Manufactured Homes

INSPECTION CERTIFICATION ASSOCIATES

Characteristics of Manufactured

Manufactured in specialized, controlled facilities

Built to HUD guidelines

Assembled onsite

Are expensive to relocate


OVERSIZE LOAD

Manufactured vs Modular

Manufactured vs Modular

- Modular are governed by IRC and AHJ
- Modular are not bound by DOT constraints on total final size

Modular Homes

Although factory built and transported to site to be put together they must still:

- Be built to code requirements of the AHJ
- Sections meet maximum DOT dimensions for transport
- Use lightweight construction for transport
- Have a foundation specific for the home

What are Manufactured Homes?

Manufactured homes generally come in single or two-section units and their dimensions range from 8 feet or more wide and 40 feet or more long. Manufactured homes can be placed on a basement and include multi-wides and expandable manufactured homes. Excluded are travel trailers, motor homes, and modular housing.

Building Guidelines

- The federal standards regulate manufactured housing design and construction, strength and durability, transportability, fire resistance, energy efficiency and quality. The HUD Code also sets performance standards for the heating, plumbing, air conditioning, thermal and electrical systems. HUD is the only federally-regulated national building code. Each home or segment of a home is labeled with a red tag that is the manufacturer's guarantee the home was built to conform to the HUD code. On-site additions, such as garages, decks and porches, often add to the attractiveness of manufactured homes and must be built to local, state or regional building codes.

What is a Mobile Home?

Homes built AFTER 1976 should, technically, no longer be referred to as *Mobile Homes* but instead are *Manufactured Homes* and are built to a higher standard of quality than yesterday's "*Mobile Homes*".

The term *Mobile Home* is often used interchangeably with the term *Manufactured Home* but in fact they mean quite different things. "Mobile Home" refers to homes built PRIOR to 1976 when the HUD code governing building standards for factory-built homes was instituted, greatly improving quality standards.

Fire and Structural

For safety for the occupants, these structures were incredibly prone to injuries and deaths from fire and high wind events such as tornados and hurricanes. These two factors are the main driving force to the standards implemented.

Necessity for Inspections

Special Considerations

- Lower quality materials in manufacturing
- Inadequate maintenance
- Inadequate site
- Inadequate site preparation
- Poor installation

Who needs the inspection?

- The homeowner
- The lender (FHA, VA, USDA)
- Insurance Under Writers

Typical Defects Found

- Failing roofs
- Deteriorated or failing siding
- Inadequate or missing skirt
- Improper electrical modifications
- Safety issues with stairs and railings
- Safety issues with interiors

Manufactured Homes

Similarities to Ordinary Construction

Due to being manufactured offsite and having to be transported

- Designed to be lighter weight
- Limitation on certain materials

Why are manufactured AKA mobile homes constructed differently?

There are several reasons that this type of construction is always going to be different. They all revolve around the fact that they are mobile. Because they are designed to be mobile, they must meet other criteria such as:

- Lightweight
- Strength to take the stresses of being transported
- Being able to be relocated

HUD's Focus

The main focus for HUD has always been about safety, not just in manufactured homes, but in all things dealing with HUD. The majority of the HUD standards that have been integrated are NFPA guidelines, as NFPA has the highest guidelines for safety.

Labeling

All manufactured homes should have the following labeling:

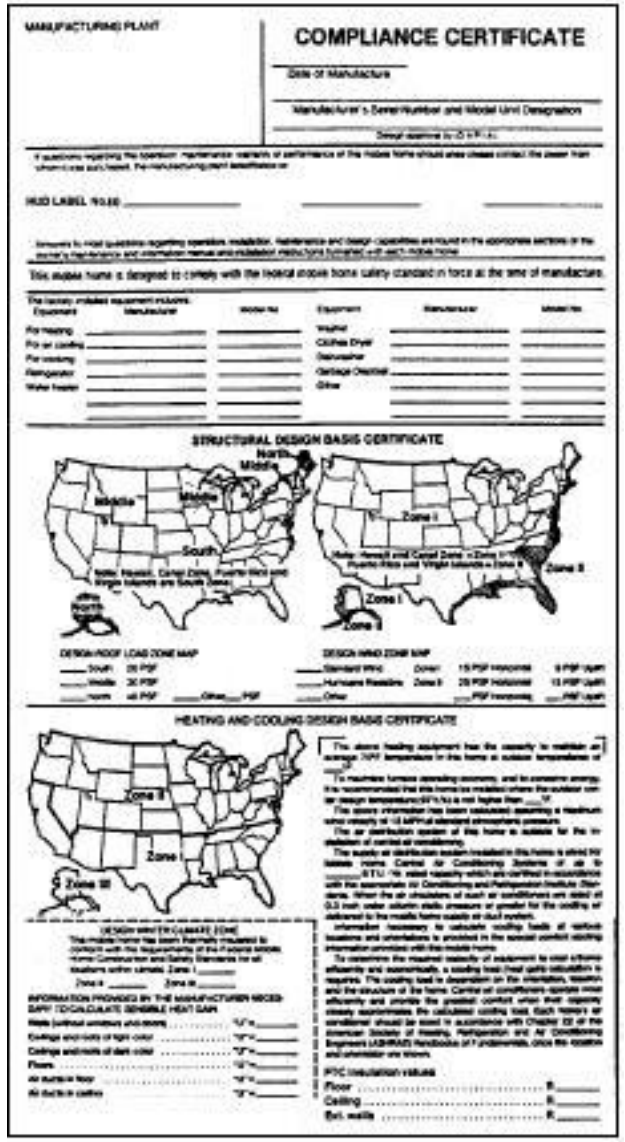
- Hud Label aka Certification Label
- Data Plate

The Certification Label

- The Certification Label (also know as a HUD tag) is a metal plate that is affixed to the outside of the manufactured home. Section 3280.11(b) states, "The label shall be approximately 2 in. by 4 in. in size and shall be permanently attached to the manufactured home by means of 4 blind rivets, drive screws, or other means that render it difficult to remove without defacing it. It shall be etched on 0.32 in. thick aluminum plate. The label number shall be etched or stamped with a 3 letter designation which identifies the production inspection primary inspection agency and which the Secretary shall assign. Each label shall be marked with a 6 digit number which the label supplier shall furnish. The labels shall be stamped with numbers sequentially."

The Data Plate

The Data Plate is a paper label affixed inside the home and is the size of a standard sheet of paper (8 ½" x 11"). The Data Plate can be found in a kitchen cabinet, an electrical panel, or a bedroom closet. The Data Plate has maps of the United States to inform the owner of the Wind Zone, Snow Load, and Roof Load of the home.



MANUFACTURING PLANT

COMPLIANCE CERTIFICATE

Date of Manufacture

Manufacturer's Serial Number and Model Unit Designation

HUD LABEL NO.(S)

This mobile home is designed to comply with the Federal mobile home safety standard in force at the time of manufacture.

STRUCTURAL DESIGN BASIS CERTIFICATE

DESIGN ROOF LOAD ZONE MAP

DESIGN WIND ZONE MAP

HEATING AND COOLING DESIGN BASIS CERTIFICATE

DESIGN WINTER CLIMATE ZONE

INFORMATION PROVIDED BY THE MANUFACTURER NEEDED BY TECHNICIAN TO CALCULATE SENSIBLE HEAT GAIN

The Data Plate

The Data Plate has maps of the United States to inform the owner of the Wind Zone, Snow Load, and Roof Load of the home; the Data Plate will contain the following information:

- The name and address of the manufacturing plant in which the manufactured home was manufactured
- The serial number and model designation of the unit, and the date the unit was manufactured

The Data Plate

- The statement: This manufactured home is designed to comply with the Federal Manufactured Home Construction and Safety Standards in force at the time of manufacture
- A list of the certification label(s) number(s) that are affixed to each transportable manufactured section under §3280.8
- A list of major factory-installed equipment, including the manufacturer's name and the model designation of each appliance

The Data Plate

This information may be combined with the heating/cooling certificate and insulation zone map required by §§3280.510 and 3280.511. The Wind Zone Map on the Data Plate shall also contain the statement:

- *This home has not been designed for the higher wind pressures and anchoring provisions required for ocean/coastal areas and should not be located within 1500' of the coastline in Wind Zones II and III, unless the home and its anchoring and foundation system have been designed for the increased requirements specified for Exposure D in ANSI/ASCE 7–88.*

The Data Plate

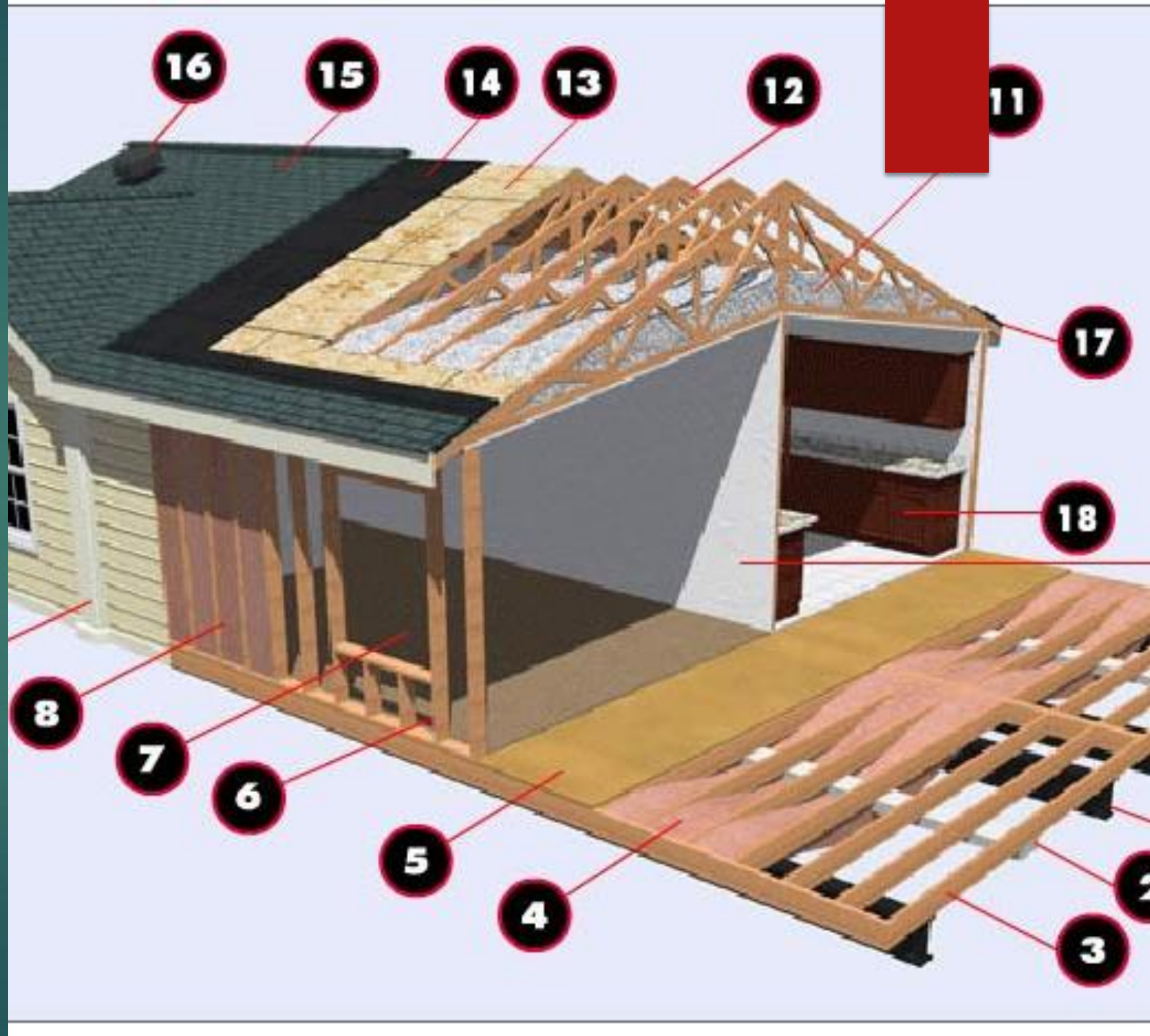
The statement::

- *This home has—has not—(appropriate blank to be checked by manufacturer) been equipped with storm shutters or other protective coverings for windows and exterior door openings. For homes designed to be located in Wind Zones II and III, which have not been provided with shutters or equivalent covering devices, it is strongly recommended that the home be made ready to be equipped with these devices in accordance with the method recommended in the manufacturers printed instructions.*

The statement:

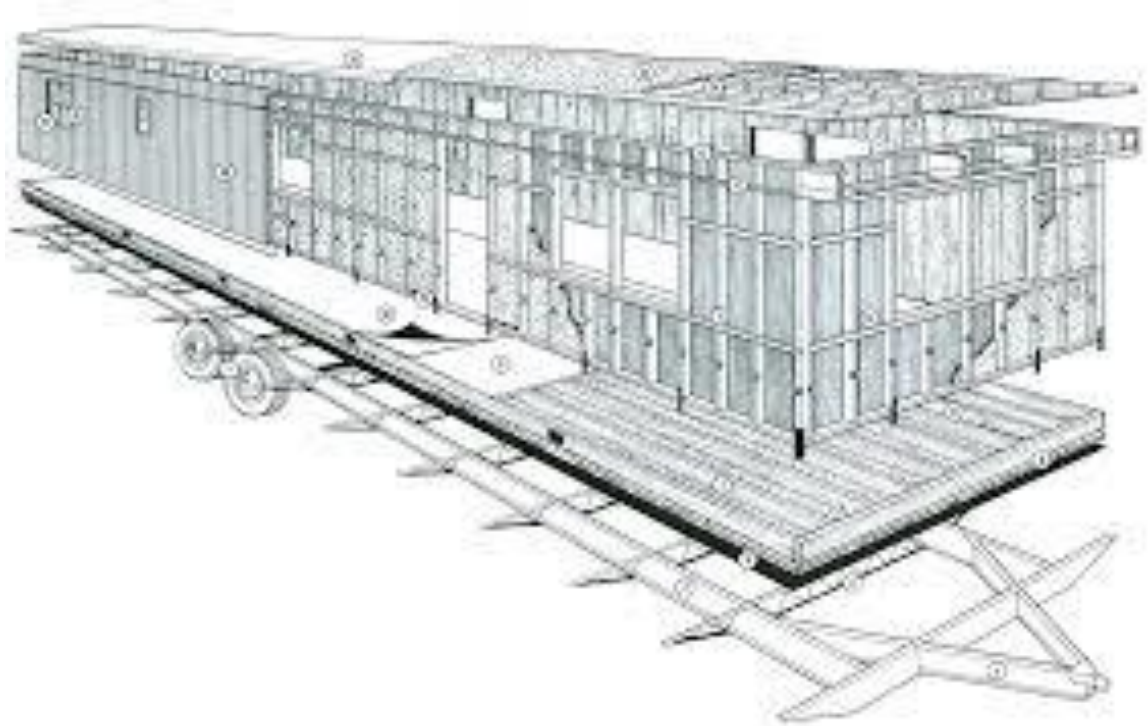
- *''Design Approval by'', followed by the name of the agency that approved the design.*

Main Construction Features



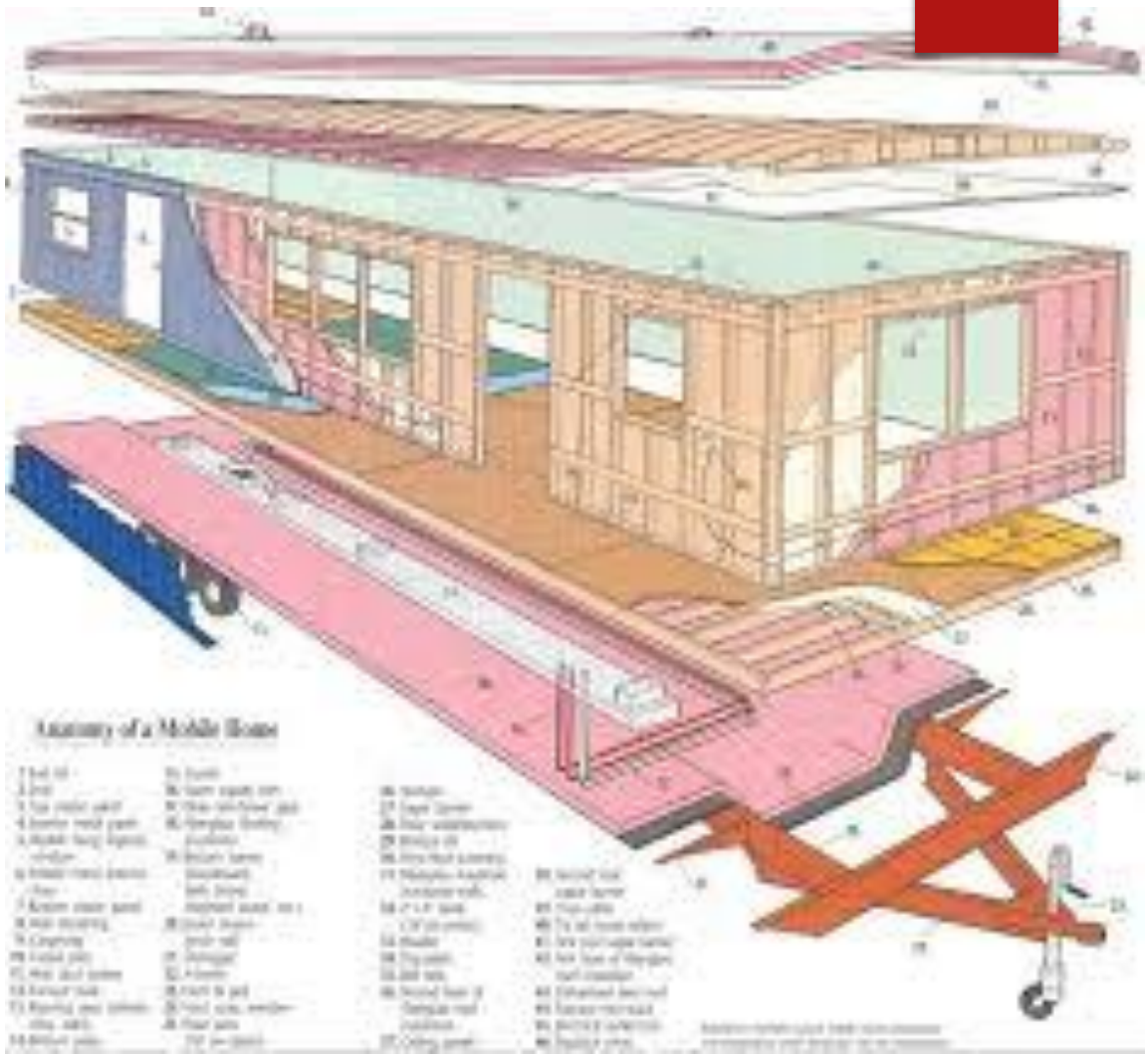
Manufactured Homes

Manufactured homes are one of several types of homes constructed entirely or partially in an offsite factory, transported over roadways, and then placed or assembled on a site-built foundation. After the home is in position, utilities (e.g., water, sewer, electric) are connected, ancillary components (e.g., siding, skirting) are installed, and the home is ready for habitation. Factory built homes include manufactured homes, modular homes, panelized homes, and pre-cut homes.



Envelope Construction

The manufactured home envelope must be designed to meet MHCSS (24 CFR 3280) strength and rigidity requirements. The floor decking material, attached to the floor joists, is usually wood composite panels or plywood.



Floor Construction

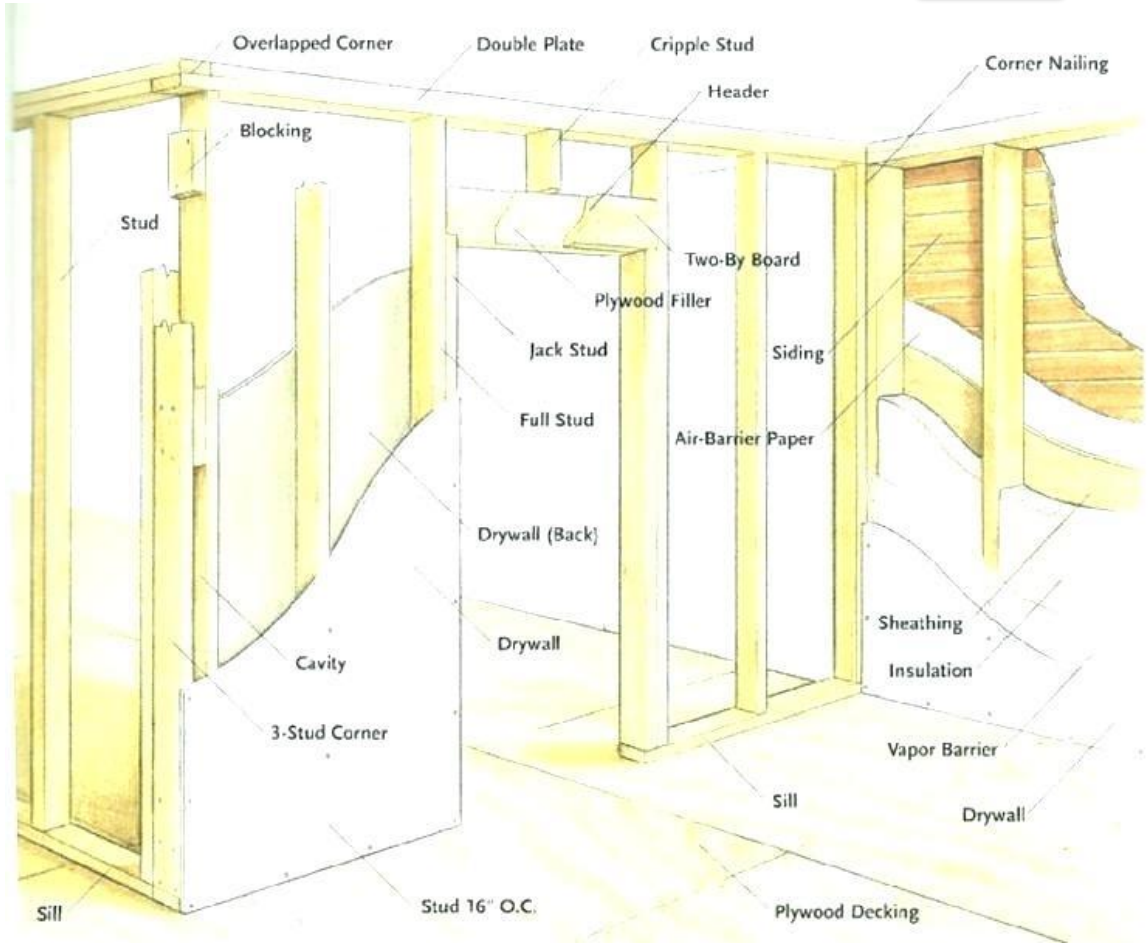
- Floor joists spanning between steel cross beams generally are spaced at 16-inch centers.

Wall Construction

- Exterior wall frames generally are constructed with wood studs, and the exterior of the home is generally covered with vinyl, aluminum, or wood siding. Common wood stud dimensions used in HUD Code housing are typically 2 inches wide by 3 inches deep, or 2 inches wide by 4 inches deep based on the design vertical and lateral loads. Some designs for manufactured homes located in HUD Wind Zone III require the use of studs 2 inches wide by 6 inches deep.

Interior Construction

Interior structural walls must have the structural capacity adequate for their intended use, with a minimum capacity to resist a horizontal load of 5 pounds per square foot (24 CFR 3280.305(f)(2). Interior wall frames typically use 2-inch by 3-inch wood studs. Interior non-structural walls can use 1-inch by 2-inch studs for framing.



Roof Construction

- The roof and ceiling system is typically constructed with prefabricated scissor trusses or other peaked trusses, sheathed with composite roof panels, underlayment, and shingles. Roof trusses typically are spaced at 24-inch centers.

Envelope Construction

Other construction features of manufactured homes include insulation, vapor barriers, gypsum wall and ceiling board, exterior roof and wall sheathing, doors and windows, and other finishing materials similarly found in site-built and modular homes.

Chassis Components

- Chassis-heavy-duty axles, leaf springs, and tires comprise the running gear.
- Frame-'I' beam, heavy-duty steel welded frames. 8'', 10'', or 12'' 'I; beams, depending on length of frame.
- Rigid steel outriggers and center members.
- Hitch-sturdy 'I' beam hitch members optionally removable for cleaner appearance.

Chassis Types

There are two general chassis designs.

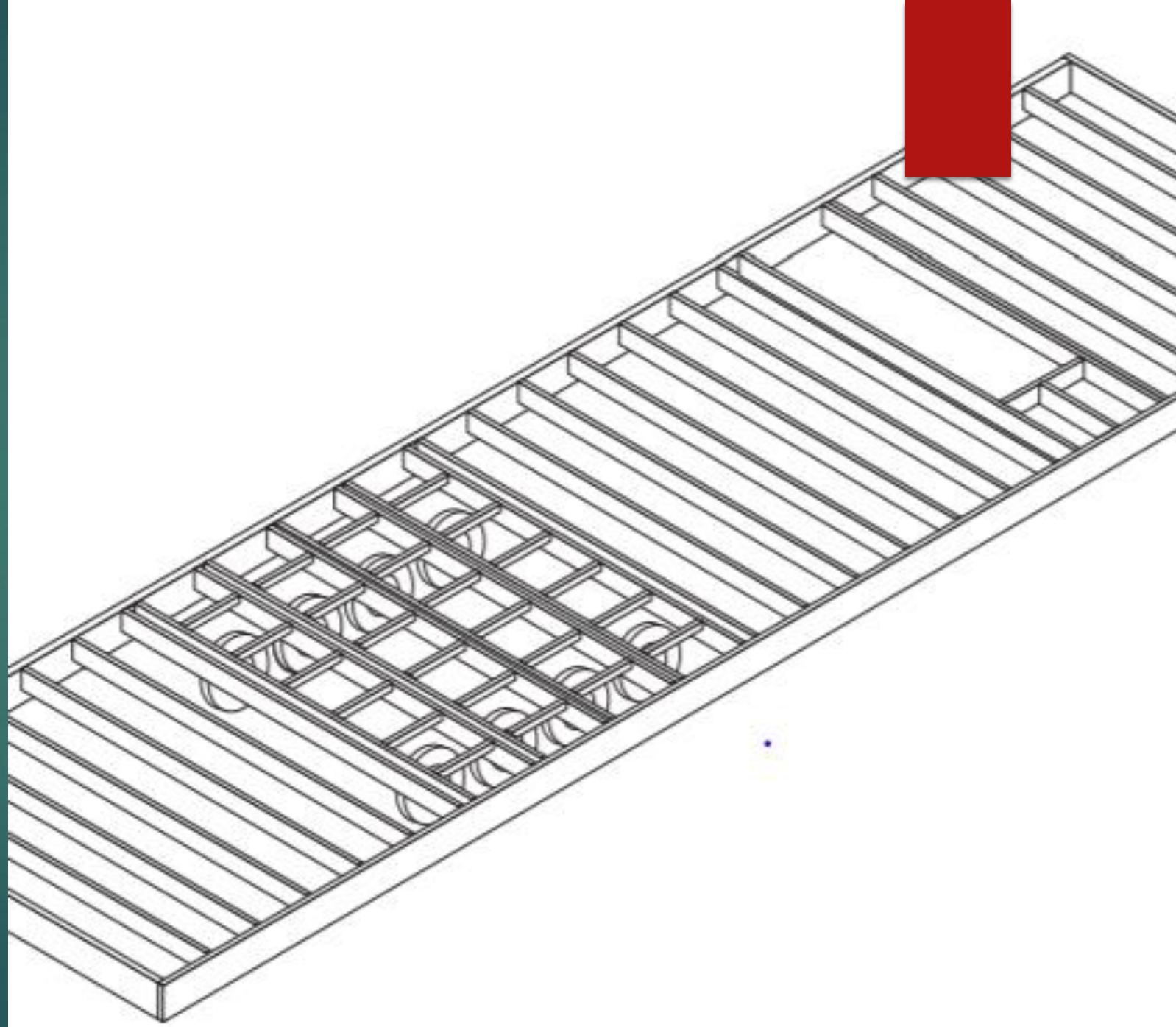
- The traditional chassis
- The Integrated Support System

The Traditional Chassis

- The traditional chassis system consists of two longitudinal steel beams (between 10 and 12 inches deep); steel cross members that span between the beams; and steel "outriggers" extend beyond the beams to support exterior walls of the home (Figure 2-1). Manufactured homes designed to be placed on perimeter foundation walls often are manufactured with shorter outriggers to provide clearance for the site-built foundation walls.

Integrated Support System

An alternative configuration relocates the steel main beams to the perimeter of the home, eliminating the cantilever “outriggers”



The Floor System Components

- Bottom board tightly sealed on bottom of the floor.
- Floor insulation- all-weather insulation for temperature control, blanket fiberglass installed under entire floor for complete weatherproofing.
- Floor joists
- HVAC ductwork – aluminum- framed duct.
- 5/8'' decking glued and fastened to floor joists.
- Roll goods-cushioned vinyl floor in non-carpeted areas.

The Wall System Components

- 2”x4” studs.
- Dadoed belt rails for unitized sidewall construction.
- 1”x4” top and bottom plate.
- Interior Paneling – paneling fire rated interior paneling glued and stapled to sidewall studs or unitized construction.

The Wall System Components

- Rugged metal anchor bonding ties sidewalls to floor for additional strength.
- Sidewall insulation – heavy-density fiberglass insulation.
- Trim to harmonize with exterior décor.
- Rigid exterior metal is prefinished aluminum with baked-on enamel finish.

The Roof/Ceiling System Components

- Decorative ceiling board.
- Gusseted truss- type rafters for extra strength.
- Blanket fiberglass insulation between rafters.
- Steel straps full length of roof over rafters support insulation and galvanized roof between rafters.
- Thick fiberglass roll insulation over rafters.
- Vapor barrier on warm side of roof to prevent condensation buildup.
- Galvanized steel one-piece roof.

Windows and Doors Components

- Large aluminum-framed windows with screens and optional storm windows.
- Egress windows for emergency exit from every sleeping room.

Mechanical Service Systems

- Electrical, plumbing, heating and construction conform to or exceed the Federal Manufactured Home Construction and Safety Standards.

Foundation Types

Typical types of foundation systems used to support a manufactured home located in SFHAs include the following:

- Piers and ground anchors.
- Perimeter wall foundations.
- Proprietary foundation systems that transmit loads from the manufactured home to the ground using patented components or assemblies.

Typical Foundation Systems

A manufactured home is typically placed on a site that has been stabilized and improved to provide adequate support for the home and anchoring system. Site and area improvements techniques vary widely across the country. Typical improvement techniques include simple ground stabilization (ground compaction), application of gravel, and/or construction of a concrete runner or slab.

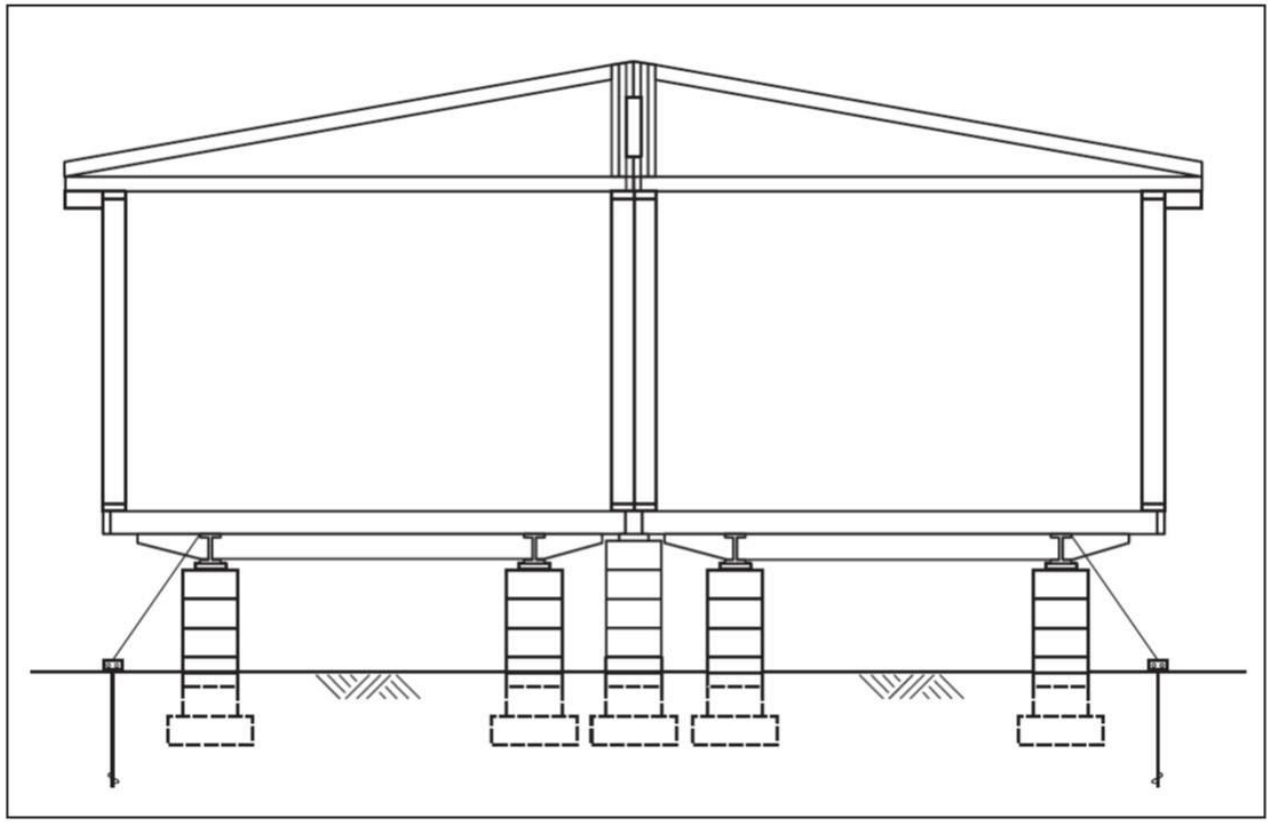
Foundations

Typical manufactured home foundations consist of a system of piers and ground anchors. Piers are typically placed beneath the two steel beams at a spacing of 8 to 10 feet along the length of the manufactured home. Frame ties are connected to the steel chassis or perimeter beams, and run to ground anchors that are used with tie-downs and straps to secure a manufactured home in place. The frame ties and anchors provide lateral support; the piers provide vertical support.

Strengthening Foundations

Although typical manufactured home foundations and installation methods often address wind events, many give little consideration to the forces associated with flooding and seismic events. They generally are not designed for flood effects such as hydrodynamic and hydrostatic forces, buoyancy, erosion, and scour. Potential failure modes observed in a typical installation include:

- Buoyancy, particularly during rapidly rising floodwaters
- Lateral movement, particularly when exposed to moving floodwaters that extend above the home's steel beams
- Pier collapse, particularly when homes are exposed to wind and moving floodwaters simultaneously
- Erosion and scour, particularly when homes are exposed to high velocity floodwaters



Typical Installation

Perimeter Wall Foundations

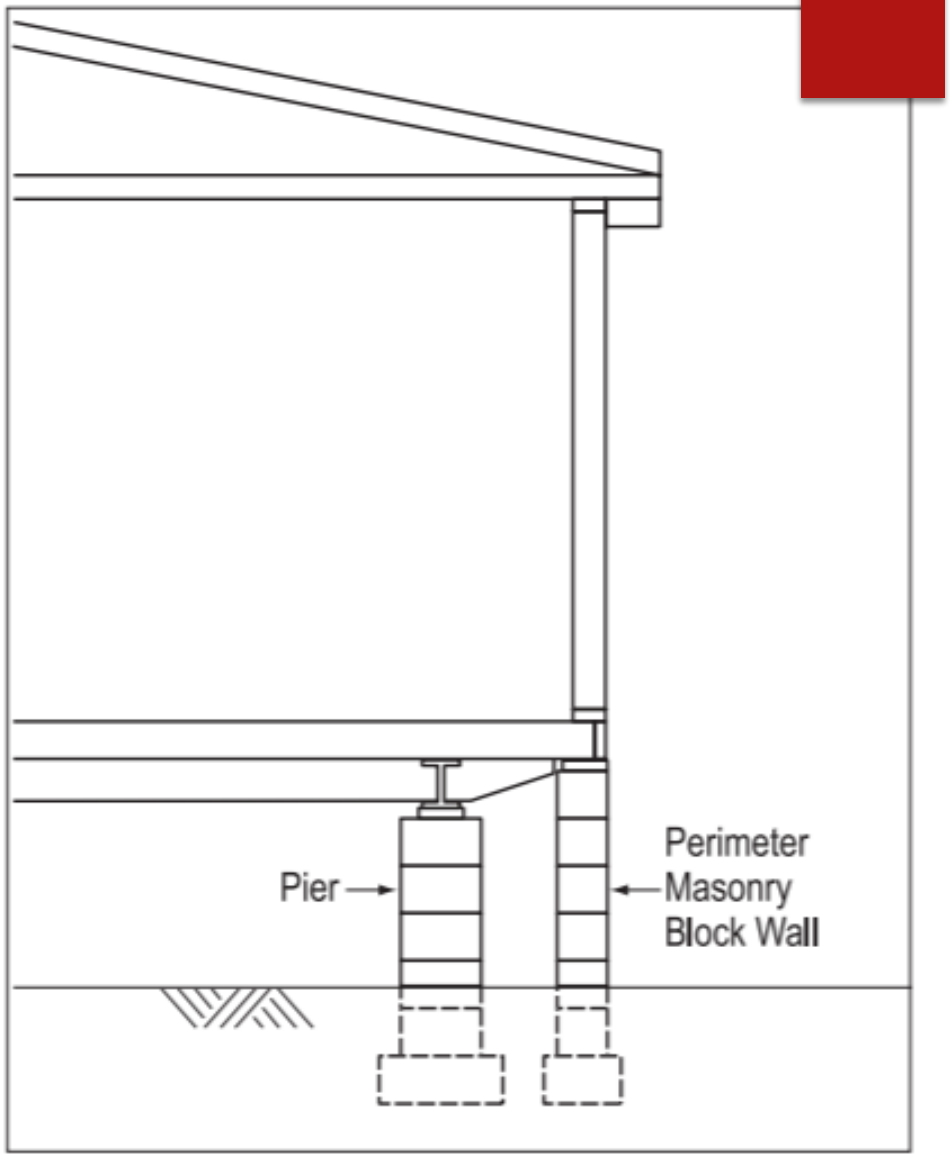
When perimeter foundations are used with a manufactured home constructed with chassis beams, the chassis beams provide support for gravity loads, and the perimeter walls resist uplift and lateral loads. When used with a manufactured home constructed with an integral floor framing system, the perimeter walls resist uplift, lateral, and gravity loads. With chassis systems, interior piers support the chassis, points along the marriage wall, and other areas of concentrated loads.

Perimeter walls can be constructed with typical building materials (e.g., cast-in-place concrete, masonry, or preservative-treated wood); footings are generally cast-in-place concrete. Attaching the floor joists to the foundation wall provides resistance to horizontal and uplift forces.

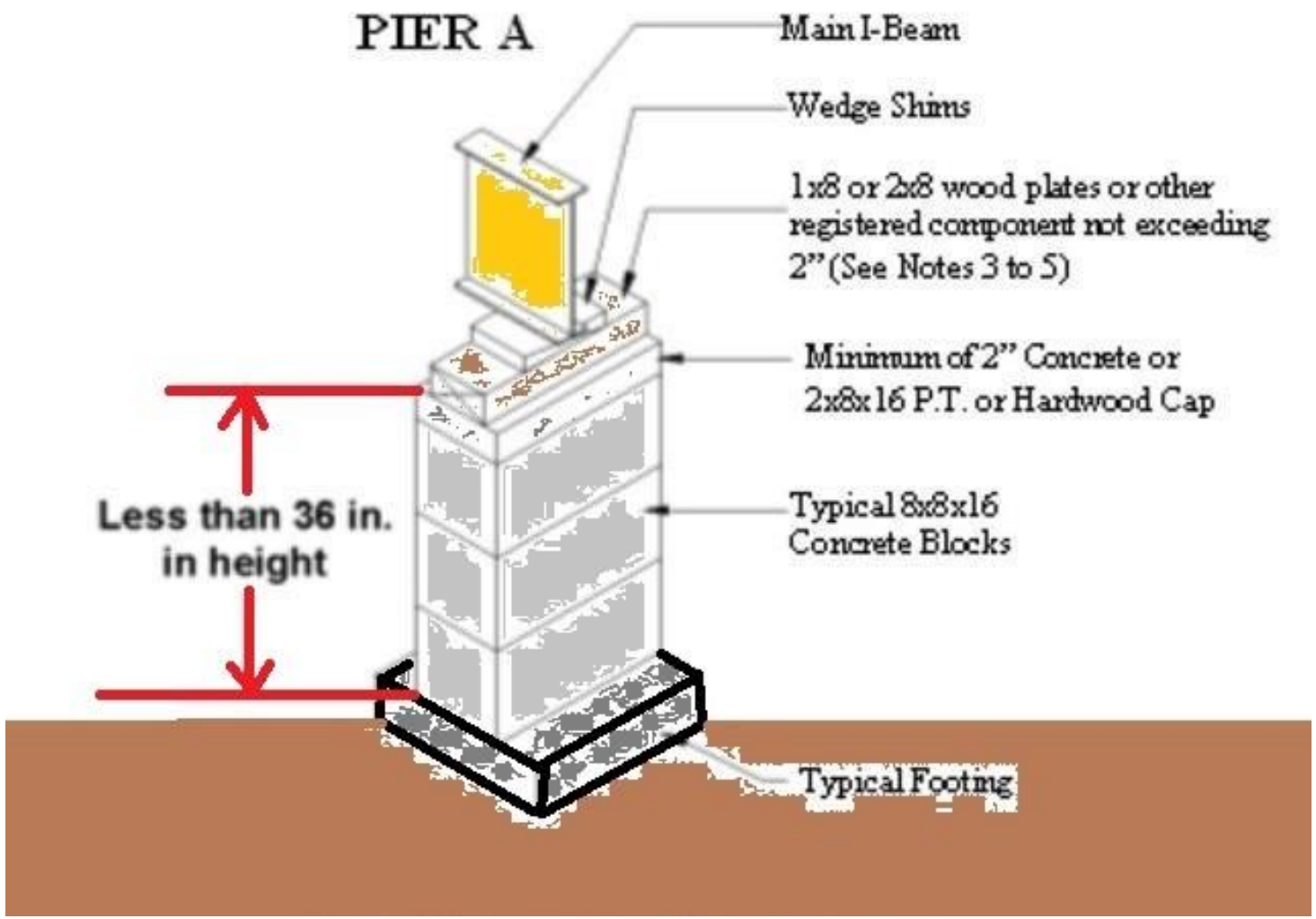
Perimeter Wall Foundation

Some considerations in using this system include the following:

- The system must be precisely measured and constructed before the home is delivered to the site.
- Typically, a crane or roller system will be needed to place the home onto the foundation.



Pier Height - TX Mfg Housing Rules



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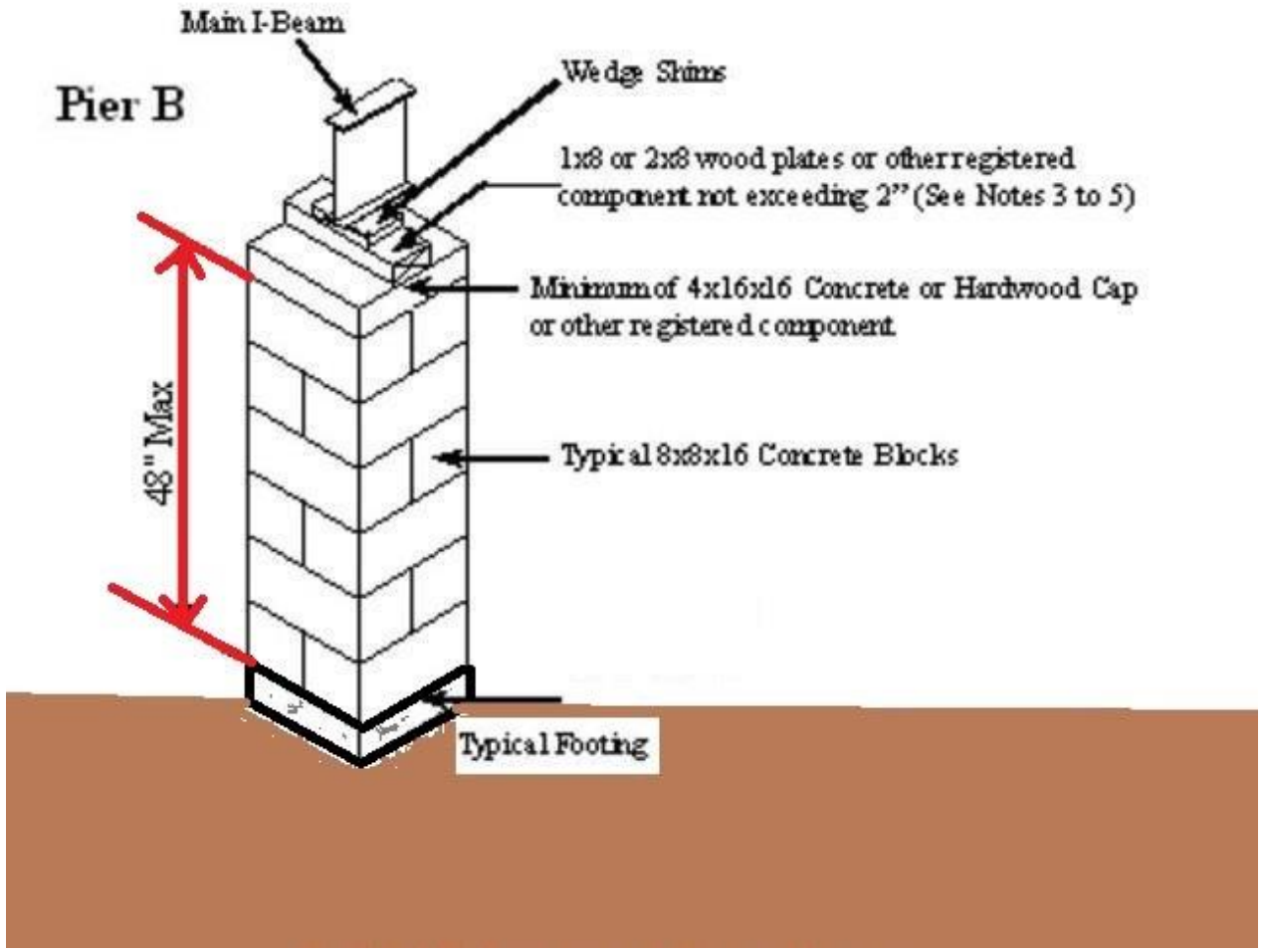

Typical Pier & Footing Installation for Manufactured Homes

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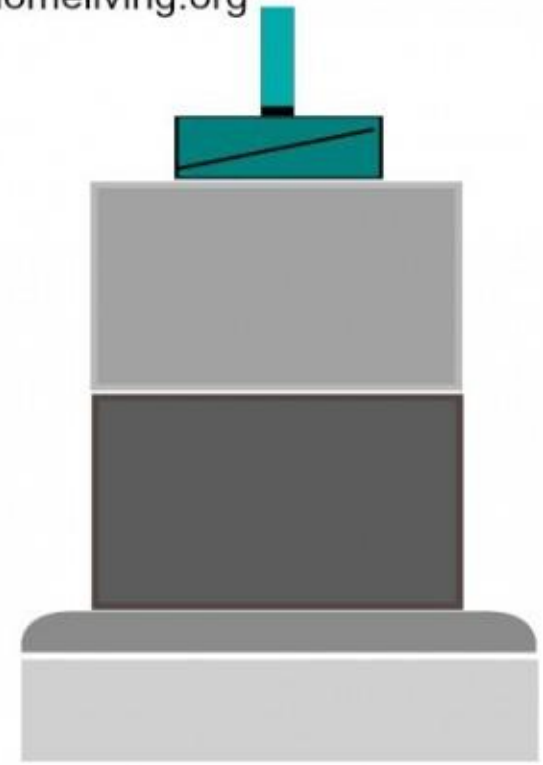
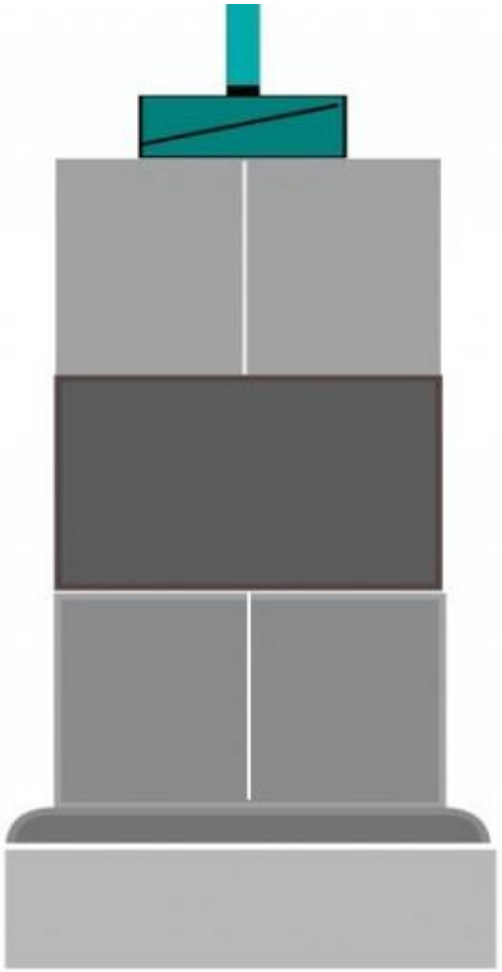
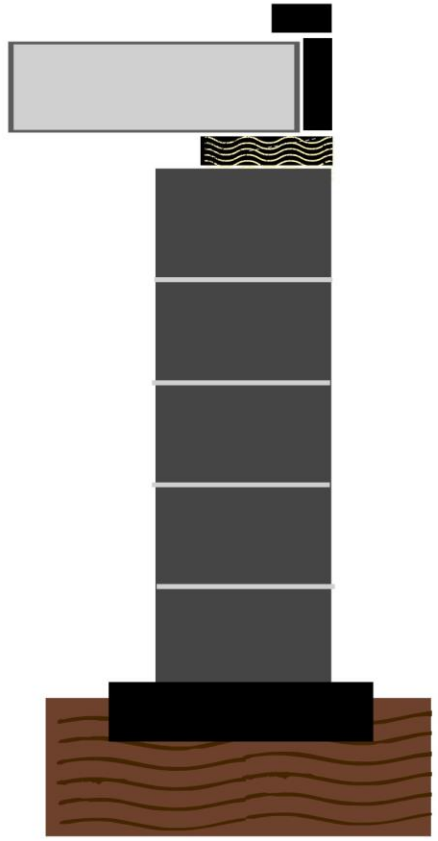


Single Block
Typical Maximum Height
is 20 Inches

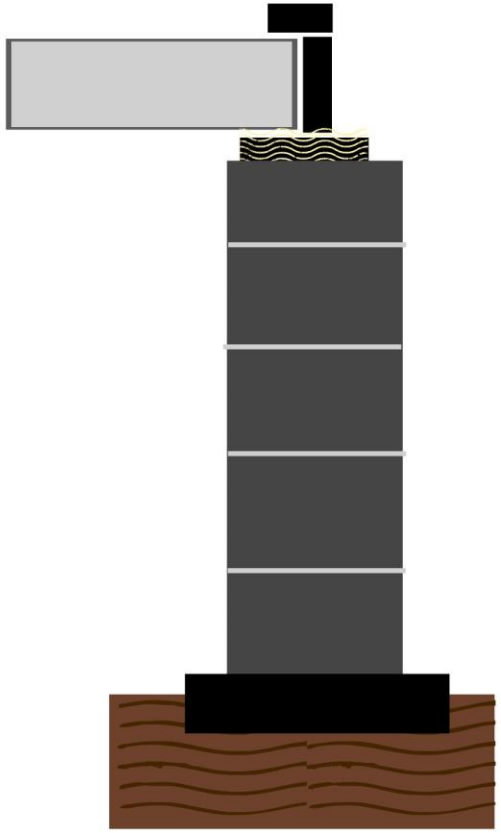


Double Interlocked Blocks
Typical Maximum Height
is 36 Inches

Perimeter and Center Line Piers for Manufactured Homes



Perimeter Pier



Center-Line Pier

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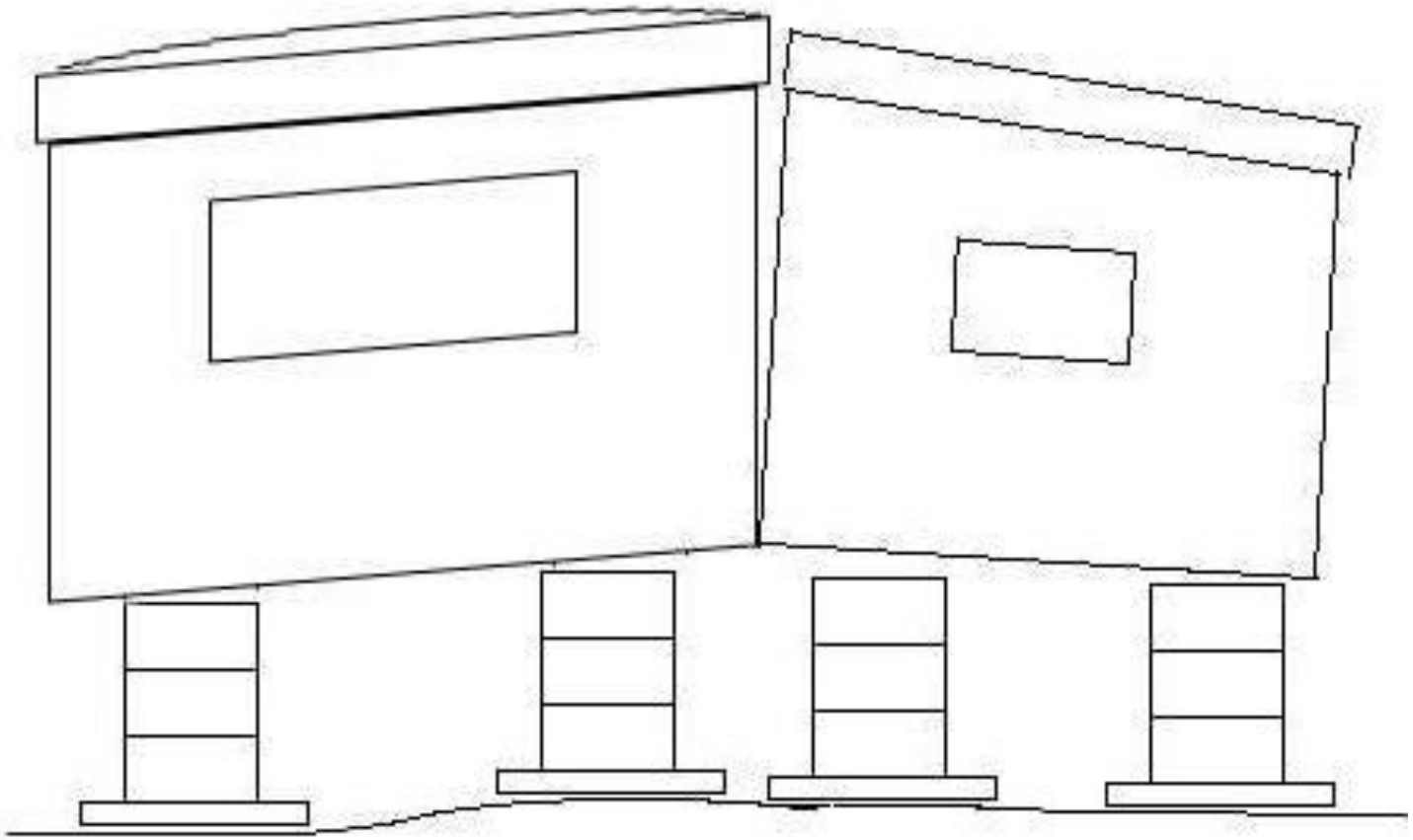
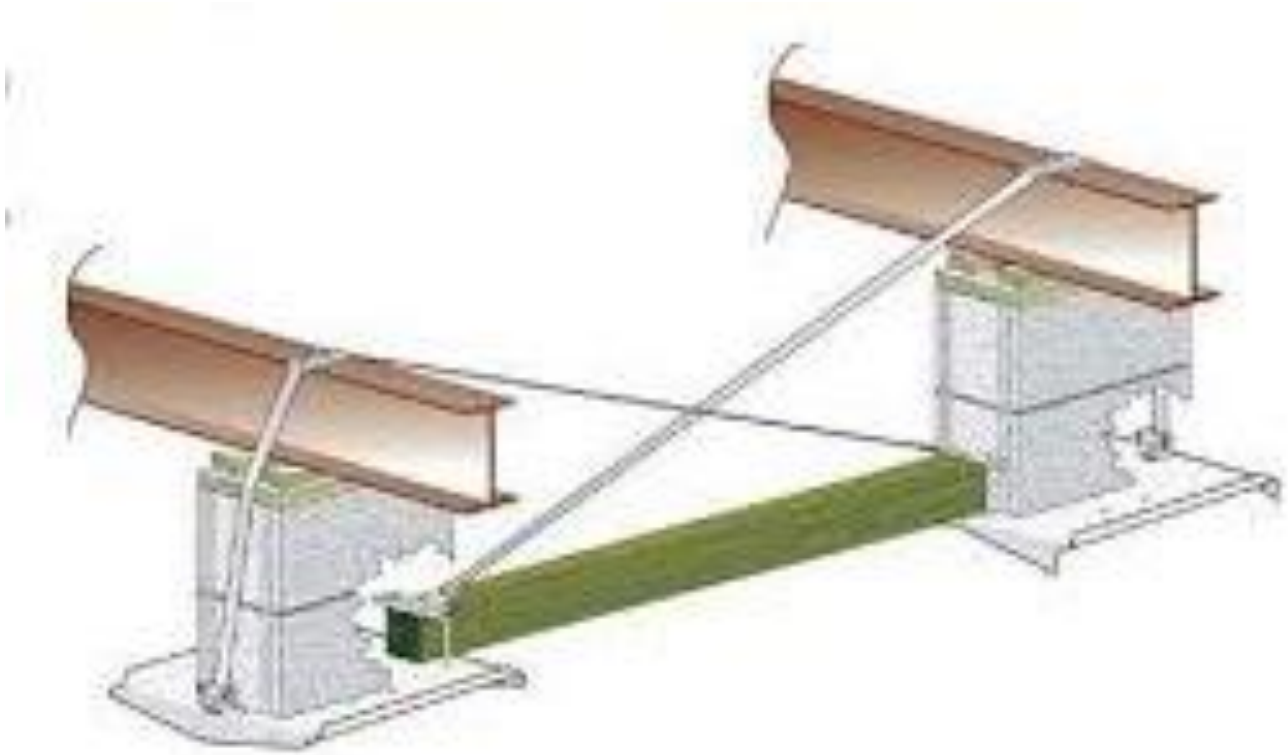


IF A HOME IS NOT ON FROSTLINE FOOTINGS AND THE PIERS SHIFT, HERE'S WHAT HAPPENS- THE HOME GOES ONE WAY, AND THE ADDITION GOES ANOTHER. THE ADDITION CAN BREAK LOOSE FROM THE HOME, OR BE DESTROYED BY THE STRESS.



Leveling Systems

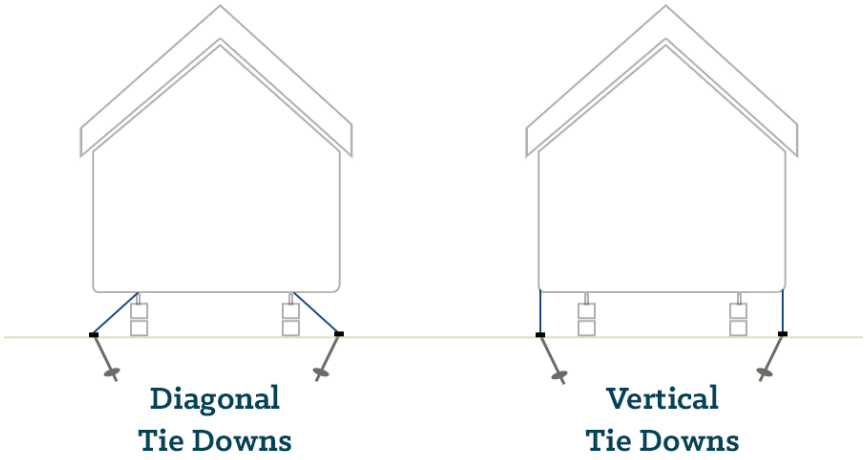
Tie Downs

Unlike normal residential construction, the structure of manufactured homes are not directly and/or permanently affixed to their foundations. Tie down straps to the ground to an anchoring system is utilized to ensure these structures are stable against external forces such as high winds and seismic.

Tie Down

Requirements for manufactured homes

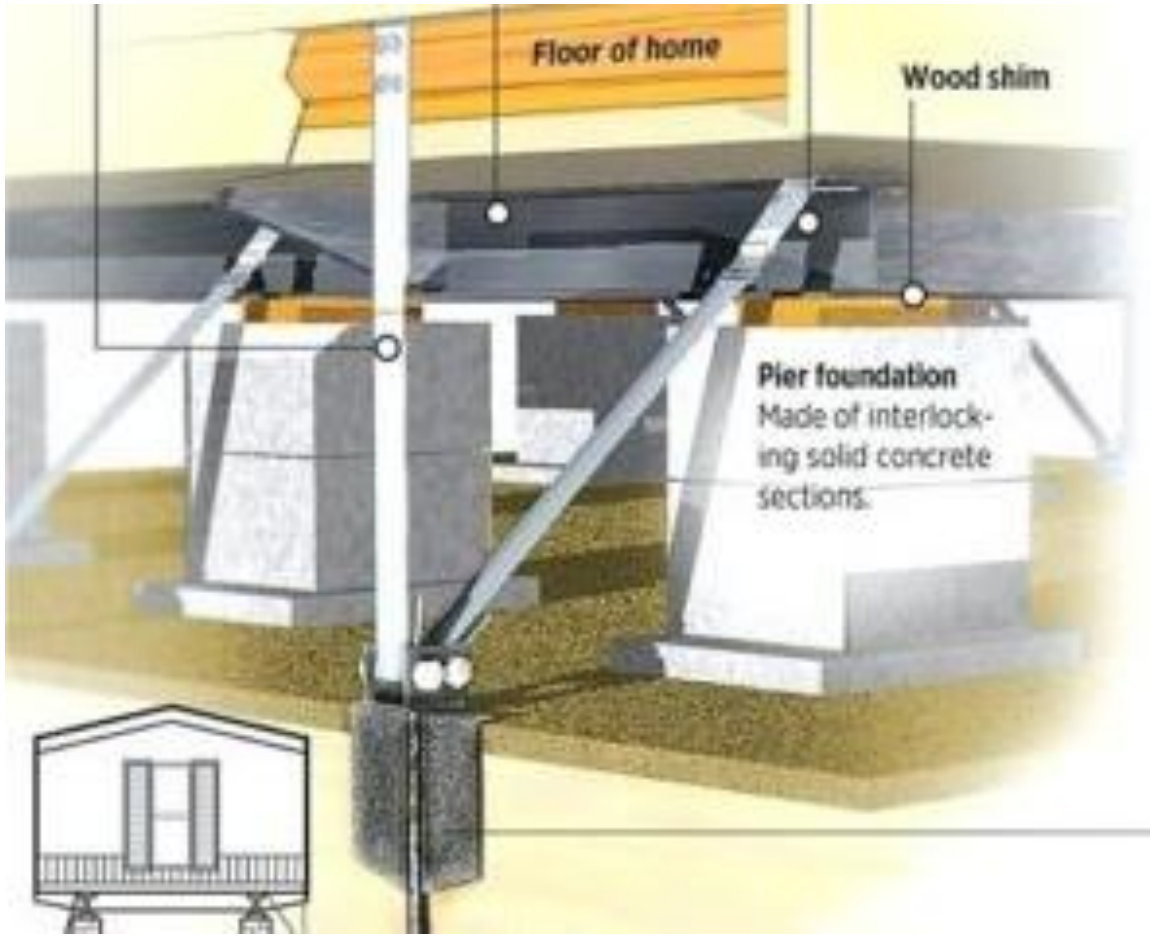
- Singlewide manufactured homes require both diagonal and vertical ties.
- Doublewide manufactured homes require only diagonal ties.



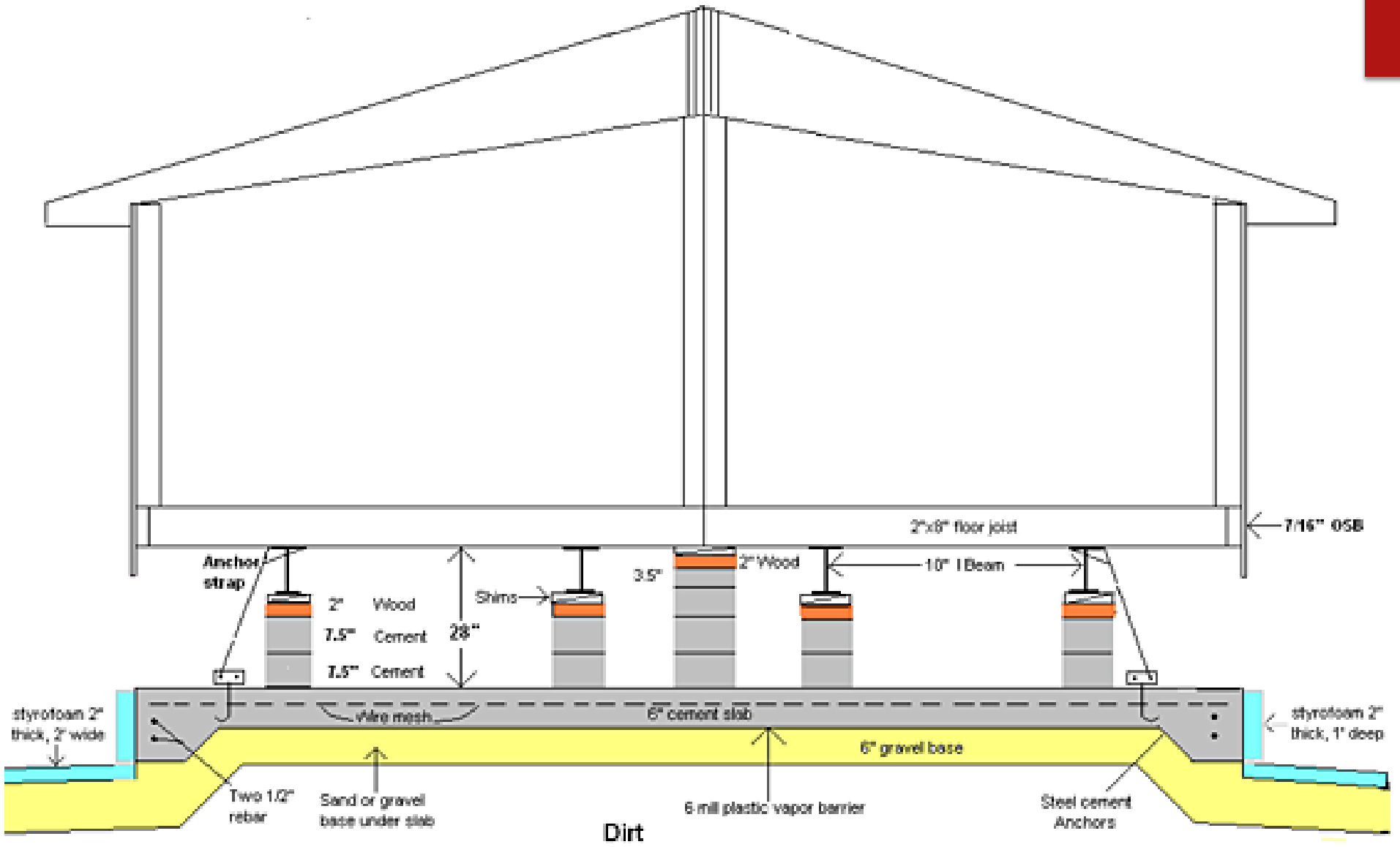
	Zone 1		Zone 2	
Length of Manufactured Home (ft)	**Number of Vertical Tiles per Side**	**Number of Diagonal Tiles per Side**	**Number of Vertical Tiles per Side**	**Number of Diagonal Tiles per Side**
Up to 40'	2	3	2	4
40' - 46'	2	3	2	4
46' - 49'	2	3	2	5
49' - 54'	2	3	3	5
54' - 58'	2	4	3	5
58' - 64'	2	4	3	6
64' - 70'	2	4	3	6
70' - 73'	2	4	3	7
73' - 84'	2	5	4	7

Types of tie-downs:

The type of tie-down you select usually depends on when your manufactured home was built. Older homes often have exposed over-the-top tie-downs. This is an effective system, but it does detract from the appearance of your house. The straps are placed over the siding and roof. Until recent years, most manufactured homes came equipped with concealed over-the-top tie-downs. These straps are located just under the exterior siding and metal roof. The end of the strap hangs out under the manufactured home. Newer model homes might not have any type of over-the-top tie-down. Because of increased structural strength of manufactured homes, these models are secured with anchoring straps attached to the home's steel frame rails, called frame anchors. Doublewides are also secured with frame anchors



Single Wide Tie Downs

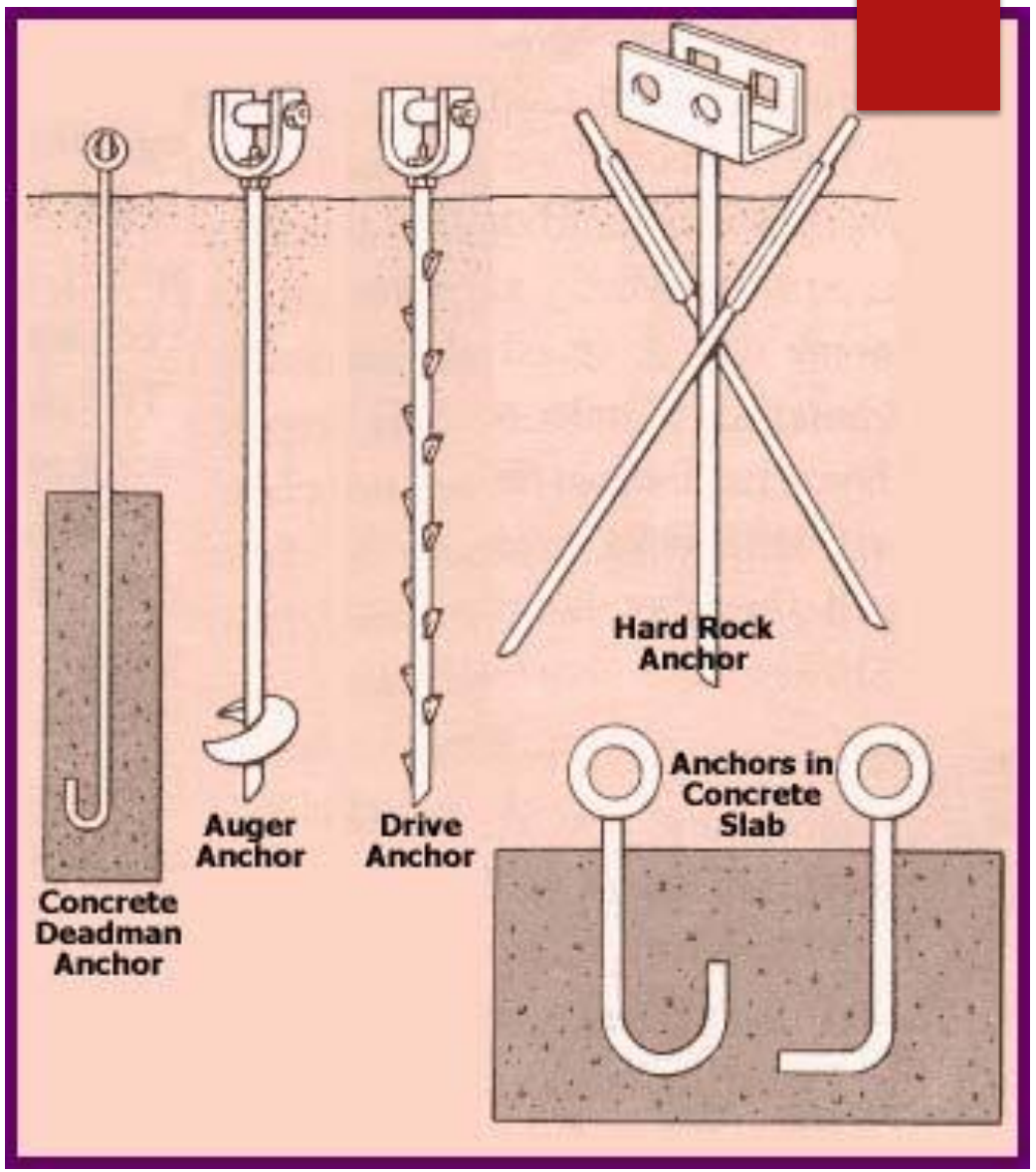

2"x8" floor joist
7/16" OSB
Anchor strap
2" Wood
7.5" Cement
7.5" Cement
28"
Shims
3.5"
2" Wood
10" I Beam
styrofoam 2" thick, 2" wide
Wire mesh
6" cement slab
styrofoam 2" thick, 1" deep
6" gravel base
Two 1/2" rebar
Sand or gravel base under slab
6 mil plastic vapor barrier
Steel cement Anchors
Dirt

Tie Down Straps

Concrete Slab Tie Downs

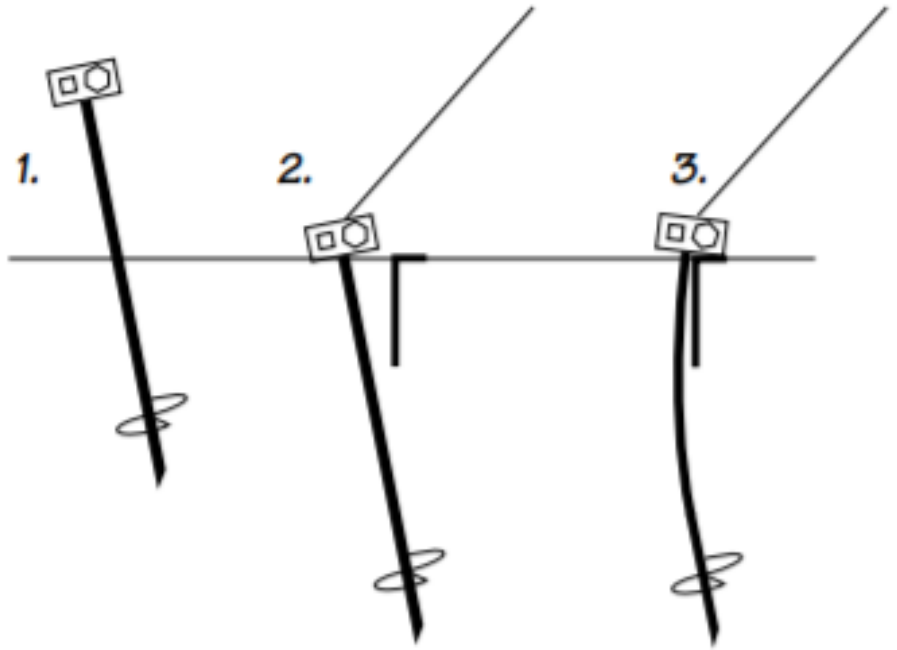
Types of Anchors

- Types of anchors: There are many types of anchors available for different types of soil conditions, including concrete slab. Auger anchors have been designed for both hard soil and soft soil. Rock anchors or drive anchors allow attachment to a rock or coral base. This type of anchor is also pinned to the ground with crossing steel stakes. If the site is a concrete base, a concrete anchor should be installed first.



Soil Anchors

- Installed at 10 degree angle, depending on soil density, stabilizers may be required or concrete type anchors.



Class 4B Stabilizer Plate
17-1/2" x 13-1/2"
Galvanized: Part # 59286

12" wide Stabilizer Plate
Black Paint: Part #59292
Galvanized: Part #59292G

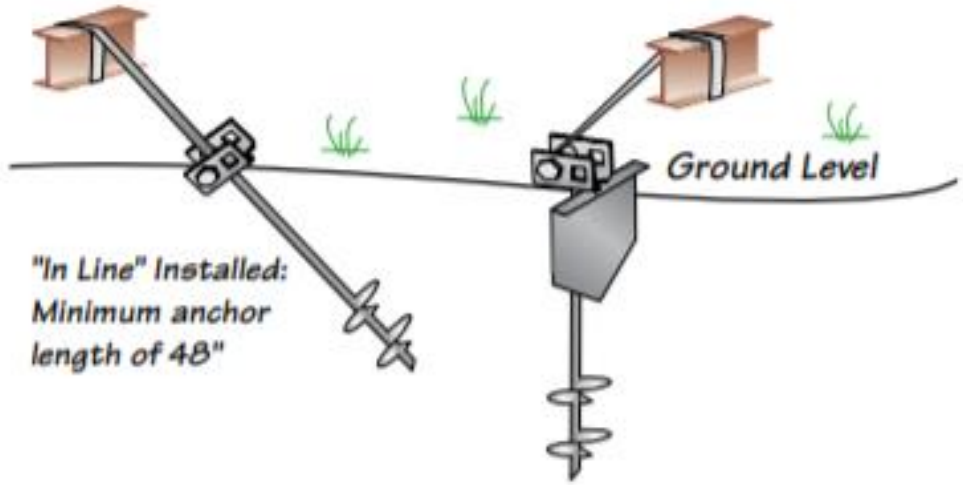
ABS Stabilizer Plate
10" x 24"
Part # 59293

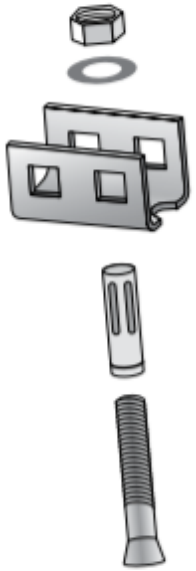
Quik-Set Stabilizer Plate
Black Paint: Part #59291
Galvanized: #59291G

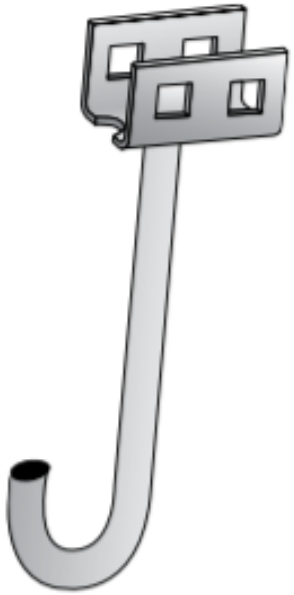
Stabilizer Plates

Stabilizer Plates

- Even if soil density is ok, in wind zones 1,2, and 3 will require stabilizers with non concrete style anchors.



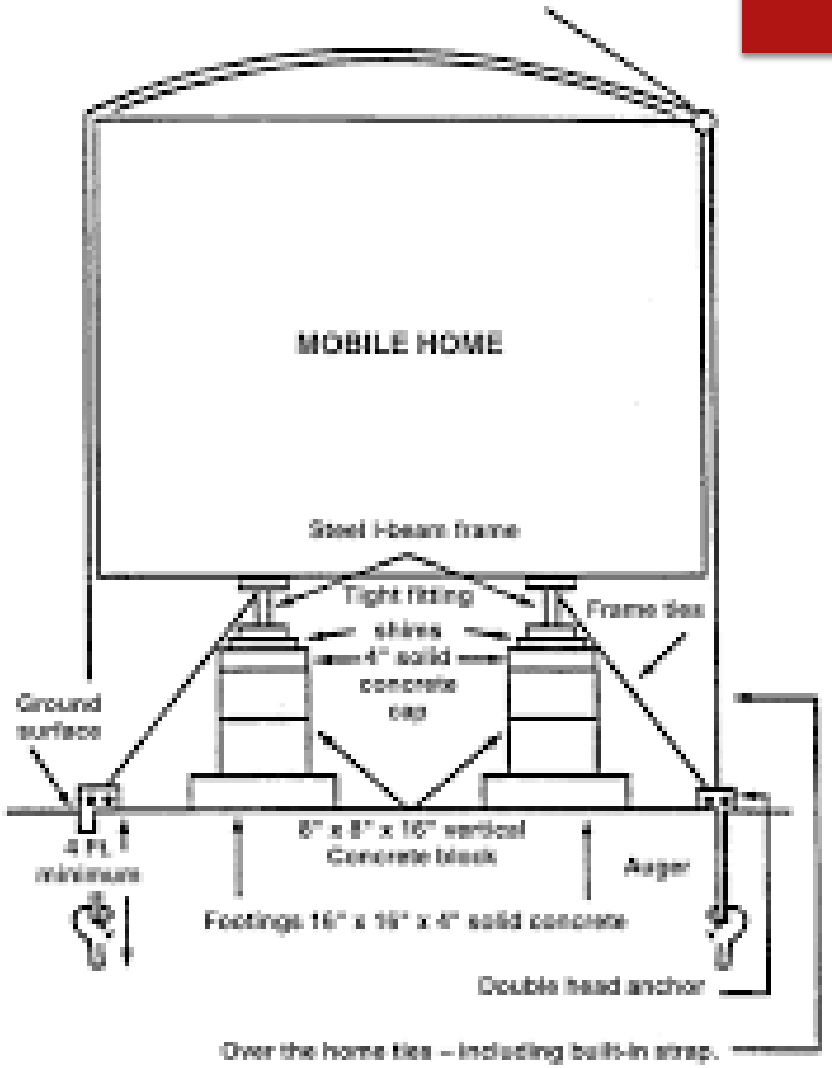




Concrete Anchors

Roof Tie Down Straps

- Since 1994
- Single wide that are equal to or less than 60 linear feet need a minimum of 3 roof ties
- Single sides that are greater than 61 linear feet need a minimum of 4 roof ties
- Double wides are only required if installed by the manufaturer



ACORD CERTIFICATION OF MOBILE HOME TIE DOWNS
SUPPLEMENT TO MOBILE HOME APPLICATION

DATE (MM/DD/YYYY)

AGENCY

APPLICANT'S NAME AND MAILING ADDRESS (Include county & ZIP)

CODE: SUBCODE:
AGENCY CUSTOMER ID

PROPERTY ADDRESS

PARK NAME (IF ANY) | DATE MOBILE HOME "PUT IN PLACE"

YEAR | MAKE | MODEL | SERIAL NUMBER | LENGTH | WIDTH

TIE DOWNS

1. Is mobile home tied down? (If Yes, answer questions 2 through 13)	YES	NO		
2. Is mobile home equipped with factory installed "under the skin" tie down strapping?	YES	NO		
3. Type of straps or cables used?	1 1/4 STEEL STRAP 1 1/2 STEEL STRAP	1/4 STEEL CABLE 1/2 STEEL CABLE		EXPLAIN
4. Is all strapping used in tie down galvanized?	YES	NO		N/A
5. Is all strapping used in tie downs without perforations?	YES	NO		N/A
6. If over the roof tie down are visible, are corner blocks of wood or metal used under strapping cable to prevent sharp bends?	YES	NO		N/A
7. Type of anchors used for tie downs?	DEAD MEN		SCREW/AUGER (EXPLAIN BELOW)	
8. If cable used, are loose ends firmly clamped and secure?	YES	NO		N/A
9. If turnbuckles are used in tie downs, are they forged steel?	YES	NO		N/A
a. Are turnbuckles ending with jaws properly secured?	YES	NO		N/A
b. If turnbuckles end with open hook, are they closed with twine or wire?	YES	NO		N/A
10. Are all additions to mobile home (including carport, added rooms, etc.) tied down?	YES	NO		N/A
11. Is mobile home properly blocked?	YES	NO (IF NO THEN AMPLIFY)		
12. HOW MANY PROPERLY SECURED STRAPS OR CABLES ARE THERE OVER THE ROOF?				
13. FACING EITHER END OF THE MOBILE HOME, HOW MANY PROPERLY SECURED FRAME TIE DOWNS ARE THERE?	RIGHT	LEFT		

EXPLANATION OF ITEMS NOT ADEQUATELY DESCRIBED ABOVE

THE UNDERSIGNED DOES HEREBY CERTIFY THAT THE ABOVE DESCRIBED MOBILE HOME AND ITS TIE DOWN FACILITIES ARE CORRECT AS DESCRIBED ABOVE.

Signature of Owner/Applicant _____ Date _____

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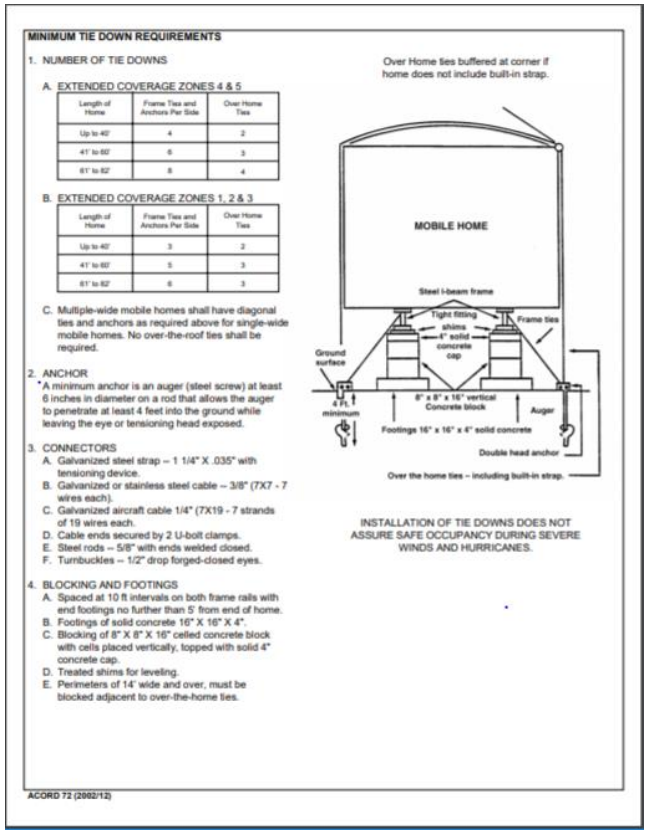


MINIMUM TIE DOWN REQUIREMENTS

1. NUMBER OF TIE DOWNS

Over Home ties buffered at corner if home does not include built-in strap.

A. EXTENDED COVERAGE ZONES 4 & 5

Length of Home	Frame Ties and Anchors Per Side	Over Home Ties
Up to 40'	4	2
41' to 60'	6	3
61' to 82'	8	4

B. EXTENDED COVERAGE ZONES 1, 2 & 3

Length of Home	Frame Ties and Anchors Per Side	Over Home Ties
Up to 40'	3	2
41' to 60'	5	3
61' to 82'	6	3

C. Multiple-wide mobile homes shall have diagonal ties and anchors as required above for single-wide mobile homes. No over-the-roof ties shall be required.

2. ANCHOR
A minimum anchor is an auger (steel screw) at least 6 inches in diameter on a rod that allows the auger to penetrate at least 4 feet into the ground while leaving the eye or tensioning head exposed.

3. CONNECTORS
A. Galvanized steel strap -- 1 1/4" X .035" with tensioning device.
B. Galvanized or stainless steel cable -- 3/8" (7X7 - 7 wires each).
C. Galvanized aircraft cable 1/4" (7X19 - 7 strands of 19 wires each.
D. Cable ends secured by 2 U-bolt clamps.
E. Steel rods -- 5/8" with ends welded closed.
F. Turnbuckles -- 1/2" drop forged-closed eyes.

4. BLOCKING AND FOOTINGS
A. Spaced at 10 ft intervals on both frame rails with end footings no further than 5' from end of home.
B. Footings of solid concrete 16" X 16" X 4".
C. Blocking of 8" X 8" X 16" celled concrete block with cells placed vertically, topped with solid 4" concrete cap.
D. Treated shims for leveling.
E. Perimeters of 14' wide and over, must be blocked adjacent to over-the-home ties.

INSTALLATION OF TIE DOWNS DOES NOT ASSURE SAFE OCCUPANCY DURING SEVERE WINDS AND HURRICANES.

ACORD 72 (2002/12)

Insurance Inspection Form

Manufacturing Home Skirting

Benefits to Skirting

- Protect against high wind uplift
- Protect against rodent infestations under your home.
- Protect pipes and other home underpinnings from the elements.
- Helps stabilize home temperatures by enclosing space under your home.
- Help prevent moisture buildup that can lead to hazardous mold growths.
- Keep the space secure from inquisitive small children suffering an injury.
- Can help lower insurance costs

Skirting

- **Skirting around the manufactured/mobile home base:** must be complete, intact, and include an access opening. The mobile home foundation perimeter wall ("skirt") has to enclose the foundation to resist vermin or other animal pests and to resist wind-driven rain.

Skirting

Skirting around the crawl space of a manufactured home or mobile home can be made of various materials, masonry block, brick, treated wood, resting on a concrete footing. (Older aluminum or vinyl siding skirting won't quality co reinforced floating slab may work ok;

Perimeter walls have to be at least 8" above surrounding grade.

Skirting

- Mandatory for some AHJ's, FHA, VA, USDA, some insurances
- Always recommended

Crawlspace Precautions

- Unsafe electrical wiring, if touched, can cause shock or even death by electrocution.
- Spills of sewage are unsanitary and risk serious illness
- Breathing insulation, dust, debris, or mold risks respiratory or other illness
- Eye injury from falling debris
- Entrapment: never enter a tight, dangerous area while working alone.

Suggested PPE

- Tyvek coverall suit
- Nitrile/latex gloves
- Work gloves
- Particulate mask respirator
- Eye protection

Tongue and Axle

- Axle, Tongue & Wheels should have been removed from a mobile home or manufactured home if it is to meet current U.S. HUD/FHA Manufactured Home standards.

Belly Wrap

- Belly wrap (plastic or other) to seal out moisture and hold in insulation: check for tears, leaks from above, rodent infestation, mold, or other damage.

Crawl Space Clearances

- The home must have a minimum of 18" of clearance space between the ground surface and the bottom of the beam or girder supporting the home and that rests on the pier tops or foundation.

  Other standards include:

  12" minimum beneath lowest frame member and ground in area of utility connections;

  No more than 25% of the main frame can be less than 12" above grade;

  If over basement or habitable lower level or more than 1/4 of home is more than 3' above grade a professional must design the foundation;

Ductwork

- **Ductwork** for HVAC system damaged, contaminated, not functional.

Environmental Damage

- **Insect damage** & rot: look for termites & carpenter ants - up skirt into floors/walls esp. @ leaks (plumbing, windows, doors)

Moisture Barriers

- **Moisture barrier**: dirt floor crawl space surfaces under a manufactured home or mobile home must be covered with a 6-mil polyehtylene (or equivalent) moisture barrier

Grading

- **Site grading** should not direct surface runoff nor roof spillage under the home but rather must direct it away). The skirting must be "self supporting" and rest on a concrete footing (to meet HUD/FHA Manufactured home specifications.

Inspecting Tie Downs

- **Stabilizing systems**: look for the required tie downs, straps, cables, that may be required to protect the home from storm and wind damage in your area.

Tie Down Anchors

Crawl-space Inspection

The undercarriage inspection includes:

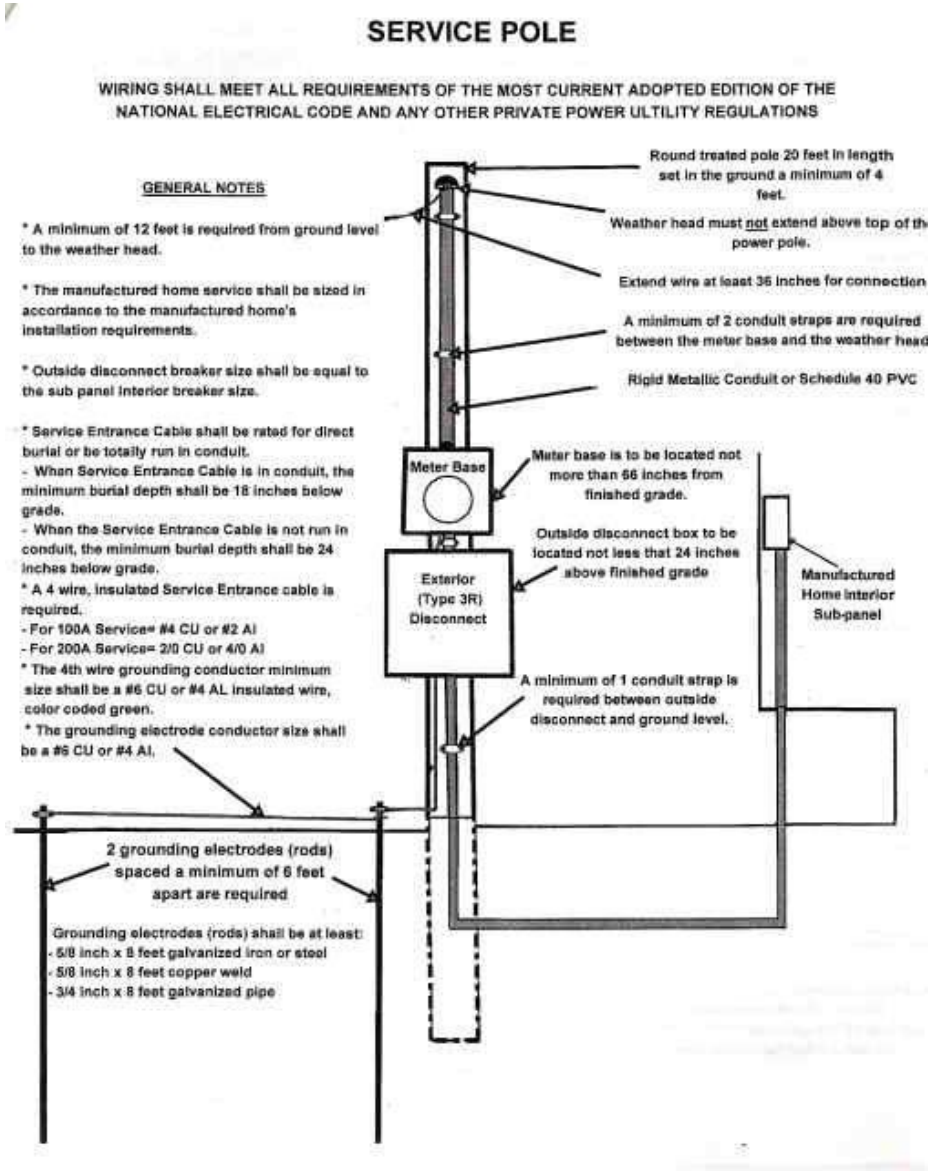
- Checking for loose straps since straps should be tight and straight.
- Looking for straps and anchors that show signs of corrosion or damage.
- Checking to make sure straps and ground anchors are not damaged or corroded.
- Checking that straps are not kinked or bent, or otherwise abnormally stressed.
- Checking vapor barriers to make sure the barriers are not torn or damaged.

Double Wides

- **Structural damage:** for doublewides inspect the center mating girder for signs of separation that may indicate framing damage, rot, poor original construction, or settlement of the supporting piers of the home's perimeter.

Utility Connections

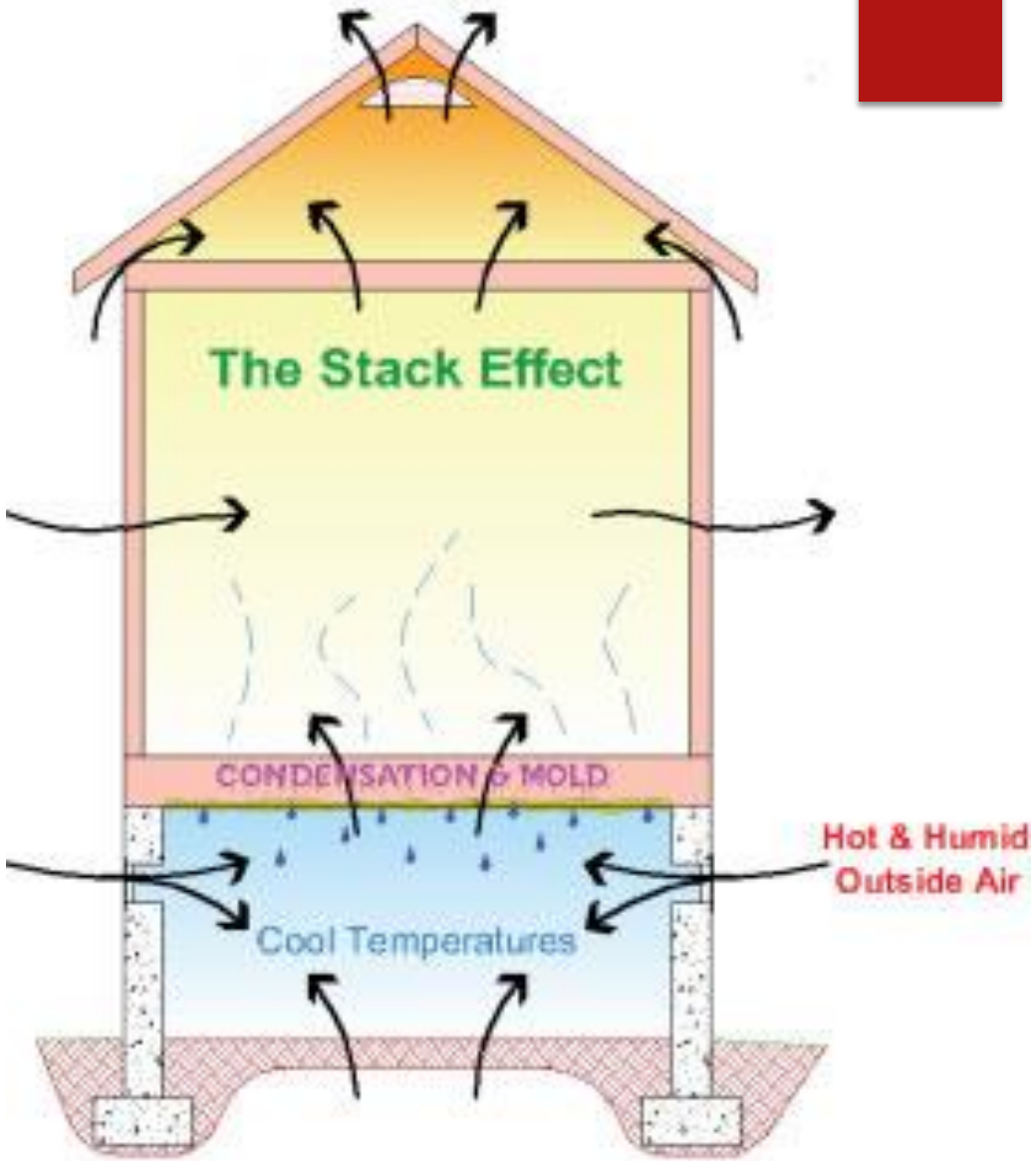
- Often visible below the manufactured or mobile home: must be permanently-installed. An "extension cord" hookup for electrical power, a garden hose for water supply, etc. are not acceptable.



Electrical Service Pole

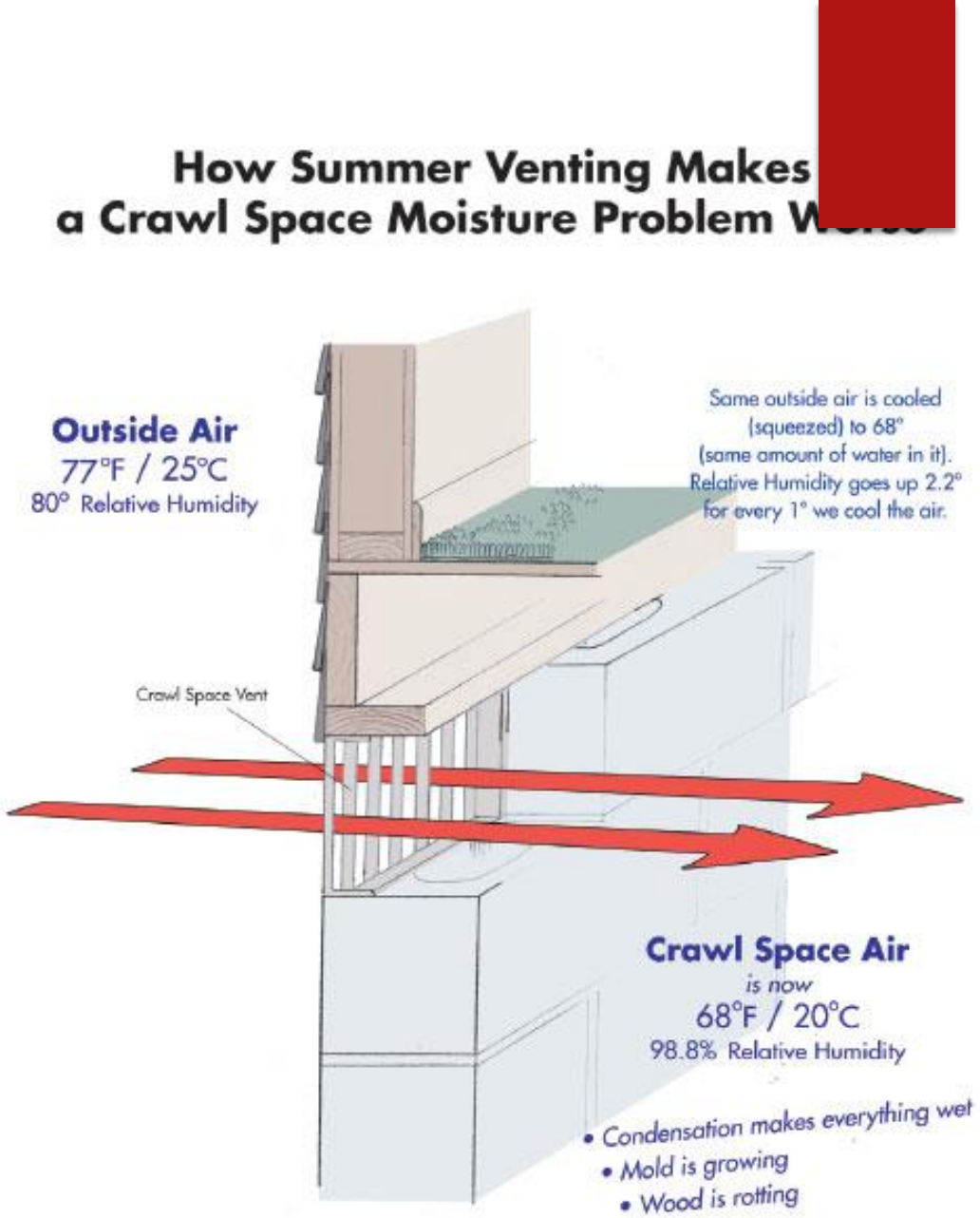
Crawl Space Ventilation

- **Ventilation of the crawl area**: current U.S. HUD/FHA standards require one square foot of ventilation opening (screened foundation vents or skirting vents) per 150 square feet of the home's crawl space floor.



Ventilation

- Ventilation of crawl spaces is controversial as climate places an influence on the humidity and moisture related issues



Fire Safety Priorities

- Electrical - aluminum wiring, owner-modified or otherwise unsafe wiring
- Heating, flues, chimneys
- Safety Exits - doors and push-out windows; unsafe steps and rails at entry doors;
- Smoke detectors critical - short exit time for this construction

Structural Defects

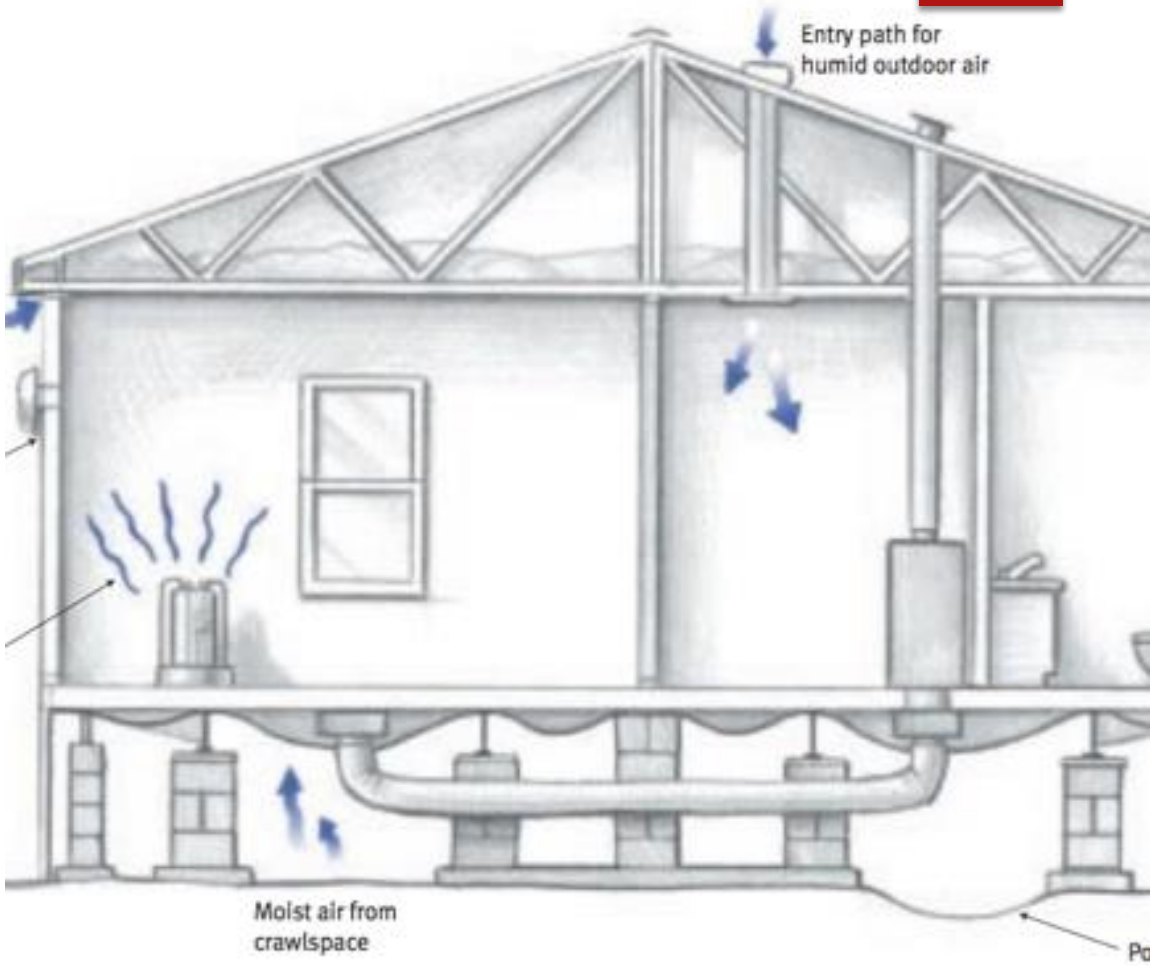
- Movement (impacts electrical & flues) - look for evidence of movement that may have disturbed piers, foundation supports, or mechanical system connections - areas of serious safety hazards
- Storm Damage such as blown off of foundation, roof damage, missing skirting
- Floor Collapse (the extensive use of particle board for subflooring exposes these structures to high risk of hidden damage and floor collapse due to roof, exterior or plumbing leaks
- Mobile home & manufactured home tie-downs - to secure the structure against wind damage

Moisture Related Defects

- Roof leaks
- Leaks at windows and doors (photo at left)
- Plumbing leaks
- Heating systems not maintained, possibly unsafe
- Rot and insect damage at points of leakage into walls and floors
- Wet or contaminated crawl areas, especially where enclosed

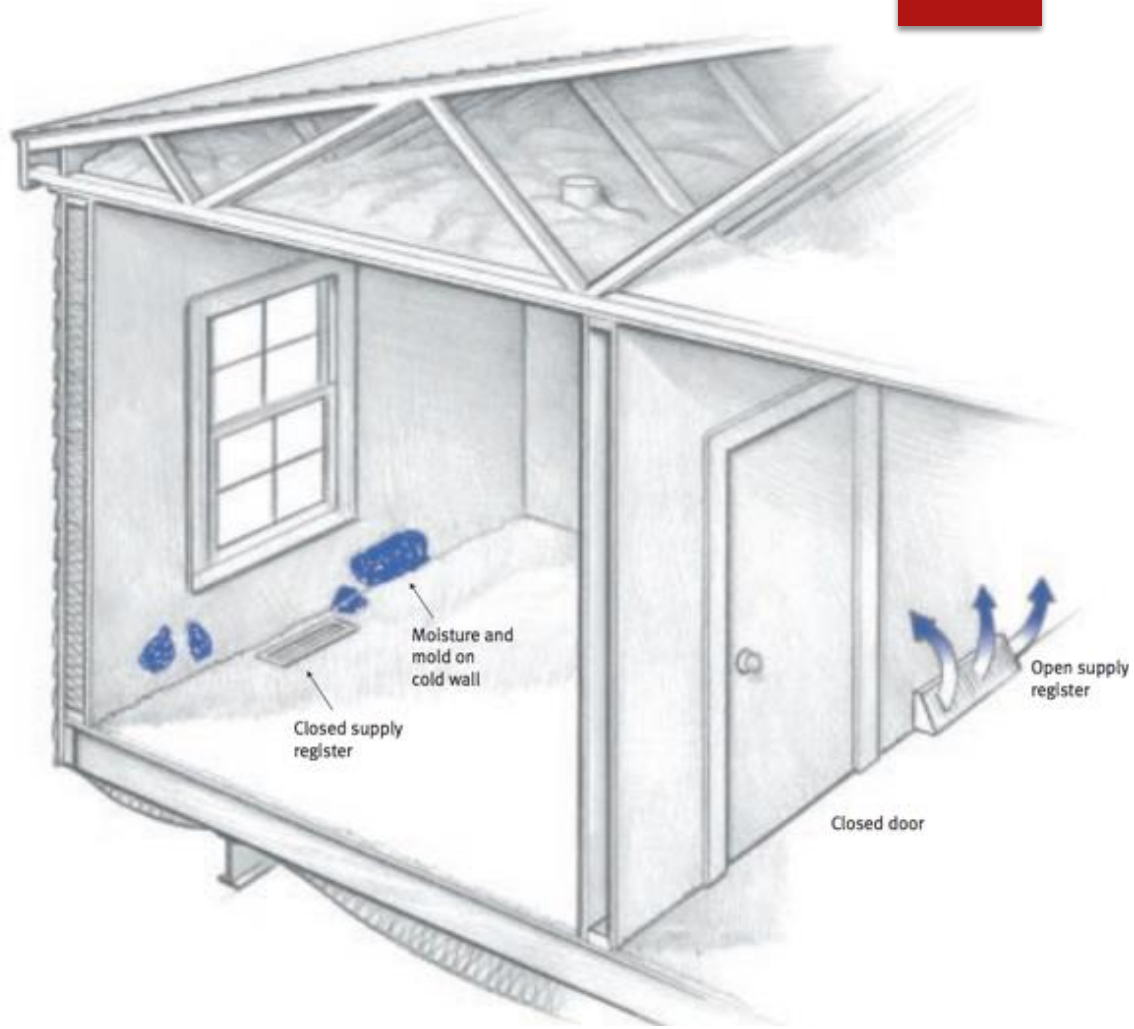
Environmental Moisture Issues

- Poor insulation
- Poor Vapor Barriers
- Poor Site Drainage



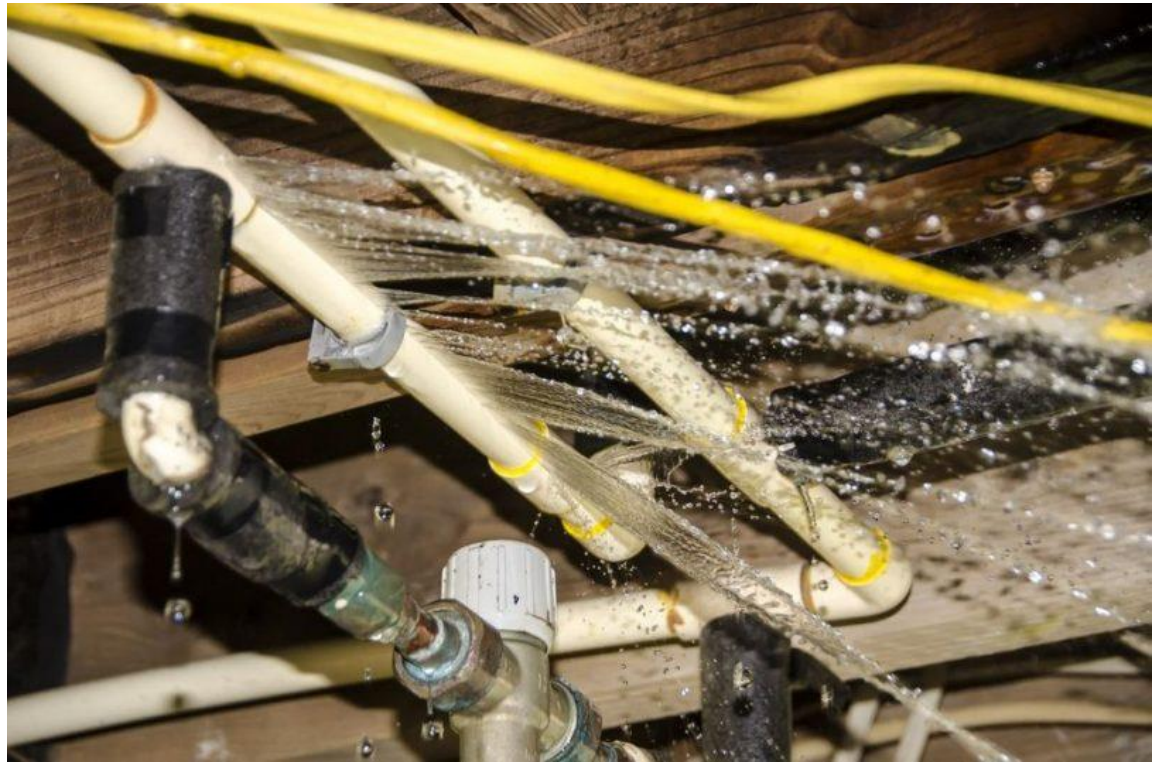
HVAC Moisture Issues

- Leaky duct work
- Not removing humidity



Inspecting Plumbing

- **Trailer & mobile home water entry lines (and some drains) are often exposed to freezing** below the unit
- If the mobile home water supply is provided by a pump and the pump is found to have cracked (and the home is located in a climate where freezing weather occurs, pump cracking probably means it froze and was not drained or protected from freezing.
- If mobile home drains are freezing the same frost protection or heating concerns need to be addressed as we've just listed.
- Open drains or leaky connections (crawl)
- Leaky supply main (crawl)



Inspecting Plumbing

- Plumbing fixtures with non-functional and / or inadequate parts such as these leaky tub/shower controls and missing tub spout in a mobile home.
- Look for plumbing leaks into the crawl area;
- Look for proper plumbing drain slope 1/8" /ft, and support (no less than 4ft o.c.), and
- Check the direction of plumbing fittings, and proper adhesive (DWV for PVC, ABS or both);

Inspecting Plumbing

- Leaky traps rot walls and floors faster than conventional construction especially where OSB or chipboard was used for subfloor material in the mobile home or trailer

Inspecting Fuel Delivery

- Mobile home and trailer gas piping: crossover flex connector at mate line of adjacent units
- Gas and oil shutoffs required per usual locations - at but not inside the appliance cover
- Gas meter base: if a gas meter is installed, the manufacturer may specify the minimum distance from the gas inlet; because installation is done on limited budget it's often by people who are not trained and don't know these or other safety requirements
- Gas piping supplying LP gas to the mobile home, trailer, or double-wide home is often not protected from damage

Inspecting Fuel Storage

- LP Tanks
- Fuel Oil Tanks

Inspecting Water Heaters

- Gas-fired water heater located in sleeping areas
- Gas or oil fired water heaters in a tight utility closet without adequate combustion air
- Electric (usually) water heaters often with bad wiring connections
- Water heater located outdoors (not a location supported by the equipment)

Freeze Protection

- In freezing climates, failure to protect water supply piping (& drain traps) from freezing. If you see supply piping with a stunning number of small parts and solder joints and repairs (photo at left) that may indicate a history of frozen pipes in that unit.
- Heat Tapes - use metal-braid shielded type connected to GFCI so if there is an electrical short the circuit breaker will trip or fuse will blow

Storm Water Management

Manufactured homes typically do not have any storm water management aka gutters, downspouts and downspout extensions. Paired with typically poor site preparation and a style of construction that is easily damaged by moisture, many issues with manufactured homes can be mitigated from proper storm water management.

Moisture

One of the biggest on going issues with manufactured homes:

- Low quality materials
- Inadequate site drainage
- Poor storm water management
- Lack of insulation
- Missing air/water barrier in crawl space

Mold

- Because of the extensive moisture related issues with moisture and manufactured homes, mold becomes a serious factor and risk.

Mold Damage

- Because the construction is cheaper and unique, renovating the home may cost more than the replacement depending on how extensive the damage due to mold.

Manufactured Home Inspection Reporting

Normal inspection reporting standards for conventionally constructed single family residential still applies.

Manufactured Home Inspection Reporting

Additional documentation should include:

- Types, number, and spacing of anchoring straps/anchors
- HUD Certification Label
- HUD Data Plate
- Manufacturer's information
- Climate and Wind Zone Rating
- If it appears to be modified

Photos

Ensure good documentation with representative photos for:

- Anchors
- Tiedowns
- Leveling systems
- Bracing
- Foundation Piers or Columns
- Skirting