shall be constructed of open or closed cell, 8-inch by 8-inch by 16-inch concrete blocks (with open cells vertically placed

upon the footing). Single-stacked block piers shall be installed with the 16 inch dimension perpendicular to the main (I-beam) frame. The piers shall be covered with a two inch by eight inch by sixteen inch wood or concrete cap. (See Figure A-1).

b. Subject to the limitations of 450B.5., piers between 40 and 80 inches in height and all corner piers over three blocks high shall be double blocked with blocks interlocked and capped with a four inch by sixteen inch by sixteen inch solid concrete block, or equivalent. (See Figure A-2).

c. Subject to the limitations of 450B.5., piers over 80 inches in height shall be constructed as per 450B.4.b., and they shall be laid in concrete mortar and steel reinforcing bars inserted in block cells filled with concrete. (See Figures A-3 and A-4).

5. Elevated Mobile Homes. When more than one-fourth of the area of a mobile home is installed so that the bottom of the main frame members are more than three feet above ground level, the mobile home stabilizing system shall be designed by a qualified Registered Professional Engineer or Architect and the installation shall be approved prior to installation by the authority having jurisdiction.

6. Plates and Shims. A cushion of wood plate not exceeding two inches in thickness and shims not exceeding one inch in thickness may be used to fill any gap between the top of the pier and the main frame. Two inch or four inch solid concrete blocks may be used to fill the remainder of any gap. Shims shall be at least four inches wide and six inches long and shall be fitted and driven tight between the wood plate or pier and main frame.

C. Anchoring Equipment. Anchoring equipment, when installed, shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the mobile home. When the stabilizing system is designed by a qualified Registered Professional Engineer or Architect, alternative working load may be used providing the anchoring equipment is capable of withstanding a 50 percent overload.

1. Resistance to weather deterioration. Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.625 ounces per square foot on each side of the surface coated as determined by ASTM Standard Methods of Test for Weight of Coating on Zinc-coated (galvanized) Iron or Steel Articles (ASTM A90-69 (1973). NOTE: Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

2. Permanency of Connections. Anchoring equipment shall be designed to prevent self-disconnection when ties are slack. Hook ends shall not be used in any part of the anchoring system.

3. Tensioning Device Design. Tensioning devices such as turnbuckles or yoke-type fasteners shall be ended with clevis or forged or welded eyes.

4. Ties. Cable or strapping or other approved methods or materials shall be used for ties. All ties shall be fastened to ground anchors and drawn tight with turnbuckles or other adjustable tensioning devices or devices listed with the ground anchor.

a. Tie materials shall be capable of resisting an allowable working load of 3,150 pounds with no more than 2 percent elongation and shall withstand a 50 percent overload (4,725 pounds total). Ties shall comply with the weathering requirements of MoH 450C.1. NOTE: Type 1, Class B, Grade 1 steel strapping, 1¼ inches wide and 0.035 inch thick, conforming with Federal Specification QQ-S-781G, is capable of meeting the working load and 50 percent overload specified herein.

b. Ties shall connect the ground anchor and the main structural steel frame (I-beam or other shape) which runs lengthwise under the mobile home. Ties shall not connect to steel outrigger beams which fasten to and intersect the main structural frame unless specifically stated in the manufacturer's installation instructions.

c. Connection of the cable frame tie to the mobile home I-beam or equivalent main structural frame member shall be by a 5/8-inch drop forged closed eye bolt through a hole drilled in the center of the I-beam web or other approved methods. The web shall be reinforced if necessary to maintain the I-beam strength.

d. Cable ends shall be secured with at least three U-bolt type cable clamps with the U portion of the clamp installed on the short (dead) end of the cable to assure strength at least equal to that required by Section 450-C.4.a.

D. Ground Anchors. Ground anchors, including means for attaching ties, shall be located to effectively match the anchoring system instructions provided by the mobile home manufacturer, or, if there are no instructions, in accordance with the requirements of Section 450-A herein, and shall be designed and installed to transfer the anchoring loads to the ground.

1. Capacity of Anchors. 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 tie plus a 50 percent overload (4,725 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 4,725 pounds in the direction of the vertical tie when the anchoring equipment is installed in accordance with the 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 herein.

2. Anchor Design and Installation. Each manufactured ground anchor shall be listed and installed in accordance with the terms of its listing and the anchor manufacturer's instructions and shall include means of attachment of ties meeting the requirements of Sec. 450-C.4. Ground anchor manufacturer's installation

instructions shall include the amount of preload required, the methods of adjustment after installation, and the load capacity in various types of soils. These instructions shall include tensioning adjustments which may be needed to prevent damage to the mobile home, particularly damage that can be caused by frost heave.

a. Each ground anchor shall have the manufacturer's identification and listed model identification number marked thereon so that the number is visible after installation. Instructions shall accompany each listed ground anchor specifying the types of soil for which the anchor is suitable under the requirements of MoH 450D.1. NOTE: The following data gives information relative to soil types with blow counts and torque values:

Types of Soils	Blow Count (ASTM D1586)	Test Probe[1] Torque Value[2]
Sound hard rock	NA	NA
Very-dense and/or cemented sands, coarse gravel and cobbles, preloaded silts, clays, and corals	40-up	more than 550 lbs. inch
Medium-dense coarse sands, sandy gravels, very-stiff silts and clays	24-39	350-549 lbs. inch
Loose to medium dense sands, firm to stiff clays and silts, aluvian fill	14-23[3]	200 to 349 lbs. inch

[1]The test probe is a device for measuring the torque value of soils to assist in evaluating the holding capability of the soils in which the anchor is placed. The test probe has a helix on it. The overall length of the helical section is 10.75 inches; the major diameter is 1.25 inches; the minor diameter is 0.81 inches; the pitch is 1.75 inches. The shaft must be of suitable length for anchor depth.

[2]A measure synonymous with moment of a force when distributed around the shaft of the test probe.

[3]Below these values, a professional engineer should be consulted.

3. Use of Concrete Slabs or Continuous Footings. If concrete slabs or continuous footings are used to transfer the anchoring loads to the ground, the following shall be required:

a. Steel rods cast in concrete shall be capable of resisting loads as specified in MoH 450D.1.

b. Deadman concrete anchors may be used in place of listed anchors if they meet the requirements of MoH 450D.1.

c. Concrete slabs may be used in place of ground anchors provided the slab is so constructed that it provides holding strength equal to the requirements of MoH 450D.1.

4. Other anchoring devices. Other anchoring devices meeting the requirements of this section shall be permitted if approved prior to installation by the authority having jurisdiction.

E. Anchor Installation.

1. Specifications for Anchors. Each type anchor suitable for this purpose shall have specification data showing the soil classification(s) for which it qualifies.

2. Selection of Anchors. Anchor selection shall be based on a determination of the soil class at the depth the anchor helical plate will be installed.

3. Depth of Anchors. All anchors shall be installed to the full depth shown in the anchor manufacturer's installation instructions.

Table 450A.2.a(1)

Number of Ties Required Per Side of Single Wide[1] Mobile Homes[2]

This table is based on a minimum working load per anchor of 3,150 pounds with a 50 percent overload (4,725 pounds total).

1	2	3	4	5
			Alternate Method[4]	
Length of[3] Mobile Home (Feet)	No. of Vertical Ties	No. of Diagonal Ties[5]	No. of Baling Straps	No. of Diagonal Ties[6]
up to 40	2	3	2	3
40-46	2	3	2	3
46-49	2	3	2	3
49-54	2	3	2	3
54-58	2	4	2	4
58-64	2	4	2	4
64-70	2	4	2	5
70-73	2	4	2	5
73-84	2	5	2	5

[1] Double-wide mobile homes require only the diagonal ties specified in column 3, and these shall be placed along the outer side walls.

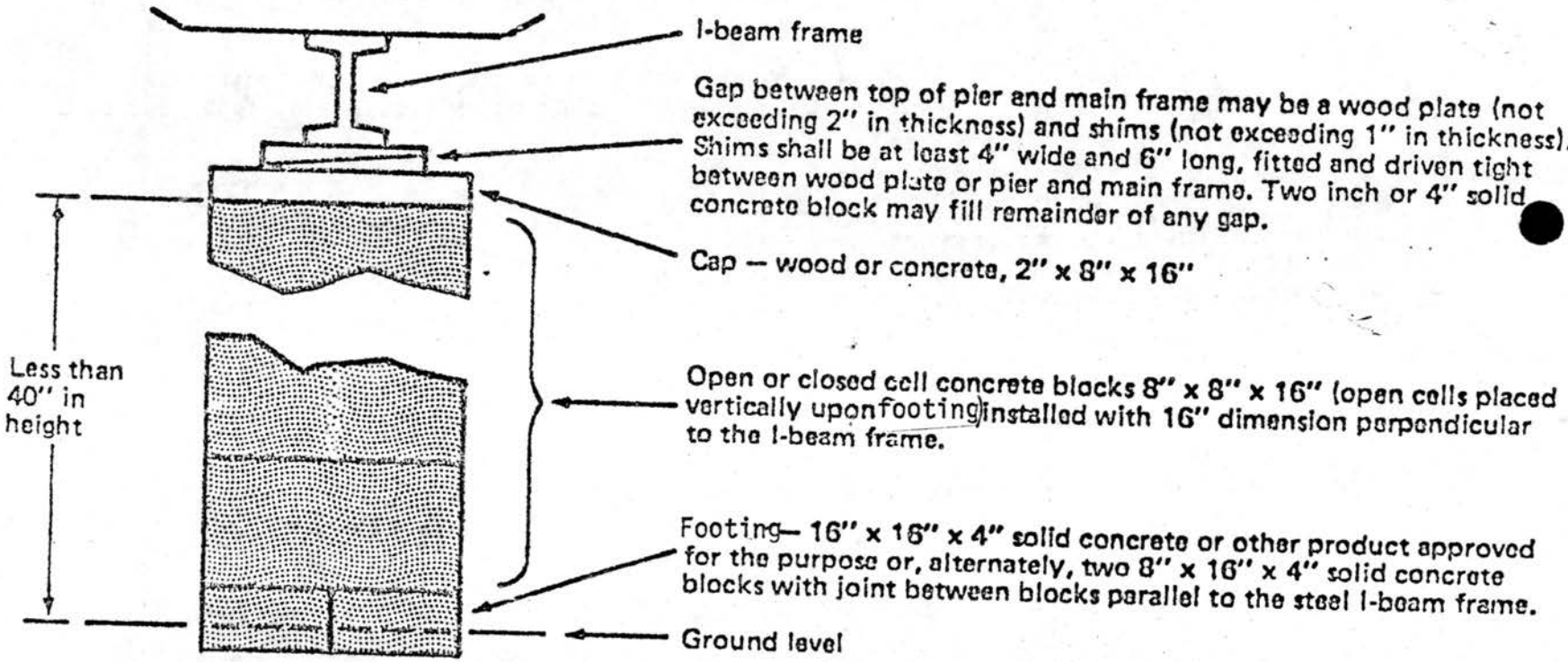
[2] Except when the anchoring system is designed and approved by a registered professional engineer or architect.

[3] Length of mobile home (as used in this Table) means length excluding draw bar.

[4] Alternate Method. When this method is used, an approved reinforcement means shall be provided. If baling is used to accomplish this reinforcement, the provisions of MoH 450A.2.c shall apply.

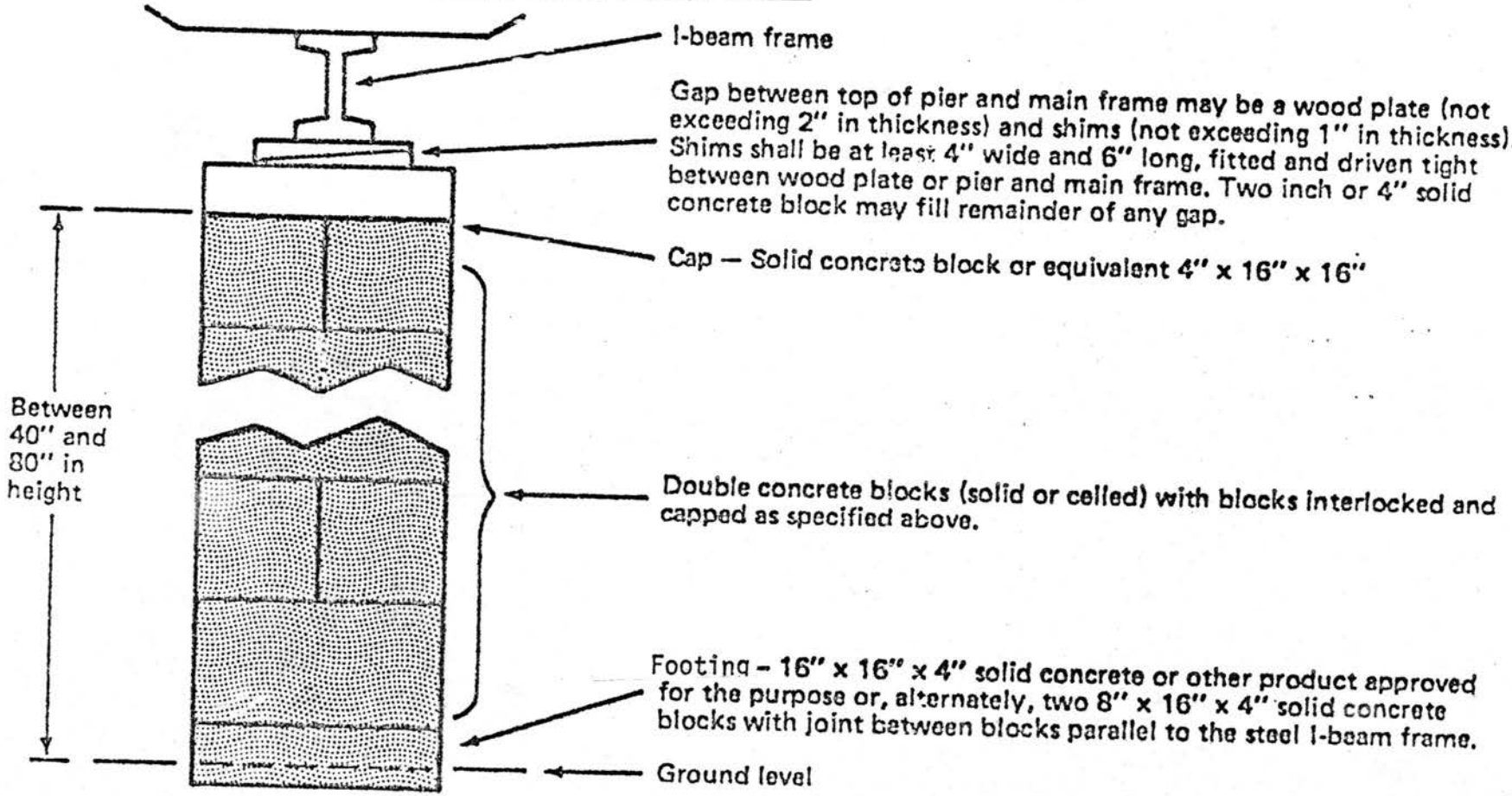
[5] Diagonal ties in this method shall deviate at least 40° from vertical.

[6] Diagonal ties in this method shall be $45^{\circ} \pm 5^{\circ}$ from vertical and shall be attached to the nearest main frame member.



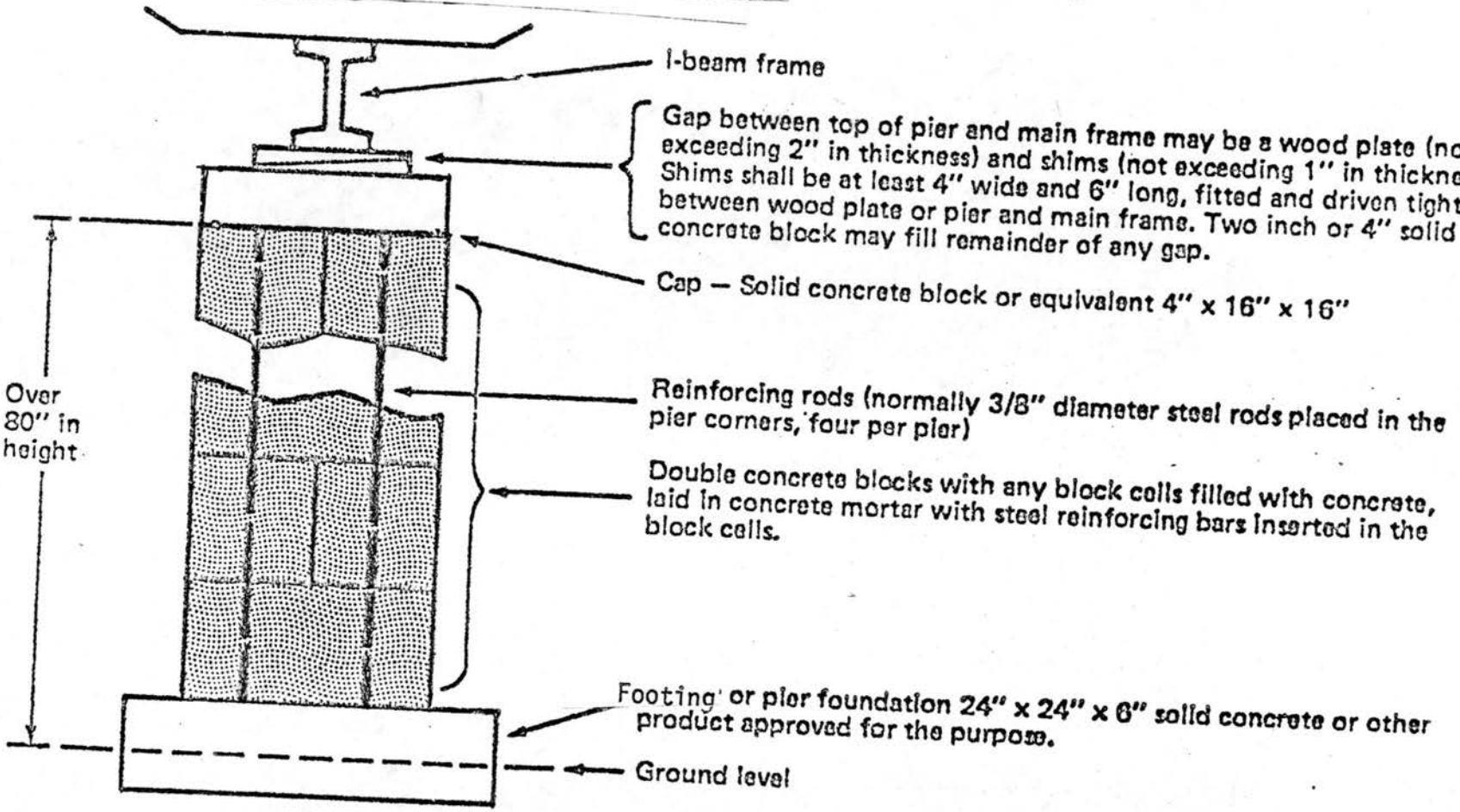
Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-1. For piers less than 40 inches in height (except corner piers over 3 blocks high). Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.



Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-2 For piers 40 inches to 80 inches in height and all corner piers over 3 blocks high. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.



Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-3 For piers exceeding 80 inches in height. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

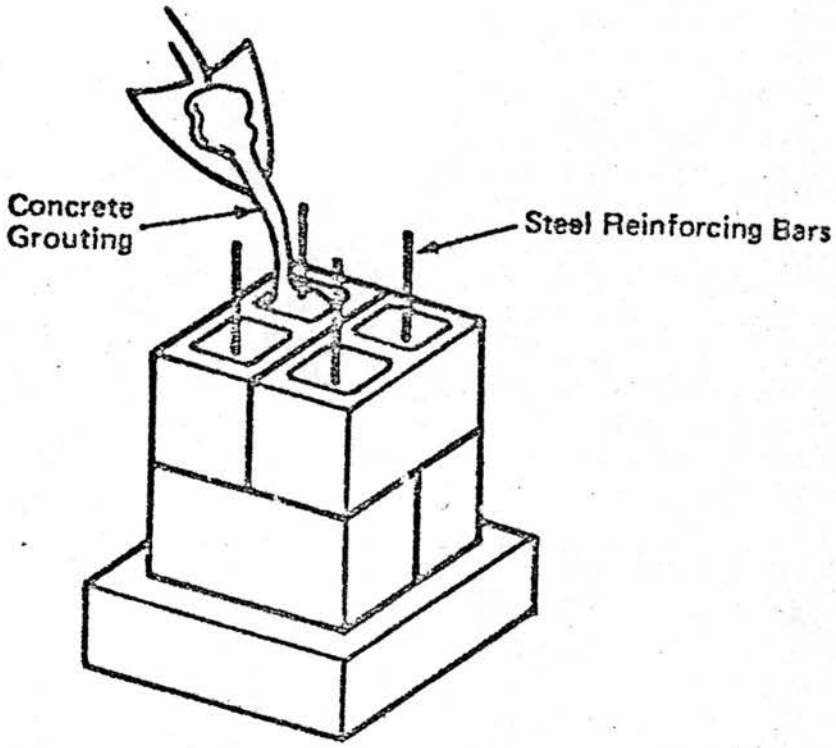


Figure A-4 For piers exceeding 80 inches in height the concrete blocks must be filled with concrete grouting and steel reinforcing rods utilized.

Rules of the Building Code Division

Governing

INSTALLATION OF MOBILE HOME SUPPORT AND TIE-DOWN SYSTEMS

Department of Administration
Building Code Division
408 Metro Square Building
St. Paul, Minnesota 55101

MoH 103 Definitions. In addition to the definition contained herein, the definitions in ANSI A119.1 or NFPA 501B shall apply.

A. Accessory

1. A subordinate structure which, when installed, becomes a part of a mobile home.

2. Components which constitute portions or parts of ground support and anchoring systems.

B. Agency, Independent Inspection. An organization, approved by the Commissioner, qualified to review and approve plans and specifications for mobile homes with respect to model, structural, electrical, mechanical and plumbing requirements and in addition evaluate quality control programs and make inspections.

C. Agency, Listing. An agency approved by the Commissioner which is in the business of listing or labeling and which maintains a periodic inspection program on current production of listed products, and which makes available at least an annual published report of such listing in which specific information is included that the product has been tested to approved standards and found safe for use in a specified manner.

D. Agency, Evaluation. An organization approved by the Commissioner which is qualified by reason of facilities, personnel, experience and demonstrated reliability to investigate and evaluate mobile homes.

E. Agency, Testing. An organization which is:

1. Primarily interested in testing and evaluating equipment and installations;

2. Qualified and equipped for, or to observe experimental testing to approved standards;

3. Not under the jurisdiction or control of any manufacturer or supplier of any industry;

4. Makes available a published report in which specific information is included stating that the equipment and installations listed or labeled have been tested and found safe for use in a specific manner; and

5. Approved by the Commissioner.

F. Alteration, Construction. The replacement, addition, modification or removal of any equipment or installations which may affect the construction, plumbing, heat-producing or electrical system or the functioning thereof of mobile homes subject to the code.

G. Alteration, Installation. The replacement, addition, modification or removal of any components of the ground support or ground anchoring systems required under the provisions of these rules.

H. Anchoring Equipment. Straps, cables, turnbuckles, and chains, including tensioning devices, which are used with ties to secure a mobile home to ground anchors.

I. Anchoring System. A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist overturning and lateral movement of the mobile home from wind forces.

J. Approved. Means acceptable to the authority having jurisdiction.

K. Authority Having Jurisdiction. The Commissioner of Administration or his authorized representative.

L. Authorized Representative. Authorized representative includes any person, firm or corporation, or employee thereof, approved or recognized by the Commissioner to perform inspection services.

M. Baling. Baling is a method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a mobile home with straps.

N. Code. Code means the standards code promulgated by the American National Standards Institute and identified as ANSI A119.1 or the provisions of the National Fire Protection Association and identified as NFPA 501B, including revisions adopted by the Commissioner.

O. Compliance Certificate,Construction. The certificate provided by the manufacturer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with the code.

P. Compliance Certificate, Installation. The certificate provided by the installer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with these rules.

Q. Commissioner. Commissioner means the Commissioner of Administration or his duly authorized representative.

R. Dealer. Dealer means any person, other than a manufacturer who sells three (3) or more mobile homes in any consecutive twelve (12) month period.

S. Diagonal Tie. A tie intended to primarily resist horizontal or shear forces and which may secondarily resist vertical, uplift, and overturning forces.

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

U. Ground Anchor. Any device at the mobile home stand designed to transfer mobile home anchoring loads to the ground.

V. Installer. Mobile Home installer means any person who, within any consecutive twelve (12) month period, installs for others three (3) mobile homes at site of occupancy by making necessary service connections or attaching support systems or ground anchoring systems.

W. Installation Instructions. Those instructions provided by the manufacturer accompanying each mobile home detailing the manufacturer's requirements for ground supports and anchoring systems attachments.

X. Length of Mobile Homes. The distance measured from the extreme front to the extreme rear of a mobile home (excluding hitch, coupling, tongue and other attachments).

Y. Listed. Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

Z. Main Frame. The structural component on which is mounted the body of the mobile home.

A_1. Manufacturer. A person who manufactures mobile homes.

B_1. Mobile Home. Mobile home means a factory-built structure or structures equipped with the necessary service connections and made so as to be readily movable as a unit or units on its or their own running gear and designed to be a relocatable structure or structures used for any occupancy without a permanent foundation. The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the mobile home placed thereon will be moved from time to time at the convenience of the owner.

C_1. Model-Group. Two or more manufacturer-designed mobile homes which constitute one model.

D_1. Person. This means a person, partnership, corporation or other legal entity.

E_1. Seal, Construction. Seal means a device or insignia issued by the Commissioner to be displayed on the mobile home to evidence compliance with the code with respect to construction.

F_1. Seal, Installation. Installation seal means a device or insignia issued by the Commissioner upon application supported by such evidence as the Commissioner deems necessary to establish that the installation seals will be affixed only to those mobile homes where support systems and ground anchoring systems comply with these Rules and the Code.

G_1. Stabilizing Devices. All components of the anchoring and support systems such as piers, footings, ties, anchoring equipment, ground anchors and any other equipment which supports the mobile home and secures it to the ground.

H_1. Stabilizing System. A combination of the anchoring system and the support system when properly installed.

I_1. Support System. A combination of footings, piers, caps, and shims that will, when properly installed, support the mobile home.

J_1. Systems, Construction. An arrangement or method of construction for structural, plumbing, heat-producing, and electrical installations in mobile homes subject to the code.

K_1. Systems, Ground Support and Anchoring.

1. Support system means any device or combination thereof placed beneath a mobile home at the site of occupancy for the purpose of providing support.

2. Anchoring system means any device or combination thereof connected to a mobile home and designed for the purpose of securing the mobile home to the ground.

L_1. Tie. Strap, cable or securing device used to connect the mobile home to ground anchors.

M_1. Vertical Tie. A tie intended to primarily resist the uplifting and overturning forces.

A. Stabilizing Devices. Stabilizing devices when installed at the site of occupancy shall comply with these rules.

1. Manufacturer's Installation Instructions. Each mobile home shall have its stabilizing system installed in accordance with the mobile home manufacturer's installation instructions. These instructions shall be left with the mobile home following installation.

a.. Footings shall be sized to support the loads shown in these instructions.

b. Stabilizing devices not provided with the mobile home shall meet or exceed the design and capacity requirements of the mobile home manufacturer and these Rules and shall be installed in accordance with the mobile home manufacturer's installation instructions.

2. Stabilizing system design. Mobile homes manufactured prior to September 1974 not provided with manufacturer's instructions for stabilizing devices and their installation shall be provided with anchoring and support systems designed by a registered professional engineer or architect or shall comply with the following requirements:

a. Number, Spacing, and Location of Anchoring Ties.

(1) Number of ties. The minimum number of ties per side for various lengths of mobile homes shall be in accordance with Table 450A.2.a(1).

(2) Spacing of Ties. Ties shall be as evenly spaced as practicable along the length of the mobile home with not more than eight feet open-end spacing on each end.

(3) Location of Ties. When continuous straps are provided as vertical ties, such ties shall be positioned at rafters and studs. Where a vertical tie and diagonal tie are located at the same place, both ties may be connected to a single ground anchor, provided that the anchor used is capable of carrying both loadings.

(4) Special Ties. Clerestory roofs and add-on sections of expandable mobile homes shall have provisions for vertical ties at the exposed ends.

b. Protection of Ties and Mobile Home Roofing and Siding. Protection shall be provided at sharp corners where the anchoring system requires the use of external cables or straps. Protection shall also be provided to minimize damage to roofing or siding by the cable or strap.

c. Alternate method using strapping. If the alternate method incorporating baling straps specified in Table 450A.2.a(1) is used, the baling straps shall be wrapped completely around the mobile home passing under the main steel frame, with both ends of each strap fastened together under tension. The straps shall be in accordance with MoH 450C. The method used to connect the ends of the strap shall not reduce the allowable working load and overload.

B. Support systems. Each mobile home shall have a support system as specified herein. A minimum clearance of 12 inches shall be maintained beneath the underside of the main frame (I-beam or channel beam) in the area of utility connections.

1. Mobile Homes with Installation Instructions. Individual footings and load-bearing piers or listed supports shall be sized and located to support the loads specified in the manufacturer's installation instructions to assure that the manufacturer's warranty remains valid.

2. Mobile Homes for Which Installation Instructions Are Not Available. Unless the entire support system is designed by a registered professional engineer or architect, and approved by the authority having jurisdiction prior to installation, supports shall be spaced not more than 10 feet apart for mobile homes 12 feet wide or less, and not more than 8 feet apart for mobile homes over 12 feet wide, beginning from the front wall of the mobile home, with not more than 2 feet open-end spacing at the area of the main frame. Supports shall be installed directly under the main frame (or chassis) of the mobile home. Methods other than those specified herein shall be approved prior to installation by the authority having jurisdiction. Double wide mobile homes built with a conventional frame shall have additional

supports placed under the center (mating) line at each end wall, and at the support columns located at the sides of center wall openings eight feet in width or greater. The supports shall be constructed to withstand the weight calculated by multiplying one half the width of the opening (in feet) times one half the width of the home (in feet) multiplied by 35 pounds per square foot. (30 pound snow load and 5 pound roof load).

3. Footings. The required load-bearing capacity of individual load-bearing supports and their footings shall be calculated at not less than a combined live and dead load of 65 PSF. Footings shall be adequate in size to withstand the tributary live and dead loads of the mobile home and any concentrated loads.

a. Footings shall be at least 16-inch by 16-inch by 4-inch solid concrete blocks or other product approved for the use intended. As an alternate, two 8-inch by 16-inch by 4-inch solid concrete blocks can be used as footings provided the joint between the blocks is parallel to the steel I-beam frame.

b. Footings or pier foundations, when required, shall be placed level on firm undisturbed soil or on controlled fill which is free of grass and organic materials, compacted to a minimum load-bearing capacity of 2,000 PSF (unless otherwide approved by a registered professional engineer). Where unusual soil conditions exist as determined by the authority having jurisdiction, footings shall be designed specifically for such conditions.

4. Piers. Piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member. Load-bearing supports or devices shall be listed and labeled, or shall be designed by a Registered Professional Engineer or Architect, and shall be approved for the use intended, prior to installation, or piers shall be constructed as follows:

a. Piers less than 40 inches in height shall be constructed of open or closed cell, 8-inch by 8-inch by 16-inch concrete blocks (with open cells vertically placed

upon the footing). Single-stacked block piers shall be installed with the 16 inch dimension perpendicular to the main (I-beam) frame. The piers shall be covered with a two inch by eight inch by sixteen inch wood or concrete cap. (See Figure A-1).

b. Subject to the limitations of 450B.5., piers between 40 and 80 inches in height and all corner piers over three blocks high shall be double blocked with blocks interlocked and capped with a four inch by sixteen inch by sixteen inch solid concrete block, or equivalent. (See Figure A-2).

c. Subject to the limitations of 450B.5., piers over 80 inches in height shall be constructed as per 450B.4.b., and they shall be laid in concrete mortar and steel reinforcing bars inserted in block cells filled with concrete. (See Figures A-3 and A-4).

5. Elevated Mobile Homes. When more than one-fourth of the area of a mobile home is installed so that the bottom of the main frame members are more than three feet above ground level, the mobile home stabilizing system shall be designed by a qualified Registered Professional Engineer or Architect and the installation shall be approved prior to installation by the authority having jurisdiction.

6. Plates and Shims. A cushion of wood plate not exceeding two inches in thickness and shims not exceeding one inch in thickness may be used to fill any gap between the top of the pier and the main frame. Two inch or four inch solid concrete blocks may be used to fill the remainder of any gap. Shims shall be at least four inches wide and six inches long and shall be fitted and driven tight between the wood plate or pier and main frame.

C. Anchoring Equipment. Anchoring equipment, when installed, shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the mobile home. When the stabilizing system is designed by a qualified Registered Professional Engineer or Architect, alternative working load may be used providing the anchoring equipment is capable of withstanding a 50 percent overload.

1. Resistance to weather deterioration. Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.625 ounces per square foot on each side of the surface coated as determined by ASTM Standard Methods of Test for Weight of Coating on Zinc-coated (galvanized) Iron or Steel Articles (ASTM A90-69 (1973). NOTE: Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

2. Permanency of Connections. Anchoring equipment shall be designed to prevent self-disconnection when ties are slack. Hook ends shall not be used in any part of the anchoring system.

3. Tensioning Device Design. Tensioning devices such as turnbuckles or yoke-type fasteners shall be ended with clevis or forged or welded eyes.

4. Ties. Cable or strapping or other approved methods or materials shall be used for ties. All ties shall be fastened to ground anchors and drawn tight with turnbuckles or other adjustable tensioning devices or devices listed with the ground anchor.

a. Tie materials shall be capable of resisting an allowable working load of 3,150 pounds with no more than 2 percent elongation and shall withstand a 50 percent overload (4,725 pounds total). Ties shall comply with the weathering requirements of MoH 450C.1. NOTE: Type 1, Class B, Grade 1 steel strapping, 1¼ inches wide and 0.035 inch thick, conforming with Federal Specification QQ-S-781G, is capable of meeting the working load and 50 percent overload specified herein.

b. Ties shall connect the ground anchor and the main structural steel frame (I-beam or other shape) which runs lengthwise under the mobile home. Ties shall not connect to steel outrigger beams which fasten to and intersect the main structural frame unless specifically stated in the manufacturer's installation instructions.

c. Connection of the cable frame tie to the mobile home I-beam or equivalent main structural frame member shall be by a 5/8-inch drop forged closed eye bolt through a hole drilled in the center of the I-beam web or other approved methods. The web shall be reinforced if necessary to maintain the I-beam strength.

d. Cable ends shall be secured with at least three U-bolt type cable clamps with the U portion of the clamp installed on the short (dead) end of the cable to assure strength at least equal to that required by Section 450-C.4.a.

D. Ground Anchors. Ground anchors, including means for attaching ties, shall be located to effectively match the anchoring system instructions provided by the mobile home manufacturer, or, if there are no instructions, in accordance with the requirements of Section 450-A herein, and shall be designed and installed to transfer the anchoring loads to the ground.

1. Capacity of Anchors. 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 tie plus a 50 percent overload (4,725 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 4,725 pounds in the direction of the vertical tie when the anchoring equipment is installed in accordance with the 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 herein.

2. Anchor Design and Installation. Each manufactured ground anchor shall be listed and installed in accordance with the terms of its listing and the anchor manufacturer's instructions and shall include means of attachment of ties meeting the requirements of Sec. 450-C.4. Ground anchor manufacturer's installation

instructions shall include the amount of preload required, the methods of adjustment after installation, and the load capacity in various types of soils. These instructions shall include tensioning adjustments which may be needed to prevent damage to the mobile home, particularly damage that can be caused by frost heave.

a. Each ground anchor shall have the manufacturer's identification and listed model identification number marked thereon so that the number is visible after installation. Instructions shall accompany each listed ground anchor specifying the types of soil for which the anchor is suitable under the requirements of MoH 450D.1. NOTE: The following data gives information relative to soil types with blow counts and torque values:

Types of Soils	Blow Count (ASTM D1586)	Test Probe[1] Torque Value[2]
Sound hard rock	NA	NA
Very-dense and/or cemented sands, coarse gravel and cobbles, preloaded silts, clays, and corals	40-up	more than 550 lbs. inch
Medium-dense coarse sands, sandy gravels, very-stiff silts and clays	24-39	350-549 lbs. inch
Loose to medium dense sands, firm to stiff clays and silts, aluvian fill	14-23[3]	200 to 349 lbs. inch

[1]The test probe is a device for measuring the torque value of soils to assist in evaluating the holding capability of the soils in which the anchor is placed. The test probe has a helix on it. The overall length of the helical section is 10.75 inches; the major diameter is 1.25 inches; the minor diameter is 0.81 inches; the pitch is 1.75 inches. The shaft must be of suitable length for anchor depth.

[2]A measure synonymous with moment of a force when distributed around the shaft of the test probe.

[3]Below these values, a professional engineer should be consulted.

3. Use of Concrete Slabs or Continuous Footings. If concrete slabs or continuous footings are used to transfer the anchoring loads to the ground, the following shall be required:

a. Steel rods cast in concrete shall be capable of resisting loads as specified in MoH 450D.1.

b. Deadman concrete anchors may be used in place of listed anchors if they meet the requirements of MoH 450D.1.

c. Concrete slabs may be used in place of ground anchors provided the slab is so constructed that it provides holding strength equal to the requirements of MoH 450D.1.

4. Other anchoring devices. Other anchoring devices meeting the requirements of this section shall be permitted if approved prior to installation by the authority having jurisdiction.

E. Anchor Installation.

1. Specifications for Anchors. Each type anchor suitable for this purpose shall have specification data showing the soil classification(s) for which it qualifies.

2. Selection of Anchors. Anchor selection shall be based on a determination of the soil class at the depth the anchor helical plate will be installed.

3. Depth of Anchors. All anchors shall be installed to the full depth shown in the anchor manufacturer's installation instructions.

F. Design Loads. The following minumum design live loads shall be applicable in all areas of the State of Minnesota.

1. Horizontal 15 lbs/ft^2
2. Vertical/upward 9 lbs/ft^2
3. Vertical/downward 30 lbs/ft^2

Table 450A.2.a(1)

Number of Ties Required Per Side of Single Wide[1] Mobile Homes[2]

This table is based on a minimum working load per anchor of 3,150 pounds with a 50 percent overload (4,725 pounds total).

1	2	3	4	5
			Alternate Method[4]	
Length of[3] Mobile Home (Feet)	No. of Vertical Ties	No. of Diagonal Ties[5]	No. of Baling Straps	No. of Diagonal Ties[6]
up to 40	2	3	2	3
40-46	2	3	2	3
46-49	2	3	2	3
49-54	2	3	2	3
54-58	2	4	2	4
58-64	2	4	2	4
64-70	2	4	2	5
70-73	2	4	2	5
73-84	2	5	2	5

[1]Double-wide mobile homes require only the diagonal ties specified in column 3, and these shall be placed along the outer side walls.

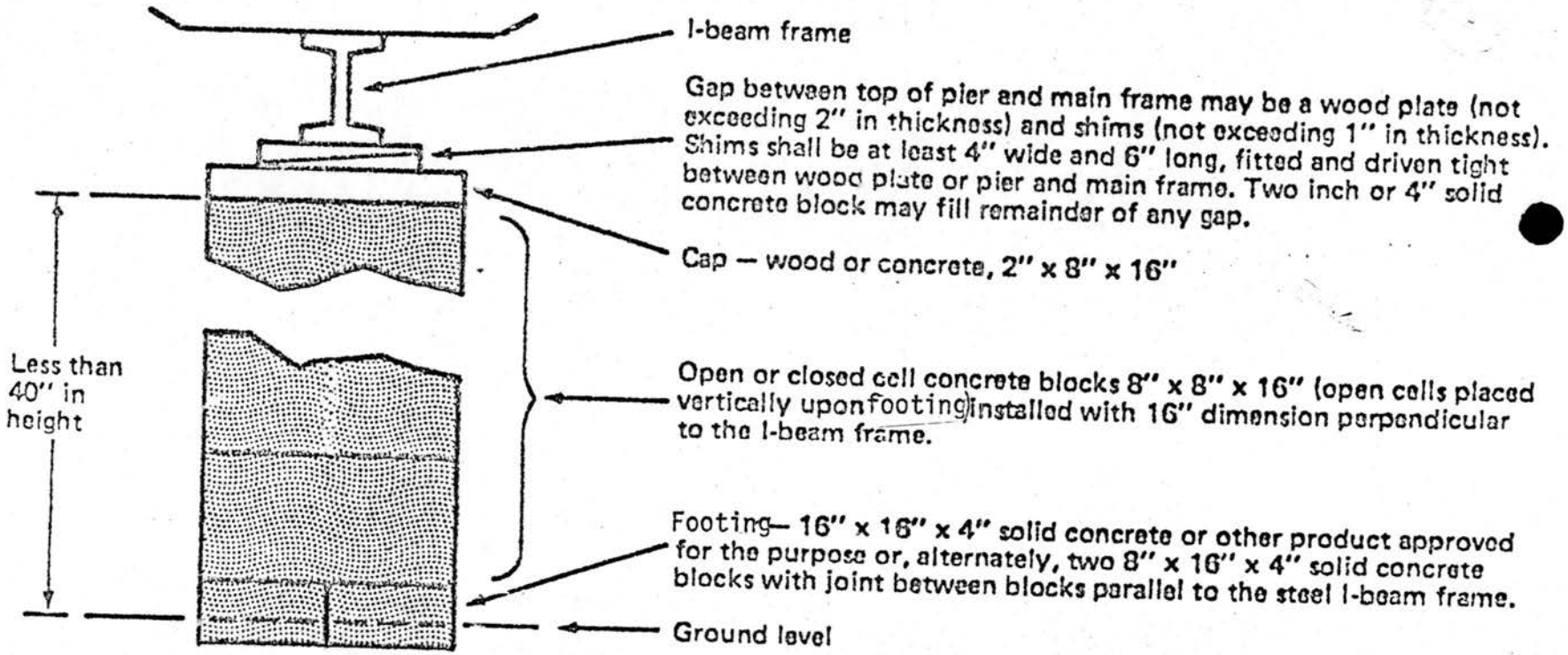
[2]Except when the anchoring system is designed and approved by a registered professional engineer or architect.

[3]Length of mobile home (as used in this Table) means length excluding draw bar.

[4]Alternate Method. When this method is used, an approved reinforcement means shall be provided. If baling is used to accomplish this reinforcement, the provisions of MoH 450A.2.c shall apply.

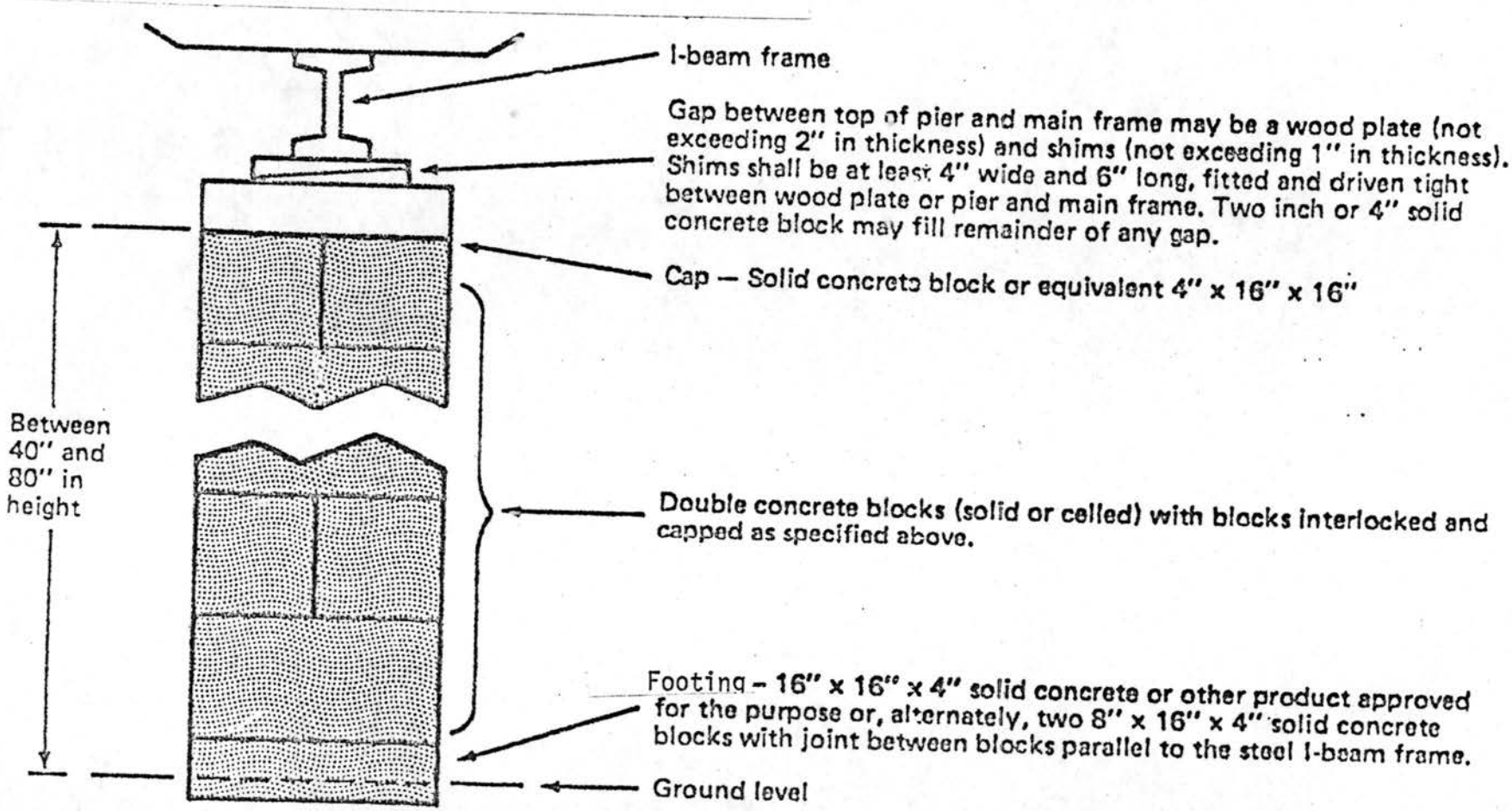
[5]Diagonal ties in this method shall deviate at least 40° from vertical.

[6]Diagonal ties in this method shall be $45^{\circ} \pm 5^{\circ}$ from vertical and shall be attached to the nearest main frame member.



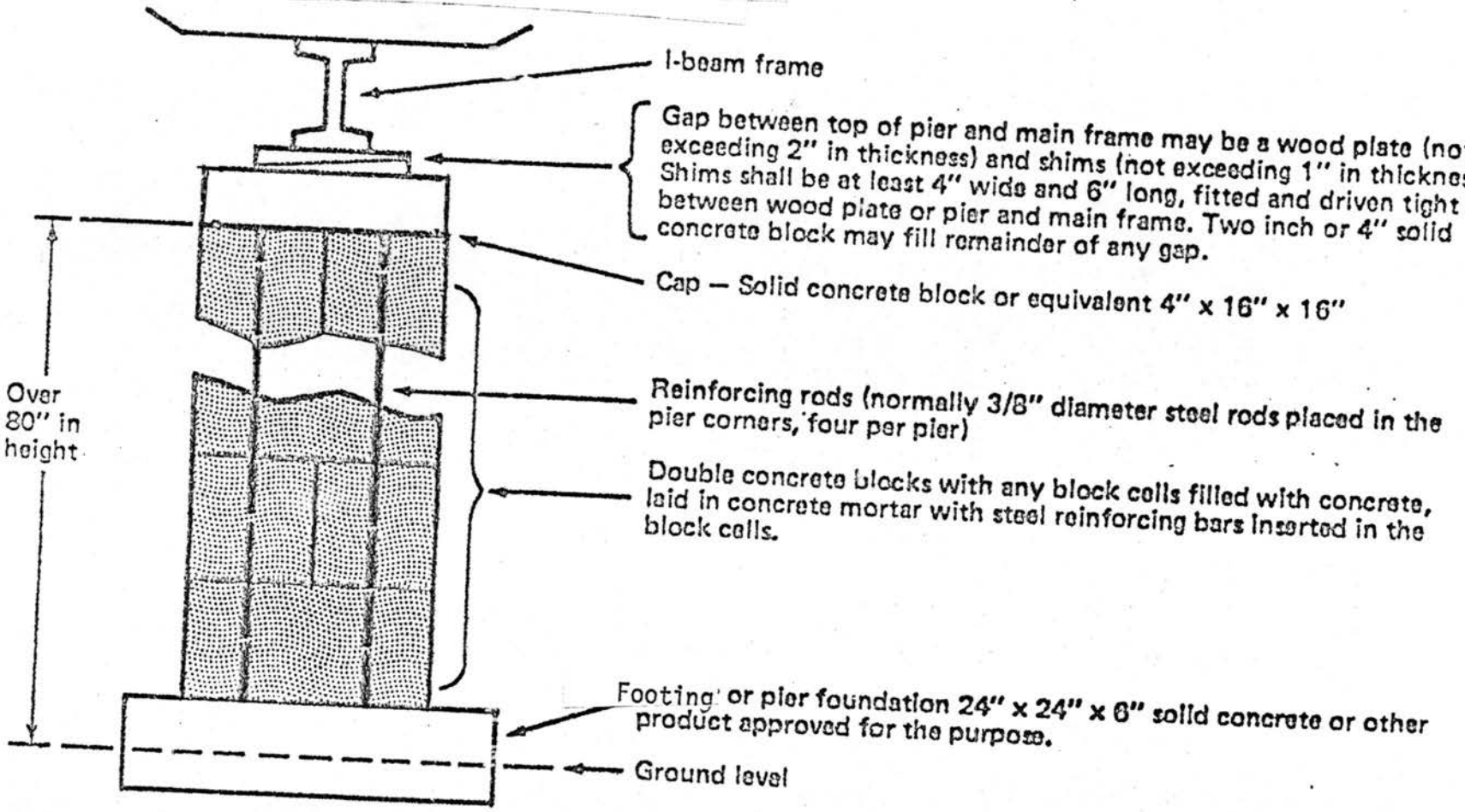
Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-1. For piers less than 40 inches in height (except corner piers over 3 blocks high). Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.



Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-2 For piers 40 inches to 80 inches in height and all corner piers over 3 blocks high. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.



Footing placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-3 For piers exceeding 80 inches in height. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

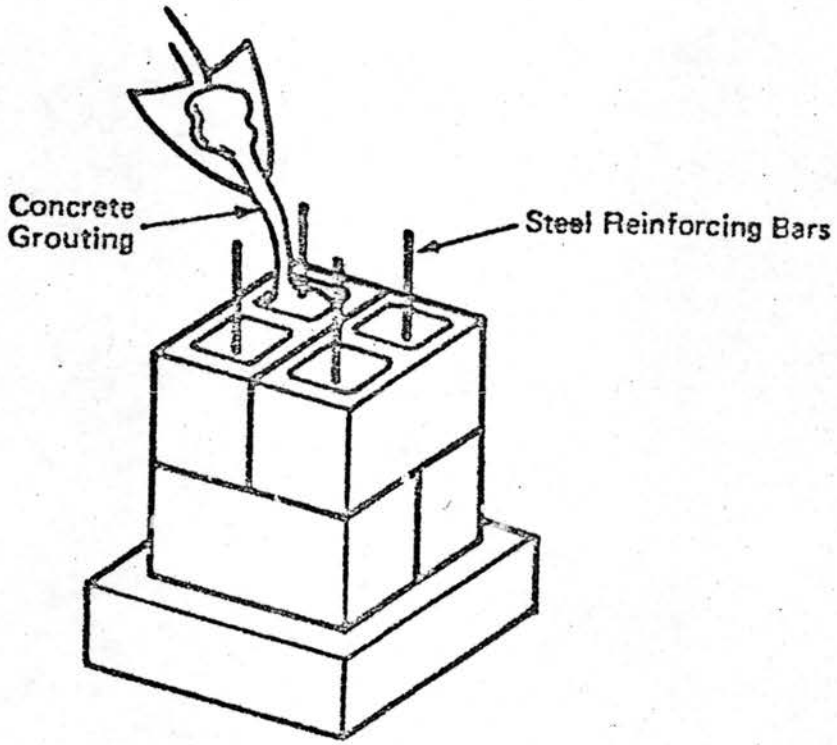


Figure A-4 For piers exceeding 80 inches in height the concrete blocks must be filled with concrete grouting and steel reinforcing rods utilized.

APPROVED AS TO FORM AND LEGALITY

MAY 13 1977 19

WARREN SPANNAUS, ATTORNEY GENERAL

BY /s/ Michael B. Miller

SPECIAL ASSISTANT ATTORNEY GENERAL

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED
MAY 13 1977
11:50 A.M.
Joan Anderson Growe
Secretary of State

RECEIVED
OCT 5 1976
OFFICE OF HEARING
EXAMINERS

IN THE MATTER OF THE PROPOSED ADOPTION
OF RULES OF THE BUILDING CODE DIVISION
GOVERNING INSTALLATION OF MOBILE HOME
SUPPORT AND TIE-DOWN SYSTEMS.

PROPOSED RULES

MoH 103 Definitions. In addition to the definition contained herein, the definitions in ANSI A119.1 or NFPA 501B shall apply.

A. Accessory

1. A subordinate structure which, when installed, becomes a part of a mobile home.

2. Components which constitute portions or parts of ground support and anchoring systems.

B. Agency, Independent Inspection. An organization, approved by the Commissioner, qualified to review and approve plans and specifications for mobile homes with respect to model, structural, electrical, mechanical and plumbing requirements and in addition evaluate quality control programs and make inspections.

C. Agency, Listing. An agency approved by the Commissioner which is in the business of listing or labeling and which maintains a periodic inspection program on current production of listed products, and which makes available at least an annual published report of such listing in which specific information is included that the product has been tested to approved standards and found safe for use in a specified manner.

D. Agency, Evaluation. An organization approved by the Commissioner which is qualified by reason of facilities, personnel, experience and demonstrated reliability to investigate and evaluate mobile homes.

E. Agency, Testing. An organization which is:

1. Primarily interested in testing and evaluating equipment and installations;

2. Qualified and equipped for, or to observe experimental testing to approved standards;

3. Not under the jurisdiction or control of any manufacturer or supplier of any industry;

4. Makes available a published report in which specific information is included stating that the equipment and installations listed or labeled have been tested and found safe for use in a specific manner; and

5. Approved by the Commissioner.

F. Alteration, Construction. The replacement, addition, modification or removal of any equipment or installations which may affect the construction, plumbing, heat-producing or electrical system or the functioning thereof of mobile homes subject to the code.

G. Alteration, Installation. The replacement, addition, modification or removal of any components of the ground support or ground anchoring systems required under the provisions of these rules.

H. Anchoring Equipment. Straps, cables, turnbuckles, and chains, including tensioning devices, which are used with ties to secure a mobile home to ground anchors.

I. Anchoring System. A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist overturning and lateral movement of the mobile home from wind forces.

J. Approved. Means acceptable to the authority having jurisdiction.

K. Authority Having Jurisdiction. The Commissioner of Administration or his authorized representative.

L. Authorized Representative. Authorized representative includes any person, firm or corporation, or employee thereof, approved or recognized by the Commissioner to perform inspection services.

M. Baling. Baling is a method of "wrapping" a cross section (roof, walls, and floor) and the main frame (chassis) of a mobile home with straps.

N. Code. Code means the standards code promulgated by the American National Standards Institute and identified as ANSI A119.1 or the provisions of the National Fire Protection Association and identified as NFPA 501B, including revisions adopted by the Commissioner.

O. Compliance Certificate,Construction. The certificate provided by the manufacturer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with the code.

P. Compliance Certificate, Installation. The certificate provided by the installer or dealer to both the Commissioner and the owner which warrants that the mobile home complies with these rules.

Q. Commissioner. Commissioner means the Commissioner of Administration or his duly authorized representative.

R. Dealer. Dealer means any person, other than a manufacturer who sells three (3) or more mobile homes in any consecutive twelve (12) month period.

S. Diagonal Tie. A tie intended to primarily resist horizontal or shear forces and which may secondarily resist vertical, uplift, and overturning forces.

T. Footer. That portion of the support system that transmits loads directly to the soil.

U. Ground Anchor. Any device at the mobile home stand designed to transfer mobile home anchoring loads to the ground.

V. Installer. Mobile Home installer means any person who, within any consecutive twelve (12) month period, installs for others three (3) mobile homes at site of occupancy by making necessary service connections or attaching support systems or ground anchoring systems.

W. Installation Instructions. Those instructions provided by the manufacturer accompanying each mobile home detailing the manufacturer's requirements for ground supports and anchoring systems attachments.

X. Length of Mobile Homes. The distance measured from the extreme front to the extreme rear of a mobile home (excluding hitch, coupling, tongue and other attachments).

Y. Listed. Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

Z. Main Frame. The structural component on which is mounted the body of the mobile home.

A_1. Manufacturer. A person who manufactures mobile homes.

B_1. Mobile Home. Mobile home means a factory-built structure or structures equipped with the necessary service connections and made so as to be readily movable as a unit or units on its or their own running gear and designed to be a relocatable structure or structures used for any occupancy without a permanent foundation. The phrase "without a permanent foundation" indicates that the support system is constructed with the intent that the mobile home placed thereon will be moved from time to time at the convenience of the owner.

C_1. Model-Group. Two or more manufacturer-designed mobile homes which constitute one model.

D_1. Person. This means a person, partnership, corporation or other legal entity.

E_1. Seal, Construction. Seal means a device or insignia issued by the Commissioner to be displayed on the mobile home to evidence compliance with the code with respect to construction.

F_1. Seal, Installation. Installation seal means a device or insignia issued by the Commissioner upon application supported by such evidence as the Commissioner deems necessary to establish that the installation seals will be affixed only to those mobile homes where support systems and ground anchoring systems comply with these Rules and the Code.

G_1. Stabilizing Devices. All components of the anchoring and support systems such as piers, footers, ties, anchoring equipment, ground anchors and any other equipment which supports the mobile home and secures it to the ground.

H_1. Stabilizing System. A combination of the anchoring system and the support system when properly installed.

I_1. Support System. A combination of footers, piers, caps, and shims that will, when properly installed, support the mobile home.

J_1. Systems, Construction. An arrangement or method of construction for structural, plumbing, heat-producing, and electrical installations in mobile homes subject to the code.

K_1. Systems, Ground Support and Anchoring.

1. Support system means any device or combination thereof placed beneath a mobile home at the site of occupancy for the purpose of providing support.

2. Anchoring system means any device or combination thereof connected to a mobile home and designed for the purpose of securing the mobile home to the ground.

L_1. Tie. Strap, cable or securing device used to connect the mobile home to ground anchors.

M_1. Vertical Tie. A tie intended to primarily resist the uplifting and overturning forces.

A. Stabilizing Devices. Stabilizing devices when installed at the site of occupancy shall comply with these rules.

1. Manufacturer's Installation Instructions. Each mobile home shall have its stabilizing system installed in accordance with the mobile home manufacturer's installation instructions. These instructions shall be left with the mobile home following installation.

a. Footers shall be sized to support the loads shown in these instructions.

b. Stabilizing devices not provided with the mobile home shall meet or exceed the design and capacity requirements of the mobile home manufacturer and this Standard and shall be installed in accordance with the mobile home manufacturer's installation instructions.

2. Stabilizing System Design. Mobile homes not provided with manufacturer's instructions for stabilizing devices and their installation for the zone in which the mobile home is to be installed shall be provided with anchoring and support systems designed by a registered professional engineer or architect or shall comply with the following requirements:

a. Number, Spacing, and Location of Anchoring Ties.

(1) Number of Ties. The minimum number of ties per side for various lengths of mobile homes in hurricane and non-hurricane zones shall be in accordance with Table 450A-2.a(1).

(2) Spacing of Ties. Ties shall be as evenly spaced as practicable along the length of the mobile home with not more than eight feet open-end spacing on each end.

(3) Location of Ties. When continuous straps are provided as vertical ties, such ties shall be positioned at rafters and studs. Where a vertical tie and diagonal tie are located at the same place, both ties may be connected to a single ground anchor, provided that the anchor used is capable of carrying both loadings.

(4) Special Ties. Clerestory roofs and add-on sections of expandable mobile homes shall have provisions for vertical ties at the exposed ends.

b. Protection of Ties and Mobile Home Roofing and Siding. Protection shall be provided at sharp corners where the anchoring system requires the use of external cables or straps. Protection shall also be provided to minimize damage to roofing or siding by the cable or strap.

c. Alternate Method Using Strapping. If the alternate method incorporating baling straps specified in Table A-1 is used, the baling straps shall be wrapped completely around the mobile home passing under the main steel frame, with both ends of each strap fastened together under tension. The straps shall be in accordance with Section 450-C. The method used to connect the ends of the strap shall not reduce the allowable working load and overload.

B. Support Systems. Each mobile home shall have a support system as specified herein. A minimum clearance of 12 inches should be maintained beneath the underside of the main frame (I-beam or channel beam) in the area of utility connections.

1. Mobile Homes with Installation Instructions. Individual footers and load-bearing piers or listed supports shall be sized and located to support the loads specified in the manufacturer's installation instructions to assure that the manufacturer's warranty remains valid.

2. Mobile Homes for Which Installation Instructions Are Not Available. Unless the entire support system is designed by a registered professional engineer or architect, supports shall be spaced not more than 10 feet apart for mobile homes 12 feet wide or less, and not more than 8 feet apart for mobile homes over 12 feet wide, beginning from the front wall of the mobile home, with not more than 2 feet open-end spacing at the area of the main frame. Supports shall be installed directly under the main frame (or chassis) of the mobile home. Methods other than those specified herein may be approved by the authority having jurisdiction. Double wide mobile homes built with a conventional frame shall have additional supports placed under the center

(mating) line at each end wall, and at the support columns located at the sides of center wall openings eight feet in width or greater. The supports shall be constructed to withstand the weight calculated by multiplying one half the width of the opening (in feet) times one half the width of the home (in feet) multiplied by 35 pounds per square foot. (30 pound snow load and 5 pound roof load).

3. Footers. The required load-bearing capacity of individual load-bearing supports and their footers shall be calculated at not less than a combined live and dead load of 55 PSF for the Middle Zone or 65 PSF for the North and Hurricane Zones. Footers shall be adequate in size to withstand the tributary live and dead loads of the mobile home and any concentrated loads.

a. Footers shall be at least 16-inch by 16-inch by 4-inch solid concrete blocks or other product approved for the use intended. As an alternate, two 8-inch by 16-inch by 4-inch solid concrete blocks can be used as footers provided the joint between the blocks is parallel to the steel I-beam frame.

b. Footers or pier foundations, when required, shall be placed level on firm undisturbed soil or on controlled fill which is free of grass and organic materials, compacted to a minimum load-bearing capacity of 2,000 PSF (unless otherwide approved by a registered professional engineer). Where unusual soil conditions exist as determined by the authority having jurisdiction, footings shall be designed specifically for such conditions. NOTE: In areas subject to frost heave, see Paragraph F.1.

4. Piers. Piers or load-bearing supports or devices shall be designed and constructed to evenly distribute the loads. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member. Load-bearing supports or devices shall be listed and labeled, shall be designed by a Registered Professional Engineer or Architect, shall be approved for the use intended, or piers shall be constructed as follows:

a. Piers less than 40 inches in height shall be constructed of open or closed cell, 8-inch by 8-inch by 16-inch concrete blocks (with open cells vertically placed

upon the footer). Single-stacked block piers shall be installed with the 16-inch dimension perpendicular to the main (I-beam) frame. The piers shall be covered with a two inch by eight inch by sixteen inch wood or concrete cap. (See Figure A-2).

b. Subject to the limitations of 450-B.5., piers between 40 and 80 inches in height and all corner piers over three blocks high shall be double blocked with blocks interlocked and capped with a four inch by sixteen inch by sixteen inch solid concrete block, or equivalent. (See Figure A-3).

c. Subject to the limitations of B.5., piers over 80 inches in height shall be constructed as per B.4.b., and they shall be laid in concrete mortar and steel reinforcing bars inserted in block cells with the block cells filled with concrete. (See Figures A-4 and A-5).

5. Plates and Shims. A cushion of wood plate not exceeding two inches in thickness and shoms not exceeding one inch in thickness may be used to fill any gap between the top of the pier and the main frame. Two inch or four inch solid concrete blocks may be used to fill the remainder of any gap. Shims shall be at least four inches wide and six inches long and shall be fitted and driven tight between the wood plate or pier and main frame.

C. Anchoring Equipment. Anchoring equipment, when installed, shall be capable of resisting an allowable working load equal to or exceeding 3,150 pounds and shall be capable of withstanding a 50 percent overload (4,725 pounds total) without failure of either the anchoring equipment or the attachment point on the mobile home. When the stabilizing system is designed by a qualified Registered Professional Engineer or Architect, alternative working laods may be used providing the anchoring equipment is capable of withstanding a 50 percent overload.

1. Resistance to Weather Deterioration. Anchoring equipment exposed to weathering shall have a resistance to weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 ounces per square foot on each side of the surface coated (0.0005 inches thick)* as determined by ASTM Standard Methods of Test for Weight of Coating on Zinc-coated (galvanized) Iron or Steel Articles (ASTM A90-69(1973)). NOTE: Slit or cut edges of zinc-coated steel strapping do not need to be zinc coated.

2. Permanency of Connections. Anchoring equipment shall be designed to prevent self-disconnection when ties are slack. Hook ends shall not be used in any part of the anchoring system.

3. Tensioning Device Design. Tensioning devices such as turnbuckles or yoke-type fasteners shall be ended with clevis or forged or welded eyes.

4. Ties. Cable or strapping or other approved methods or materials shall be used for ties. All ties shall be fastened to ground anchors and drawn tight with turnbuckles or other adjustable tensioning devices or devices listed with the ground anchor.

a. Tie materials shall be capable of resisting an allowable working load of 3,150 pounds with no more than 2 percent elongation and shall withstand a 50 percent overload (4,725 pounds total). Ties shall comply with the weathering requirements of Paragraph C.1. NOTE: Type 1, Class B, Grade 1 steel strapping, 1¼ inches wide and 0.035 inch thick, conforming with Federal Specification QQ-S-781G, is capable of meeting the working load and 50 percent overload specified herein.

b. Ties shall connect the ground anchor and the main structural steel frame (I-beam or other shape) which runs lengthwise under the mobile home. Ties shall not connect to steel outrigger beams which fasten to and intersect the main structural frame unless specifically stated in the manufacturer's installation instructions.

* This coating shall be 0.625 ounces per square foot on each side of surface coated, effective January 1, 1977.

c. Connection of the cable frame tie to the mobile home I-beam or equivalent main structural frame member shall be by a 5/8-inch drop forged closed eye bolt through a hole drilled in the center of the I-beam web or other approved methods. The web shall be reinforced if necessary to maintain the I-beam strength.

d. Cable ends shall be secured with at least three U-bolt type cable clamps with the U portion of the clamp installed on the short (dead) end of the cable to assure strength at least equal to that required by Section 450-C.4.a.

D. Ground Anchors. Ground anchors, including means for attaching ties, shall be located to effectively match the anchoring system instructions provided by the mobile home manufacturer, or, if there are no instructions, in accordance with the requirements of Section 450-A herein, and shall be designed and installed to transfer the anchoring loads to the ground.

1. Capacity of Anchors. 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 tie plus a 50 percent overload (4,725 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 4,725 pounds in the direction of the vertical tie when the anchoring equipment is installed in accordance with the 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 herein.

2. Anchor Design and Installation. Each manufactured ground anchor shall be listed and installed in accordance with the terms of its listing and the anchor manufacturer's instructions and shall include means of attachment of ties meeting the requirements of Sec. 450-C.4. Ground anchor manufacturer's installation

instructions shall include the amount of preload required, the methods of adjustment after installation, and the load capacity in various types of soils. These instructions shall include tensioning adjustments which may be needed to prevent damage to the mobile home, particularly damage that can be caused by frost heave.

a. Each ground anchor shall have the manufacturer's identification and listed model identification number marked thereon so that the number is visible after installation. Instructions shall accompany each listed ground anchor specifying the types of soil for which the anchor is suitable under the requirements of Paragraph D.1. NOTE: The following data gives information relative to soil types with blow counts and torque values:

Types of Soils	Blow Count (ASTM D1586)	Test Probe[1] Torque Value[2]
Sound hard rock	NA	NA
Very-dense and/or cemented sands, coarse gravel and cobbles, preloaded silts, clays, and corals	40-up	more than 550 lbs. inch
Medium-dense coarse sands, sandy gravels, very-stiff silts and clays	24-39	350-549 lbs. inch
Loose to medium dense sands, firm to stiff clays and silts, aluvian fill	14-23[3]	200 to 349 lbs. inch

[1]The test probe is a device for measuring the torque value of soils to assist in evaluating the holding capability of the soils in which the anchor is placed. The test probe has a helix on it. The overall length of the helical section is 10.75 inches; the major diameter is 1.25 inches; the minor diameter is 0.81 inches; the pitch is 1.75 inches. The shaft must be of suitable length for anchor depth.

[2]A measure synonymous with moment of a force when distributed around the shaft of the test probe.

[3]Below these values, a professional engineer should be consulted.

3. Use of Concrete Slabs or Continuous Footers. If concrete slabs or continuous footers are used to transfer the anchoring loads to the ground, the following shall be required:

a. Steel rods cast in concrete shall be capable of resisting loads as specified in Paragraph D.1.

b. Deadman concrete anchors may be used in place of listed anchors if they meet the requirements of Section 450-D.1.

c. Concrete slabs may be used in place of ground anchors provided the slab is so constructed that it provides holding strength equal to the requirements of Paragraph D.1.

4. Other Anchoring Devices. Other anchoring devices meeting the requirements of this section shall be permitted if acceptable to the authority having jurisdiction.

E. Anchor Installation.

1. Specifications for Anchors. Each type anchor suitable for this purpose shall have specification data showing the soil classification(s) for which it qualifies.

2. Selection of Anchors. Anchor selection shall be based on a determination of the soil class at the depth the anchor helical plate will be installed.

3. Depth of Anchors. All anchors shall be installed to the full depth shown in the anchor manufacturer's installation instructions.

F. Maintaining Anchoring Systems. Tie tension should be checked and adjusted when necessary to prevent damage to the mobile home from settling or other unforeseen movements (such as frost heave).

1. Frost Heave. Frost heave can have an adverse effect on the mobile home through displacement of the mobile home anchoring and blocking systems. If a mobile home is located in an area subjected to frost heave, one of the following additional steps should be considered:

a. Footers and the load-carrying portion of the ground anchors should extend below the frost line, or

b. The mobile home should be placed on a reinforced concrete pad as specified in Section 450-D.3.c.

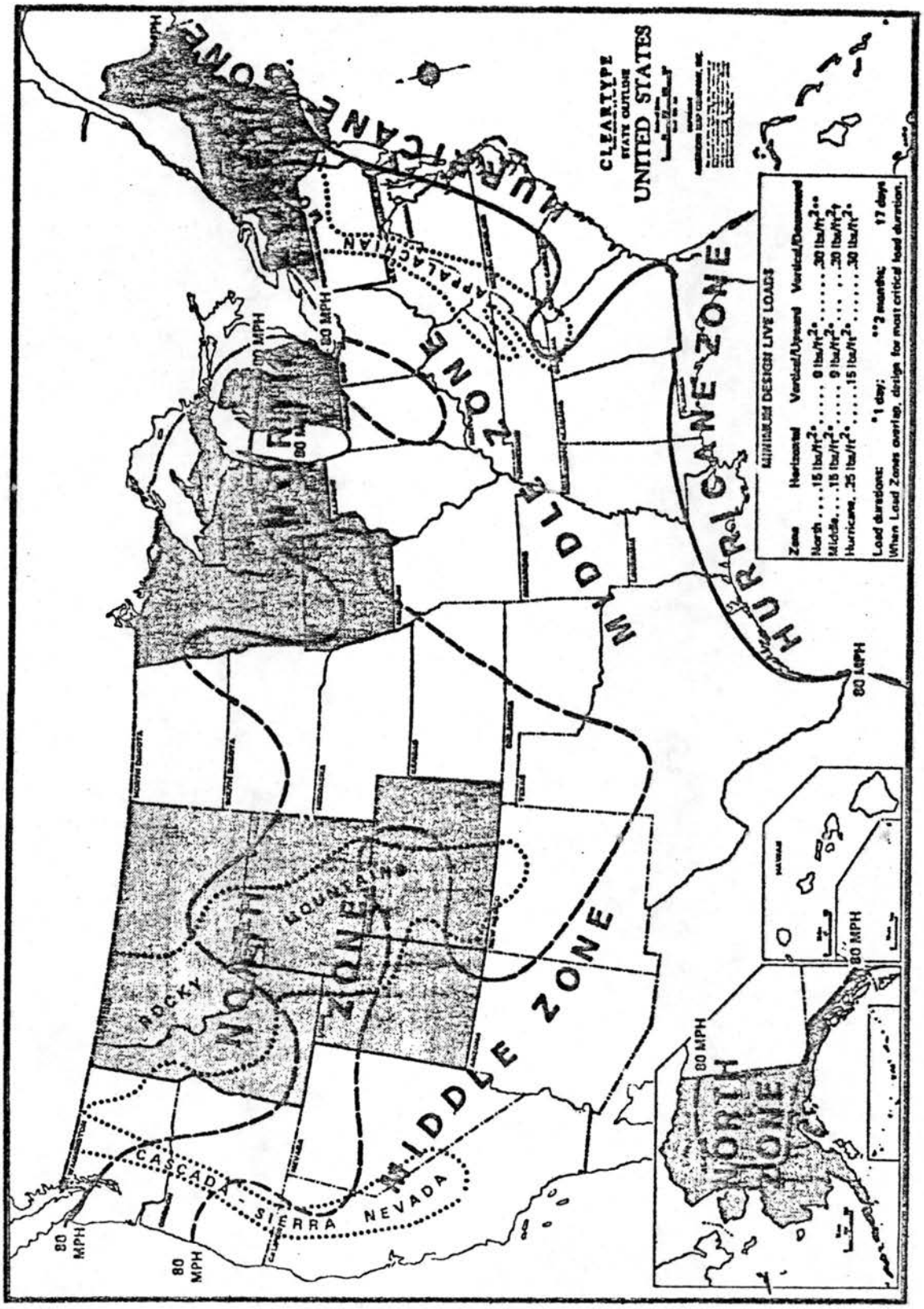


Figure A-1. Load Zone Map of U.S.A., see caption on opposite page.

Figure A-1

Load Zone Map of the United States

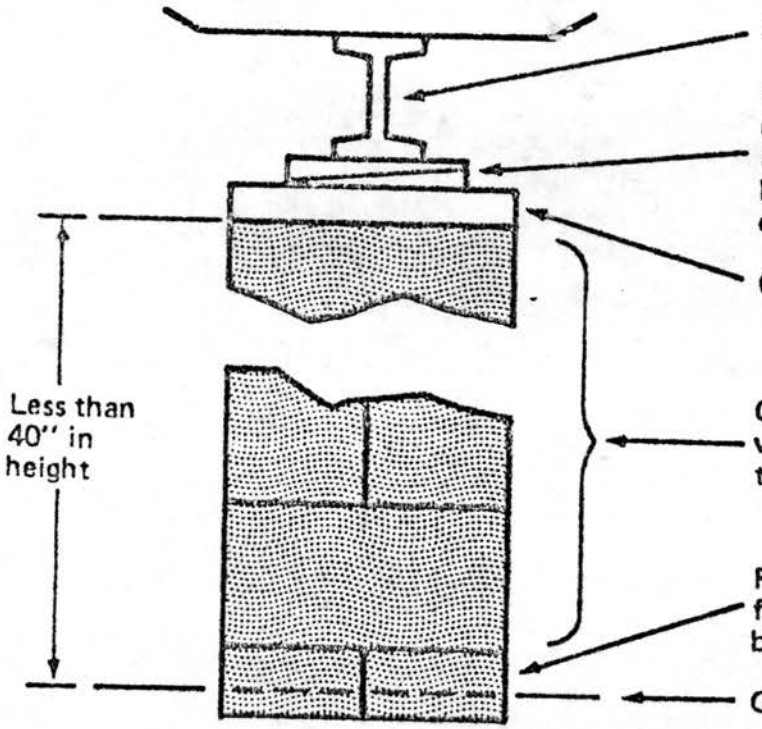
1. This map is a generalization of the load zones in the continental United States that may be useful in applying the principles set forth in Section 450A.2.a(1) and 450B.3.

2. Shown along the Gulf and Atlantic coastline is the Hurricane Zone where mobile homes "Designed for Hurricane Zones" should be used in compliance with Paragraph 6.3.2 of NFPA No. 501B. It is not feasible to show all the other areas subject to high winds in the United States, but the dash lines outline areas where recurrent winds up to 80 miles per hour have been experienced according to information now available.

3. The North Zone follows state lines in the Northern tier of states so that those states can adopt a uniform policy within their borders, mostly to safeguard against snow loads, although in many cases border states may have areas in both the Middle and North Zones. Also shown are the rough outlines of the three major mountain ranges in the United States which can affect load criteria.

4. As implied, determination of required loads for any given mobile home installation can only really be made by the local authority having jurisdiction and requires engineering judgement. Mobile home owners must be made aware of these factors for their own protection.

NOTE: In areas subject to frost heave, see Section 450 F.1



Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-2 For piers less than 40 inches in height (except corner piers over 3 blocks high). Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

Table 450A.2.a(1)

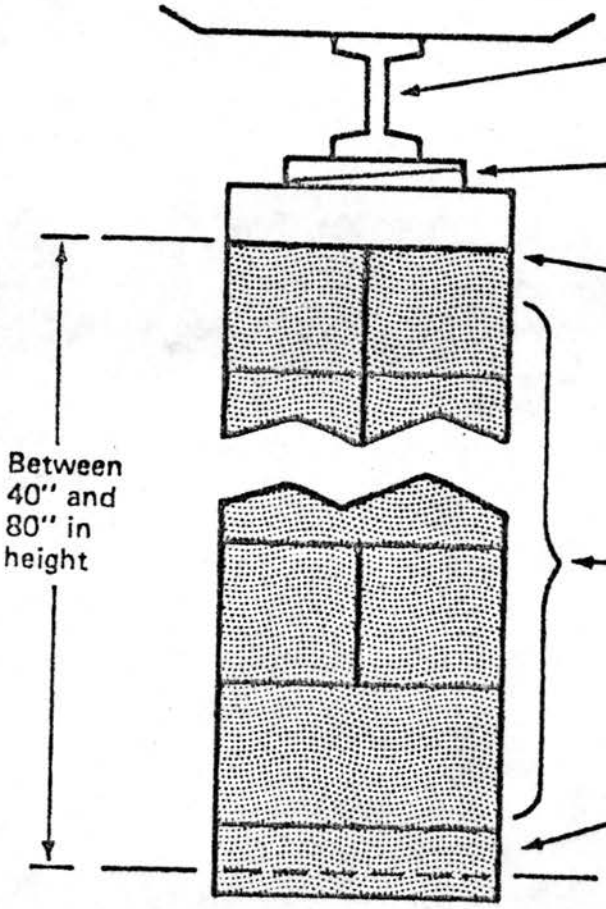
Number of Ties Required Per Side of Single Wide[1] Mobile Homes[2]

This table is based on a minimum working laod per anchor of 3,150 pounds with a 50 percent overload (4,725 pounds total).

Column 1	2 Nonhurricane Resistive	3	4	
Length of Mobile Home (Feet)[3]	No. of Vertical Ties	No. of Diagonal Ties[5]	Alternate Method[4]	
			No. of Baling Straps	No. of Diagonal Ties[6]
up to 40	2	3	2	3
40 - 46	2	3	2	3
46 - 49	2	3	2	3
49 - 54	2	3	2	3
54 - 58	2	4	2	4
58 - 64	2	4	2	4
64 - 70	2	4	2	5
70 - 73	2	4	2	5
73 - 84	2	5	2	5

[1]Double-wide mobile homes require only the diagonal ties specified in column 2, and these shall be placed along the outer side walls.
[2]Except when the anchoring system is designed and approved by a registered professional engineer or architect.
[3]Length of mobile home (as used in this Table) means length excluding draw bar.
[4]Alternate Method. When this method is used, an approved reinforcement means shall be provided. If baling is used to accomplish this reinforcement, the provisions of Section 450A.2.a(1) shall apply.
[5]Diagonal ties in this method shall deviate at least 40° from a vertical direction.
[6]Diagonal ties in this method shall be $45^{o} \pm 5^{o}$ from vertical and shall be attached to the nearest main frame member.

NOTE: In areas subject to frost heave, see Section 450 F.1



I-beam frame

Gap between top of pier and main frame may be a wood plate (not exceeding 2" in thickness) and shims (not exceeding 1" in thickness). Shims shall be at least 4" wide and 6" long, fitted and driven tight between wood plate or pier and main frame. Two inch or 4" solid concrete block may fill remainder of any gap.

Cap — Solid concrete block or equivalent 4" x 16" x 16"

Double concrete blocks (solid or celled) with blocks interlocked and capped as specified above.

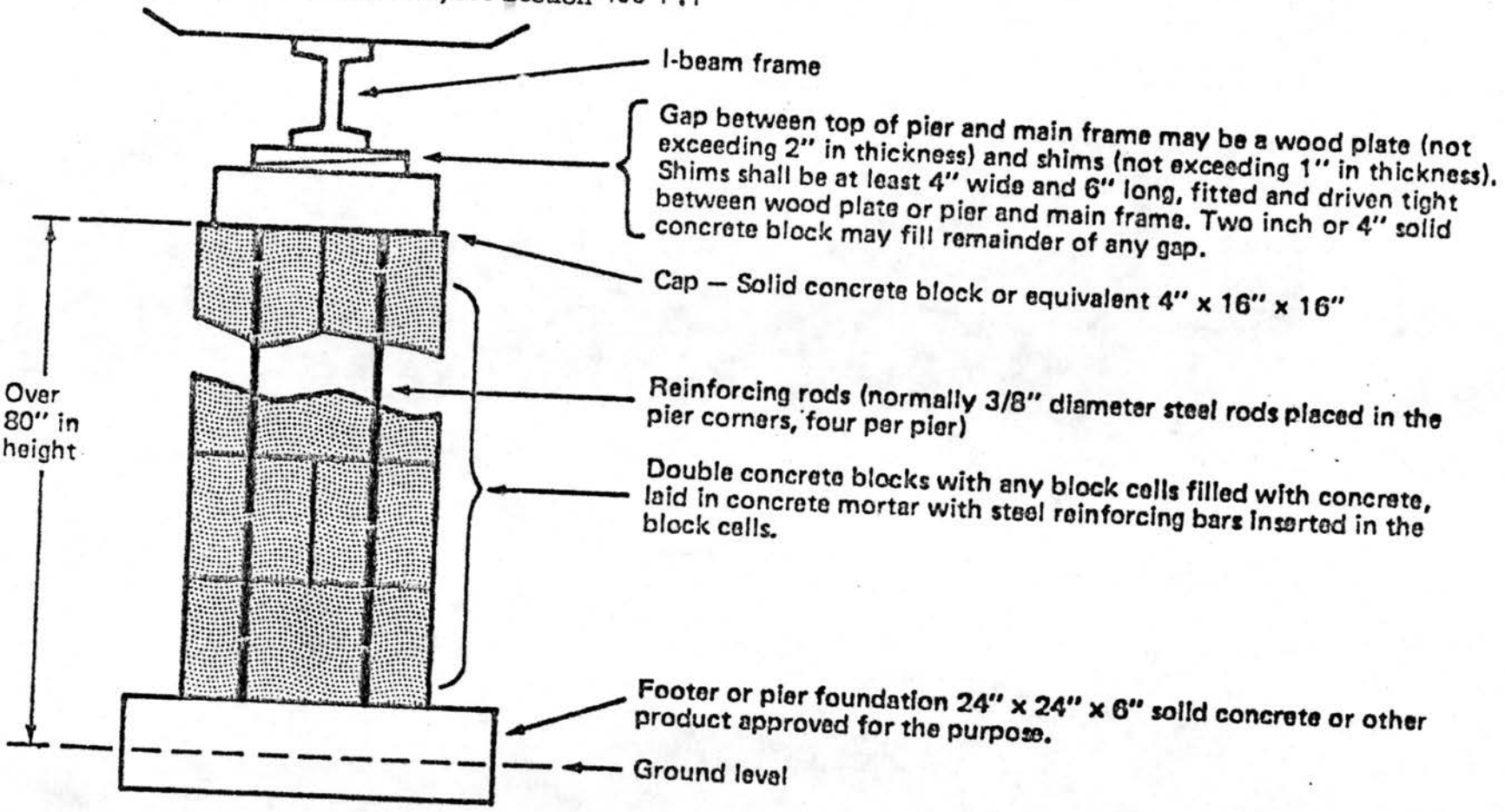
Footer — 16" x 16" x 4" solid concrete or other product approved for the purpose or, alternately, two 8" x 16" x 4" solid concrete blocks with joint between blocks parallel to the steel I-beam frame.

Ground level

Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-3 For piers 40 inches to 80 inches in height and all corner piers over 3 blocks high. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

NOTE: In areas subject to frost heave, see Section 450 F.1



Footer placed on firm undisturbed soil or on controlled fill free of grass and organic materials compacted to a minimum load-bearing capacity of 2000 PSF.

Figure A-4 **For piers exceeding 80 inches in height. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.**

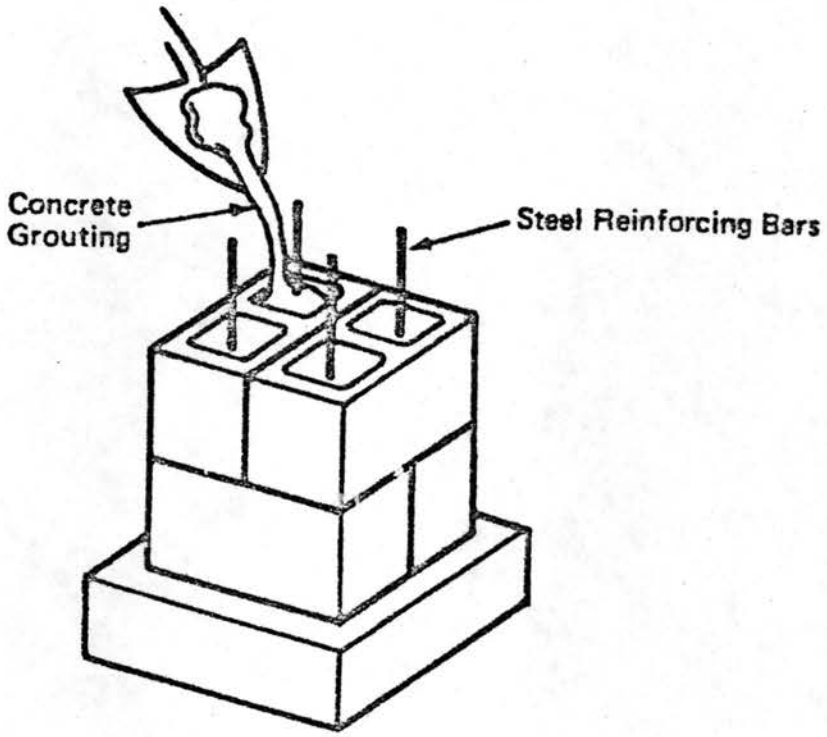


Figure A-5 For piers exceeding 80 inches in height the concrete blocks must be filled with concrete grouting and steel reinforcing rods utilized.

Figure A-2. For piers less than 40 inches in height (except corner piers over 3 blocks high). Piers shall be securly attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

Figure A-3. For piers 40 inches to 80 inches in height and all corner piers over 3 blocks high. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

Figure A-4. For piers exceeding 80 inches in height. Piers shall be securely attached to the frame of the mobile home or shall extend at least 6 inches from the centerline of the frame member.

Figure A-5. For piers exceeding 80 inches in height the concrete blocks must be filled with concrete grouting and steel reinforcing rods utilized.