

WELCOME TO THE INTERNET CONTINUING EDUCATION COURSE

Revised 1/2020

John W. Maille
Executive Director



STATE OF OKLAHOMA
USED MOTOR VEHICLE AND PARTS COMMISSION
421 N.W. 19th SUITE 330
OKLAHOMA CITY, OKLAHOMA 73103
TELEPHONE (405) 521-3600
FAX (405) 521-3604

To: Oklahoma Licensed Manufactured Home Dealers, Manufactured Home Manufacturers,
Manufactured Home Installers, and Certified Inspectors.

Re: **New I-Form and Oklahoma Installation Fees effective November 1, 2019.**

The I-Form to report **ALL** installations of manufactured homes in Oklahoma has been updated along with the Monthly Manufacturer's Shipment Report of HUD Homes. The I-form for **all** (new or used) manufactured home installations is to be completed and sent to the Used Motor Vehicle and Parts Commission.

New manufactured home installations (first time home being installed) **require** a Certified Installation Inspector, Local Authority Having Jurisdiction (LAHJ), or Licensed Engineer for review and approval.

*****New Home Installation Inspection Fees:** Any manufactured home **manufacturer** who sells a new manufactured home to be shipped to or sited in the State of Oklahoma shall pay an installation inspection fee of \$75.00 for each new single-wide manufactured home and \$125.00 for each new multi-section home. The fees shall be due on the 15th day of the month subsequent to the month in which a home is shipped to a dealer or sited in the State of Oklahoma. The Monthly Manufacturer Shipment Report of HUD Homes should be **attached** to fee payment.

Used manufactured home installations (subsequent installations other than new) do not require a "certified inspection" but must comply with Manufacturer's Installation Manual, Oklahoma Generic Standards or Site Specific Engineered Plans.

*****Used Home Installation Inspection Fees:** A used manufactured home inspection fee of \$75.00 (single or multi-section) shall be paid by the **installer** at or before the time of installation of **any used** manufactured home sited and installed in the State of Oklahoma. The I-Form(s) and fee payment need to be attached and mailed or delivered in person to the UMVPC within 30 days of installation. Sending singular check/money order with multiple I-Forms is acceptable. Payment must correlate (match) with number of I-Forms. EXAMPLE: Three I-Forms = \$225.00

All Manufactured Home Dealers- Be aware of these requirements. Confirm that the Manufacture (if applicable), Engineered plans (if applicable), Installer and/or Certified Inspector are Oklahoma licensed/certified. Non-compliance to *State Law*, by any of these before mentioned entities, may have consequences that affect your business.

Payment of Fees- Accepted by Check or Money Order only. **Payable to UMVPC.** Please visit the website www.umvpc.ok.gov for additional forms.

Contact- Joel.Ross@umvpc.ok.gov or (405) 521-2488 for further assistance if needed.

INTERNET COURSE

- This continuing education course has been approved for the 8 hour Continuing Education requirement required by the state of Oklahoma every 3 years.
- This education will be applied for renewal of the bi-annual Installers License with the Used Motor Vehicle and Parts Commission every odd year by December 31.
- This internet course is for Continuing Education Only. You must already hold an Manufactured Home Installers License to receive this CE credit.

This Internet Course is
not approved for the
education requirement
for Certified
Installation Inspector.

Contact MHAO for
more information at
800-234-6426.

EXAM

- At the end of the course there will be an Exam.
- Your exam is an open book
- There will be approximately 50 questions
- Once you complete the exam you need to mail it to MHAO

CERTIFICATE OF COMPLETION

- Once MHAO receives your Exam and proof of payment you will be mailed a CERTIFICATE OF COMPLETION.
- YOU MUST PROVIDE A COPY OF THIS CERTIFICATE WHEN YOU SUBMIT YOUR DOCUMENTATION TO THE STATE, IN ORDER TO OBTAIN YOUR LICENSE.
- Keep Certificate in a safe place for future reference.

ORGANIZATIONS

OKLAHOMA MANUFACTURED HOUSING ASSOCIATION (MHAO)

A non-profit 501(c)6 trade organization that represents members from all segments of the manufactured housing industry including manufacturers, retailers, service and supplier members, financial services, installers, transporters and community owners which work together, through their elected officials to educate and positively affect legislation and regulatory processes at the local, state and national level

**MHAO is a resource for the industry.
WE do not process or
issue your installers license**

ORGANIZATIONS

USED MOTOR VEHICLE AND PARTS COMMISSION (UMV&PC)

- THIS IS THE STATE'S REGULATORY ENFORCEMENT AGENCY
- RESPONSIBLE FOR ENFORCING THE STATE LAW RELATIVE TO THE INSTALLATION OF MANUFACTURED HOUSING, PROCESSING AND GRANTING LICENSES, IMPOSING PENALTIES, SUSPENDING OR REVOCATION OF LICENSE AND INVESTIGATING CONSUMER COMPLAINTS

WHO MUST BE LICENSED?

OAC 765:37-3-5

The Installer principal, general manager or person with ultimate supervisory authority over the installation business

Each Installer's business must have at least one licensed person who will have actual authority over any employees involved in the installation of manufactured homes

OKLAHOMA LICENSING REQUIREMENTS

MUST HAVE A PLACE OF BUSINESS where LICENSE IS DISPLAYED and RECORDS KEPT FOR 5 YEARS

INSURANCE REQUIREMENTS: \$25,000 general liability including completed operations / hazard coverage

INSTALLERS MUST CARRY THEIR STATE ID CARD

**INSTALLERS EDUCATION REQUIREMENTS
continuing education every three (3) years
LICENSES ARE RENEWED EVERY 2 YEARS**

NEW REQUIREMENT: OSBI BACKGROUND CHECK

Noncompliance can result in revocation of licenses

NEW HOMES VERSUS
USED HOMES
(ALWAYS REMEMBER
THESE POINTS)

Oklahoma Requires Installation of New Homes in Accordance with HUD Installation Standards

- Manufacturer's Instructions Are Found In The Installation Books That Come With Each Home
- Manufacturer's Instructions Are Reviewed And Approved By HUD
- The Manufacturer's Instructions Are Written To Comply With HUD Minimum Installation Standards
- Alternative Systems that are approved by the manufactured home manufacturer prior to use.

OKLAHOMA REQUIRES INSTALLATION OF USED HOMES IN ACCORDANCE WITH

- Manufacturers Installation Instructions
- Local Authority Having Jurisdiction
- Alternative Systems that are approved by the manufactured home manufacturer prior to use.

Or

- Oklahoma's "Generic" Standards

A COPY OF THE OKLAHOMA GENERIC RULES RELATING TO
INSTALLATION IS IN YOUR PACKET

(They are also found at 37 OAC 765:37-7-1 through 5)

INSTALLATION PAPERWORK REQUIRED FOR **ALL** HOMES

- INSTALLER'S INVOICE – your contract with the customer or the dealer
- INSTALLATION REPORT – RETURN PAGE 1 TO THE STATE NO LATER THAN THE 15TH OF THE MONTH SUBSEQUENT TO THE MONTH IN WHICH THE INSTALLATION IS PERFORMED OR WITHIN 30 DAYS FROM DATE INSTALLED
- INSTALLATION LABEL – must be placed on or near the breaker box.

INSTALLER'S INVOICE

OKLAHOMA RULES REQUIRE THE INSTALLER TO USE AN INVOICE

THIS INVOICE HAS BEEN APPROVED

A COPY IS IN THE COURSE BOOK

INSTALLERS INVOICE		NO.
FROM:	DESCRIPTION OF HOME: (Type, Make and Model)	
TO:	WORK PERFORMED AT:	
DATE:	INSTALLER LICENSE NO.:	YOUR WORK CODE NO.:
DESCRIPTION OF WORK PERFORMED		
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
In compliance with Oklahoma state laws and rules this home will be installed using the following installation code: 1) <input type="checkbox"/> State's Generic Standard 2) <input type="checkbox"/> Approved Plan by a Licensed Professional Engineer. If #2 indicate what plan: _____		
All Material is guaranteed to be as specified, and the above work was performed in accordance with the specifications provided for the above work and was completed in a substantial workmanlike manner for the agreed sum of _____ Dollars (\$ _____).		
This is a <input type="checkbox"/> Postal <input type="checkbox"/> Full Invoice due and payable by: _____ on _____		
In accordance with our <input type="checkbox"/> Agreement <input type="checkbox"/> Proposal No. _____		
Dated: _____		
Installer Signature: _____ Customer Signature: _____		

SET-UP INSPECTION Form I FOR NEW and USED HOMES

All **NEW** manufactured home installations are inspected by a State Certified Installation Inspector.

Set up crews or retailers with a State Certified Installation Inspector on staff can self inspect.

REGULATION: check one

New

Used (Add Date & No.)

A separate subject of home inspection fee of \$25 shall be paid by the installer or retailer at the time of installation of any used manufactured home sold and installed in the State of Oklahoma.

MS-1224



STATE OF OKLAHOMA
Used Motor Vehicle & Parts Commission
421 NW 15th #333, Oklahoma City, OK 73103
405/521-5000 - 405/521-3004 Fax
Email: okumvpc@amvpc.ok.gov

SEND METHOD:

	Dealer	LRV	Other
Mail			
Fax			
Email			
Hand			
Date sent:			

SET-UP INSPECTION - Form I
FORMS MUST BE SUBMITTED ON ALL **NEW** AND **USED HOMES** no later than the 15th of the month subsequent to the month in which the installation is performed.

Date Home Installed: _____ Circle: **Passed** **Failed** **Resubmit**

Homeowner: _____ Phone No: _____

Street Address: _____ City/Town/Zip: _____ County: _____

Make/Model: _____ Year: _____ Color: _____

Serial Number: _____ HUD Number(s): _____

Check one: Manufacturer's Installation Instructions Professional Engineer's Instructions Oklahoma's Current Code

Retailer: _____ License #: _____

Street Address: _____ City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____ E-Mail Address: _____

Installer: _____ License #: _____

Street Address: _____ City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____ E-Mail Address: _____

FOR NEW HOMES ONLY

Must be completed by certified installation inspector, local authority having jurisdiction (LAWJ) or licensed engineer.

Name (Printed): _____

Installation Inspector Certification Number: _____ Expires: _____

Address & Phone Number: _____

I hereby certify on this _____ day of _____, 20____ that the above inspection results are true and correct to the best of my knowledge and belief.

Signature: Certified Installation Inspector, Municipal Inspector or Licensed Engineer: _____

KEEP THE
WHOLE FORM
IN YOUR FILES
FOR AT LEAST
FIVE (5)
YEARS

REGISTRATION: check one

New

Used (All Fees & Tax)

*Used motor vehicle home inspection fee of \$15 shall be paid by the installer as an item on the item of installation of any used motor vehicle home used and installed in the State of Oklahoma.

OK-1128



STATE OF OKLAHOMA
Used Motor Vehicle & Parts Commission
421 NW 13th #300, Oklahoma City, OK 73103
405/521-3600 - 405/521-3604 Fax
Email: okumvpc@umvpcok.gov

SEND METHOD:

	Dealer	UMV	Other
Mail			
Fax			
Email			
Hand			

Date sent: _____

SET-UP INSPECTION - Form 8
FORMS MUST BE SUBMITTED BY ALL NEW AND USED HOMES no later than the 15th of the month subsequent to the month in which the installation is performed.

Date Home Installed: _____ Circle: **Passed** **Failed** **Resubmit**

Homeowner: _____ Phone No: _____

Street Address: _____ City/Town/City: _____ County: _____

Make/Model: _____ Year: _____ Color: _____

Serial Number: _____ HUD Number(s): _____

Check one: Manufacturer's/Installer's Instructions Professional Engineer's Instructions Oklahoma's General Code

Retailer: _____ License #: _____

Shipping Address: _____ City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____ E-Mail Address: _____

Installer: _____ License #: _____

Shipping Address: _____ City: _____ State: _____ Zip Code: _____

Phone Number: _____ Fax Number: _____ E-Mail Address: _____

FOR NEW HOMES ONLY

Must be complete by certified installation inspector, Local Authority having jurisdiction (LAWJ) or Licensed Engineer

Name (Printed): _____

Installation Inspector Certification Number: _____ Engineer: _____

Address & Phone Number: _____

I hereby certify on this _____ day of _____, 20____ that the above inspection results are true and correct to the best of my knowledge and belief.

Signature: Certified Installation Inspector, Municipal Inspector or Licensed Engineer: _____

PLEASE NOTE:

THE FEE OF \$75 MUST
ACCOMPANY THE INSTALLATION
REPORT ON **USED HOMES**

ALL HOME INSTALLATIONS

*2"x3" Installation Label
SHALL BE placed by or
near the breaker box*

Oklahoma Manufactured Home Installation Label

Installer's Name _____
Business Name _____
Business Phone _____
License Number _____
Installation Date _____

*Place on or near Breaker Box

**You are allowed to design your own label
as long as the above information is
included**

Overview of Set Up Agreements

- Hand shakes are a “thing of the past”
- If it’s not in writing, it’s not going to happen
- Pursuant to state law you “shall” have a Installers Invoice signed by you and the “other” party and kept in your files for 5 years on all new and used homes you install – no exception!
- Use your Installers Invoice on all bids and projects
- Your Installers Invoice is a binding contract

BEST PRACTICES

- DURING THE INITIAL SALE OR AGREEMENT TO DO THE SETUP YOU SHOULD NEVER QUOTE A "STANDARD PRICE" FOR THE INSTALLATION OF A HOME
- YOU MAY PRICE IT TOO LOW OR TOO HIGH. EITHER WAY COULD NOT ONLY COST YOU THE INSTALLATION, BUT IT COULD COST THE RETAILER THE SALE. IT COULD INTERFERE WITH THE FINANCING OF THE HOME

BEST PRACTICES

- THE BEST PRACTICE IS TO MAKE NO COMMITMENT ON THE SETUP COST UNTIL YOU HAVE HAD A CHANCE TO SURVEY THE SET
- YOU CAN DISCUSS "TYPICAL" SETUP COST, BUT YOU SHOULD NEVER GIVE A PRICE QUOTE OR ANY EXPECTATIONS OF A PRICE UNTIL YOU OR SOMEONE FROM YOUR COMPANY LOOKS AT THE ROUTE TO THE SITE AND THE SITE ITSELF

BEST PRACTICES

- IT IS BETTER TO ESTABLISH A REPUTATION OF **BEING FAIR AND GIVING A QUALITY SETUP** RATHER THAN GETTING A REPUTATION FOR BEING THE FASTEST AND CHEAPEST
- IT IS BETTER TO EDUCATE THE BUYER ON THE REASONS FOR NOT GIVING THEM A BLIND PRICE QUOTE ON A SETUP

BEST PRACTICES

3 WAYS TO PRICE A SETUP

- 1. No inspection at all** – You rely on the owner's description of the route to the job as well as the lay of the land where the home is to be set
- 2. Set-up Price is Estimated, Subject To An Inspection** – No inspection is done prior to the sale. This gives you the option to change the price if what was described isn't what is there

BEST PRACTICES

3. The Site is Inspected Before or During the Sale Process – You visit the site with the buyer, to talk about which direction that the home is to be set. This gives you the opportunity to discuss options that the homeowners wants.

THIS IS THE BEST OPTION!

EVERYTHING THAT IS NECESSARY TO COMPLETE THE INSTALLATION OF THE HOME

- **ALWAYS USE A CHECKLIST FOR YOUR
SETUP PROCEDURE. THIS WAY YOU WILL
NOT FORGET AN ITEM. THIS ALSO GIVES
YOU THE OPPORTUNITY TO SHOW WHY
YOUR COSTS ARE A LITTLE MORE OR
EVEN LESS THAN YOUR COMPETITION**

**TWO PAGE
INSPECTION
CHECKLIST
USED BY
STATE
INSPECTORS**

Homeowner:

Address:

Manufacturer:

Consolidated Oklahoma State Set Up Inspection Form

Item	Yes	No	N/A
1 If a New home, were manufacturer's installation instructions available?			
Comment:			
2 Was the 2x3 Installation Label placed by the breaker box?			
Comment:			
SITE PREPARATION			
3 All organic material (i.e., grass, loose top soil, etc.) was removed from under each foundation support?			
Comment:			
4 Proper drainage has been provided per installation instructions to prevent water and moisture from collecting under the home?			
Comment:			
5 Vapor barrier, if required by installation instructions, has been properly installed?			
Comment:			
6 If skirting is installed, proper ventilation is provided?			
Comment:			
SUPPORT SYSTEMS			
7 Footings are on the proper size and construction for soil conditions?			
Comment:			
8 If used, is the alternate foundation system (stabilizing system) installed properly?			
Comment:			
9 Spacing of piers is in accordance with the installation instructions?			
Comment:			
10 Pier construction meets installation instructions?			
Comment:			
11 Marriage line is blocked at all ridge beam support columns?			
Comment:			
12 Piers or other acceptable support is located at all exterior door location and other large openings as required by the installation instructions?			
Comment:			
13 Pier blocking at fireplaces, recessed entries, porches, etc. has been provided as required by installation instructions?			
Comment:			
14 Piers are shimmed tight against the I-beam?			
Comment:			
15 Correct anchors for soil conditions?			
Comment:			
16 Anchor strap degree of angle per installation instructions?			
Comment:			
17 Anchors installed to full depth per installation instructions?			
Comment:			
18 Anchor straps wrapped properly at anchor heads?			
Comment:			
19 Anchor straps installed at I-beam properly?			
Comment:			
20 Anchors are correctly spaced?			
Comment:			
21 On units with factory installed tie down straps and/or brackets, straps and anchors are installed per installation instructions?			
Comment:			
22 If the manufacturer requires "longitude anchoring" are they installed per the installation instructions?			
Comment:			
23 Stabilizer plates are installed at anchor locations as per anchor manufacturer's installation instructions?			
Comment:			
24 Anchors are within 24 inches of ends of home?			
Comment:			

UTILITIES		Yes	No	N/A
25	Assure that the drain for the water heater drip pan does not terminate under the home?			
Comment:				
26	Proper support has been provided on drain lines?			
Comment:				
27	Proper electrical connection between sections was made?			
Comment:				
DATA PLATES		Yes	No	N/A
28	Access was provided to data plate at time of inspection?			
Comment:				
FINISHING		Yes	No	N/A
29	All duct work, vents and drain lines are routed to perimeter of home?			
Comment:				
30	Proper support has been provided on all duct work?			
Comment:				
31	If damaged, bottom board has been repaired?			
Comment:				
32	Ventilation has been provided in roof?			
Comment:				
33	On multi-section units, the roof, walls and floors all appear to have been joined properly?			
Comment:				
34	All exterior siding is in place and free of damage?			
Comment:				
35	Alternate construction letter approval has been provided?			
Comment:				

Others present at time of inspection:

I, hereby certify on _____ (date) that as far as can be visually determined, the aforementioned home meets all requirements of State law and the installation method checked on the first page with the exception of the violations noted in this report.

Mid Home Installation Inspector's Signature & State Inspectors Certification Number (Different from Installers License Number)

Copy sent to: Dealer Installer Other:

Imminent safety hazards, which are marked with an asterisk (*), create imminent and unreasonable risks of death or severe personal injury. The following steps must be taken to correct the situation: - Address the violation IN WRITING within 2 BUSINESS DAYS after receiving the report. - Correct the violations within 14 BUSINESS DAYS after receiving the report.

Examples of an imminent safety hazard are:

1. Tie downs not properly installed. Improperly installed tie downs could be a safety hazard.
2. Improperly installed electric crossover.
3. Improperly installed gas line crossover.

All other violations are non-imminent safety hazards. The following steps must be taken to correct the situation:

1. Correct the violations within 30 days of receiving this report.
2. Amend the I-Form showing the home passed inspection and resubmit to the state

Recommended Corrective Action:

Add attachment if needed

IT is Better to Lose
A Few Setups
Than To Lose
Your Business

Reporting Injuries and Deaths

- Within 8 hours after the death of any employee from a work-related incident, or the inpatient hospitalization of three or more employees as a result of a work-related incident, the employer should orally report the death or injuries by telephone or in person to the Area Office of Occupational Safety and Health Administration (OSHA). Oklahoma is within Region 6, located in Dallas, Tx. Phone number is 214/767-4731.
- Title 29 Part 1926 – OSHA Handout

KNOW SOME OF THE DEFINITIONS/ABBREVIATIONS

- FEMA – Federal Emergency Management Agency
- HUD – US Department of Housing and Urban Development
- **LAHJ – LOCAL AUTHORITY HAVING JURISDICTION**
- MHCSS – Manufactured Home Construction and Safety Standards

Homes on Display



 **Page 6-7 in workbook**

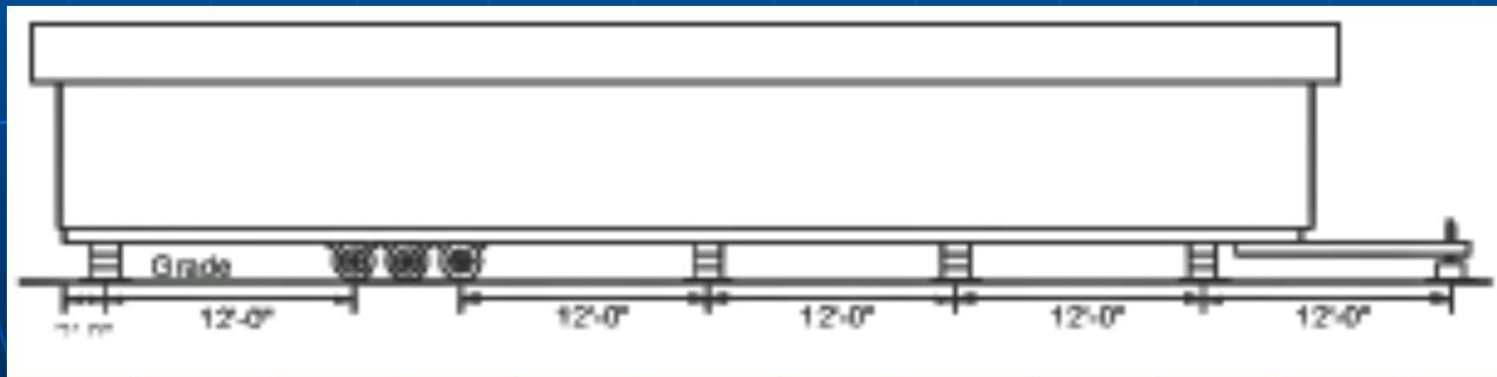
DISPLAY AND STORAGE OF THE HOME

➤ WEATHER PROTECTION

- IF THE INSTALLATION IS NOT STARTED IMMEDIATELY UPON DELIVERY OF THE HOME, THE RETAILER AND/OR INSTALLER HAS THE RESPONSIBILITY TO ENSURE THE EXTERIOR WEATHER PROTECTION COVERING OF MARRIAGE WALLS AND THE ROOF OF HOMES HAS NOT BEEN DAMAGED DURING SHIPMENT.

SUPPORTING A HOME FOR DISPLAY

- WHEN A NEW OR USED HOME IS **TO BE DISPLAYED** AT A RETAIL LOCATION, TEMPORARILY BLOCK AND SUPPORT THE HOME.
- SINGLE SECTION HOMES WITH SINGLE BLOCK PIERS SPACED **NO FURTHER APART THAN 12 FEET ON CENTER** BENEATH EACH I-BEAM



DISPLAY OF SINGLE SECTION HOMES

- SINGLE SECTION HOMES WITH SINGLE BLOCK PIERS SPACED **NO FURTHER APART THAN 12 FEET** ON CENTER BENEATH EACH I-BEAM
- THE TIRE AND AXLE SYSTEM MAY BE USED AS ONE OF THESE REQUIRED SUPPORT and
- THE HITCH JACK MAY BE USED AS ANOTHER

DISPLAY OF SINGLE SECTION HOMES

- LOCATE THE FIRST PIER NO FURTHER THAN TWO FEET FROM THE REAR END OF THE HOME.
- PLACE ADDITIONAL PIERS ALONG THE PERIMETER ON EITHER SIDE OF OPENINGS GREATER THAN FOUR FEET (I.E. SLIDING GLASS DOORS, BAY WINDOWS, ETC.)

MULTI-SECTION DISPLAY

- FOR MULTI-SECTION HOMES, LOCATE ADDITIONAL PIERS ALONG THE MARRIAGE LINE UNDER SUPPORT COLUMNS. THESE LOCATIONS WILL BE MARKED BY THE MANUFACTURER.

MULTI-SECTION DISPLAY

- FOR ALL HOMES, PLACE FOOTINGS BELOW EACH PIER.
- FOOTINGS MAY BE PLACED DIRECTLY ON THE SURFACE GRADE WITHOUT EXCAVATION AND MAY BE ABS PADS, 2X10 BY 16 INCH LONG PRESSURE TREATED LUMBER OR 16X16 BY 4 INCH THICK CONCRETE PADS.

SUPPORTING A HOME FOR STORAGE

- TO PREVENT DAMAGE TO HOMES BEING STORED **BUT NOT ON DISPLAY** FOR A PERIOD EXCEEDING 30 DAYS, LOCATE PIERS BELOW EACH I-BEAM NO FURTHER THAN TWO FEET FROM EACH END OF THE HOME AND AT THE APPROXIMATE CENTER OF THE HOME LENGTH.

Getting Started

Installing a Home

Manufacturer Address

Plant Number _____

Date of Manufacture	Hud Label No.(s)
Manufacturer's Serial Number and Model Unit Designation	
Design Approval by (D.A.P.I.A.)	

This Manufactured home is designed to comply with the federal manufactured home construction and safety standards in force at time of manufacture.
(For additional information, consult owner's manual.)

This Factory Installed equipment includes:

Equipment	Manufacturer	Model Designation
For Heating	_____	_____
For air cooling	_____	_____
For cooking	_____	_____
Refrigerator	_____	_____
Water heater	_____	_____
Clothes Dryer	_____	_____
Dishwasher	_____	_____
Garbage Disposal	_____	_____
Fireplace	_____	_____

Home Constructed For Zone I Zone II Zone III

This home has not been designed for the higher wind pressure and anchoring provisions required for oceancoastal areas and should not be located within 15000 of the coastline in Wind Zones I and II, unless the home and its anchoring and foundation system have been designed for the increased requirements specified for Exposure D in ANSIASCE 7-88.

This home has _____ has not _____ been equipped with storm shutters or other protective coverings for windows and exterior door openings. For homes designed to be located in Wind Zones I and II, 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 manufacturers printed instructions.

Basic Wind Zone Map

Manufacturer Address

This manufactured home has been thermally insulated to conform with the requirements of the Federal Manufactured Home Construction and Safety Standards for all locations within U.S. Value Zone _____. (see map at bottom) Heating equipment manufacturer and model (see list at left).

The above heating equipment has the capacity to maintain an average 70° F temperature in this home at outdoor temperatures of _____°F.

To maximize furnace operating economy, and to conserve energy, it is recommended that this home be installed where the outdoor winter design temperature (97 1/2%) is no higher than _____°F.

The above information has been calculated assuming a maximum wind velocity of 15 mph at standard atmospheric pressure.

Design Roof Load Zone Map North 40 PSF South 20 PSF

Middle 40 PSF Other ____ PSF

- LOCATE DATA PLATE
- TYPICALLY INSIDE A KITCHEN CABINET DOOR OR ON A WALL PANEL
- DATA PLATE WILL BE USED TO VERIFY THAT THE HOME WAS DESIGNED FOR THE PROPER LOCATION

CONFIRM WIND ZONE

- IDENTIFY THE WIND ZONE FOR THE HOME – **OKLAHOMA IS WIND ZONE I**
- NO HOME MAY BE LOCATED IN A HIGHER WIND ZONE THAN THAT INDICATED ON THE DATA PLATE
- A HOME MAY BE LOCATED IN A LOWER WIND ZONE THAN THAT INDICATED ON THE DATA PLATE
- IF THE HOME DOES NOT CONFORM TO THESE RULES, CONTACT THE MANUFACTURER IMMEDIATELY

Wind Zone Map



Zone 1 – 15 PSF horizontal

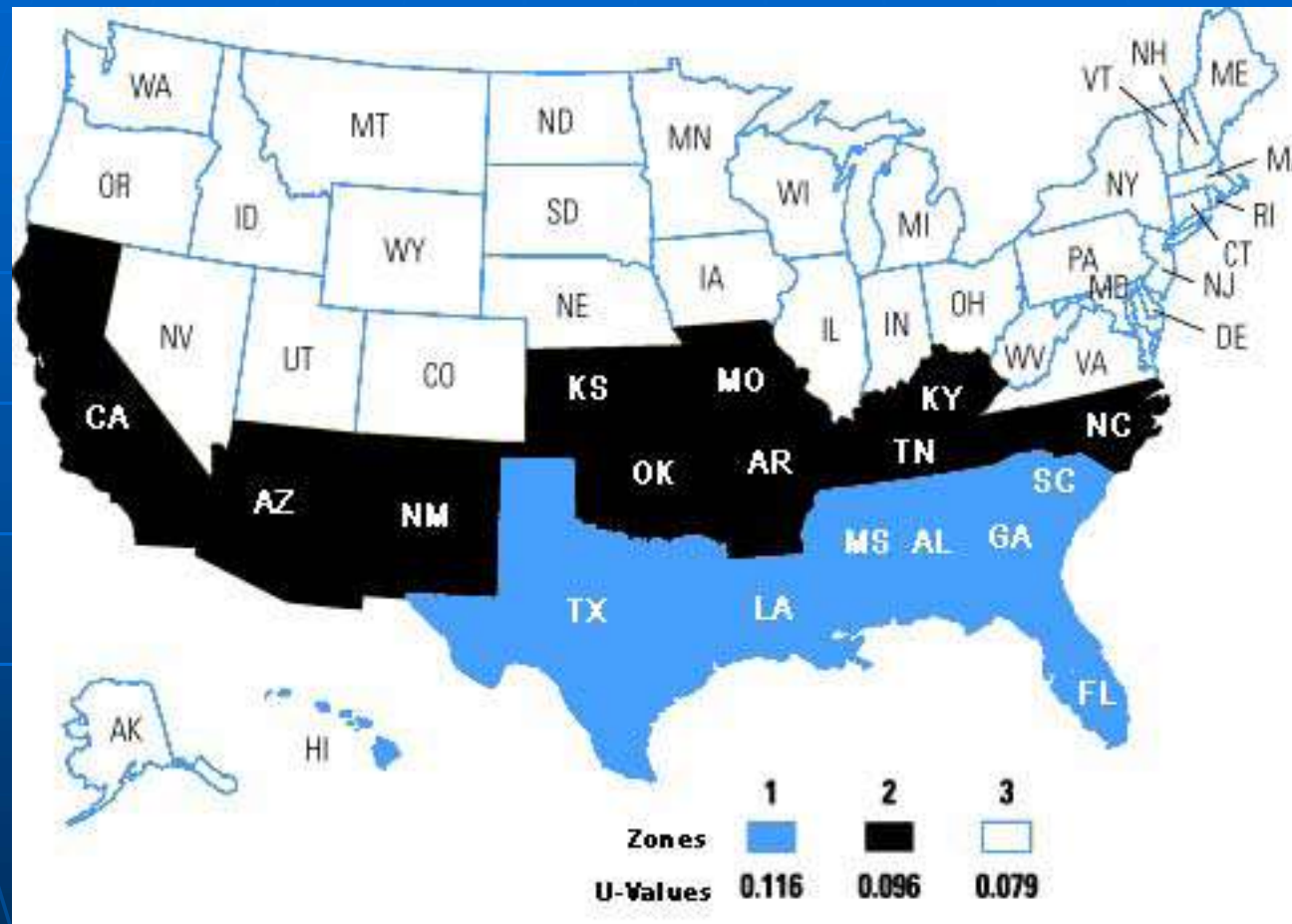
Zone II – 100 mph wind

Zone III – 110 mph wind

CONFIRM THERMAL ZONE

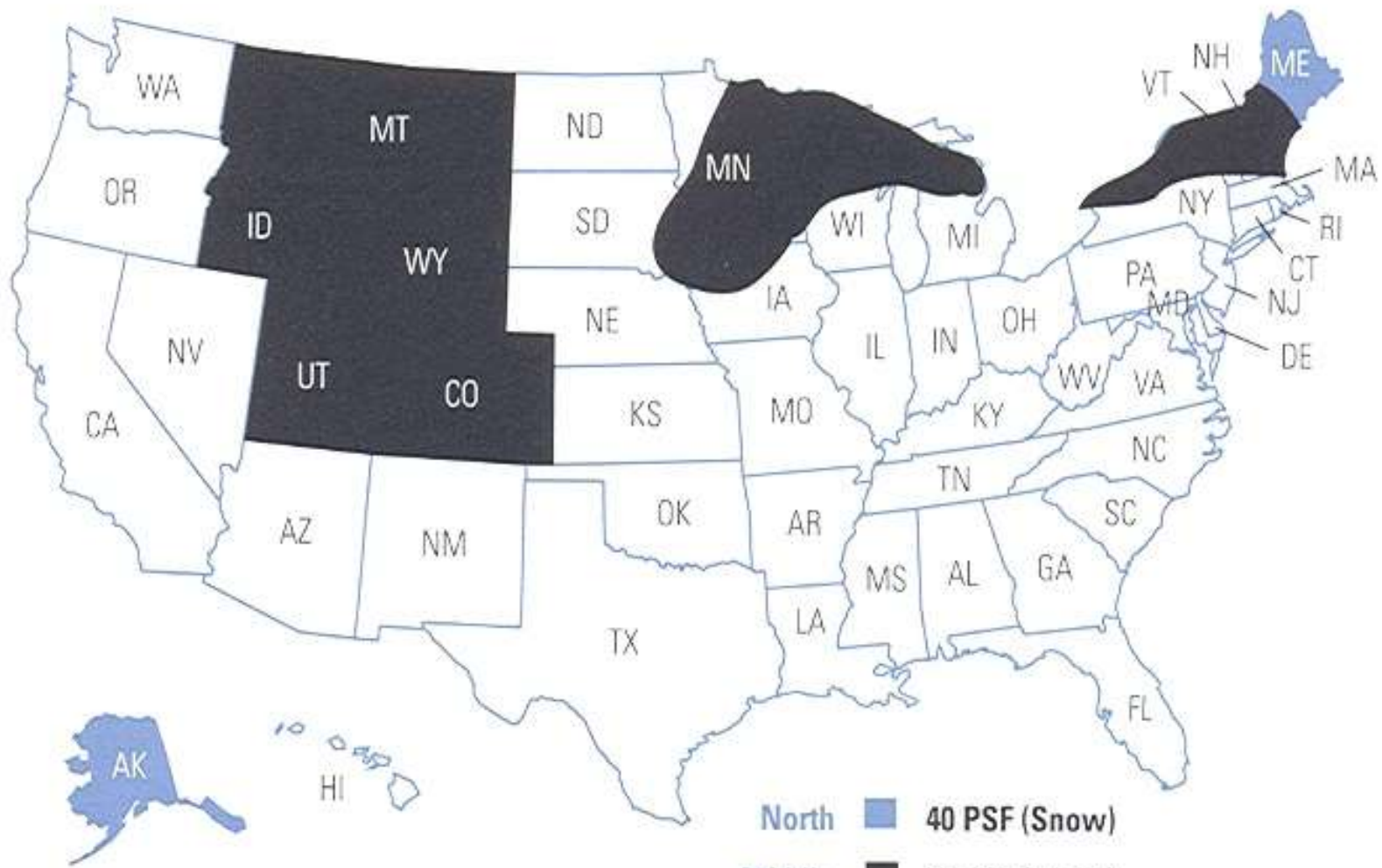
- IDENTIFY THE THERMAL (UO) ZONE FOR THE HOME. VERIFY THAT THE HOME CONFORMS TO THE FOLLOWING RULES
 - NO HOME MAY BE LOCATED IN AN AREA WITH A HIGHER THERMAL ZONE NUMBER THAN THAT INDICATED ON THE DATA PLATE
 - A HOME MAY BE LOCATED IN A LOWER THERMAL ZONE THAN THAT INDICATED ON THE DATA PLATE
 - IN NO CASE MAY A HOME DESIGNATED FOR INSTALLATION IN THE "HUMID & FRINGE CLIMATE" BE LOCATED OUTSIDE THIS REGION
 - IF THE HOME DOES NOT CONFORM TO THESE RULES, CONTACT THE MANUFACTURER IMMEDIATELY
 - **OKLAHOMA IS THERMAL ZONE II**

THERMAL ZONE



CONFIRM ROOF LOAD ZONE

- IDENTIFY THE ROOF LOAD ZONE FOR THE HOME. VERIFY THAT THE HOME CONFORMS TO THE FOLLOWING RULES.
 - NO HOME MAY BE PLACED IN AN AREA WITH A HIGHER ROOF LOAD THAN THAT INDICATED ON THE DATA PLATE – **OKLAHOMA HAS A 20 PSF ROOF LOAD**
 - A HOME MAY BE LOCATED IN AN AREA WITH A LOWER ROOF LOAD THAN THAT INDICATED ON THE DATA PLATE



- North ■ 40 PSF (Snow)
- Middle ■ 30 PSF (Snow)
- South 20 PSF (Minimum)

PREPARE THE SITE

A PROPERLY PREPARED SITE
IS CRITICAL TO A GOOD
QUALITY INSTALLATION AND
THE LONG TERM STABILITY
OF THE HOME

SITE PREPARATION

- THE HOME MANUFACTURER HAS NO CONTROL OVER THE SITE PLANNING AND INSTALLATION OF THE HOME UNLESS THE MANUFACTURER IS RESPONSIBLE FOR THE HOME'S INSTALLATION.
- FINAL RESPONSIBILITY FOR SITE PREPARATION, INCLUDING SOIL STABILITY AND FROST HEAVE CONTROL, **LIES WITH THE INSTALLER**

SITE PREPARATION

- AN IMPROPERLY PREPARED SITE MAY RESULT IN THE DENIAL OF A FOUNDATION-RELATED WARRANTY CLAIM

SITE APPROPRIATENESS

- IF THE SITE IS NOT ACCESSIBLE, NOT APPROPRIATE FOR THE PLANNED SUPPORT SYSTEM OR CANNOT BE PROPERLY GRADED, NOTIFY THE PURCHASER AND THE RETAILER, WITH THE REASONS WHY THE SITE IS UNSUITABLE. DO NOT INSTALL THE HOME UNTIL ALL ISSUES ARE REMEDIATED.

PLAN SITE ACCESS

- PLANNING THE ROUTE TO THE SITE IS TYPICALLY THE RESPONSIBILITY OF THE RETAILER OR TRANSPORTER
- WHOEVER IS RESPONSIBLE MUST SECURE APPROPRIATE PERMITS
- AVOID DITCHES, BERMS, STEEP SLOPES AND SOFT GROUND
- AVOID MOVING OVER STEEP CHANGES IN GRADE (20 DEGREES OR MORE)



This was actually a whole house being moved...but we've heard of a few mfd homes taking out a bridge or two

DO NOT
ALLOW
BRANCHES,
BUSHES, OR
OTHER
FOLIAGE TO
SCRAPE
AGAINST THE
HOME AS THE
HOME IS
MOVED TO
THE SITE



DETERMINE HOME LOCATION AND LAYOUT

- THE HOME LOCATION MAY HAVE ALREADY BEEN DETERMINED BY OTHERS. IF NOT:
 - PLAN THE HOME LOCATION AND LAYOUT IN COMPLIANCE WITH LOCAL CODES
 - FOR EXISTING INFRASTRUCTURE, SUCH AS UNDERGROUND CABLES, PIPES, AND ELECTRICAL LINES
Contact OKIE at 800-522-OKIE or 811

FIRE SEPARATION

- COMPLY WITH ANY LAHJ FIRE SEPARATION REQUIREMENTS OR THE REQUIREMENTS NFPA 501A, 2003 EDITION (CHAPTER 6)



This site
plan will not
work in
Oklahoma

PLANNING THE SITE IMPROVEMENTS

CONSIDER THE FOLLOWING:

- THE HOME LOCATION SHOULD BE LEVEL
- AVOID CONTACT WITH LARGE TREES, STEEP SLOPES, POORLY DRAINED AREAS, AND POTENTIAL FLOOD ZONES
- PRESERVE TREES AND SHRUBS FOR SHADE, VISUAL SCREENS AND WINDBREAKS
- PLAN THE DRIVEWAY, PARKING AREA, SEPTIC, WELL, OTHER STRUCTURES AND UTILITY LINES.
- CONSIDER FUTURE ADDITIONS, SUCH AS SCREEN ROOMS, PORCHES AND AWNINGS
- SITE THE HOME AWAY FROM NATURAL WATER PATHS



This is not the
ideal spot to
place a home.
WE wouldn't want
to live here -
would YOU?

The site really
does need to be
leveled and
cleared.



VISIT THE
SITE WHERE
THE HOME IS
GOING TO BE
SITED AND
BE PREPARED
FOR ANY
SURPRISES

CLEAR AND GRADE THE SITE

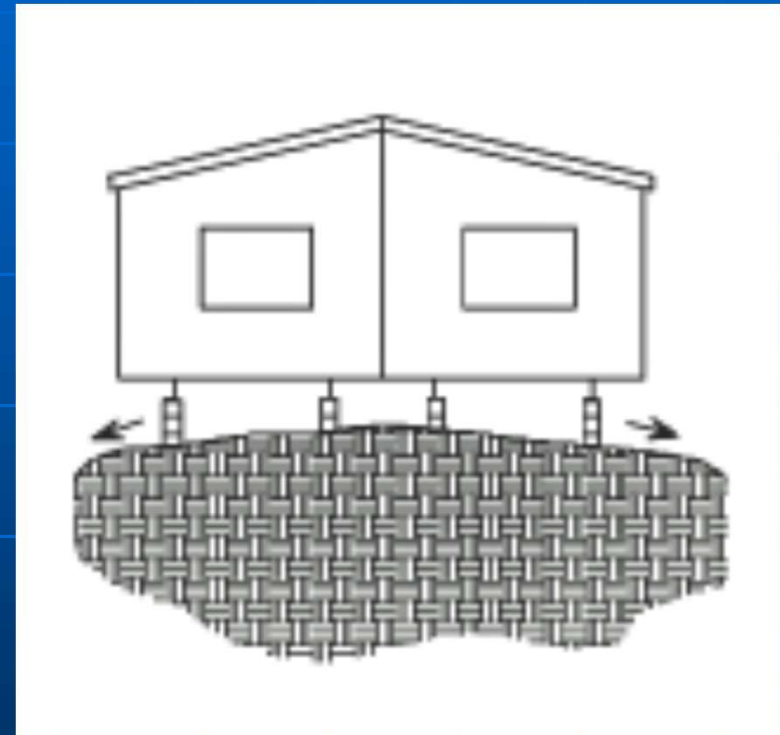
- TRIM OVERHANGING FOLIAGE CONSIDERING FUTURE GROWTH, POTENTIAL STORMS, SWAYING IN WIND AND SNOW/ICE WEIGHTED BRANCHES.
- REMOVE ORGANIC MATERIAL SUCH AS VEGETATION, WOOD, ROOTS, TWIGS, DEAD BRANCHES, GRASS, AND BRUSH FROM DIRECTLY UNDER THE HOME.

➤ REMOVE ANY DEBRIS THAT COULD BECOME TERMITE INFESTED FROM THE SITE AND SURROUNDING AREA.

➤ REMOVE ALL OTHER DEBRIS FROM THE HOME LOCATION, INCLUDING ROOTS BENEATH FOOTING LOCATION. PROPERLY DISPOSE OF ALL ITEMS.

CROWN THE SITE

CROWN THE SITE
AWAY FROM THE
FOUNDATION
FOR THE **FIRST**
10 FEET WITH
A MINIMUM
SLOPE OF 1/2
INCH PER
FOOT.





**WHAT IS
WRONG
WITH THIS
PICTURE?**

**TO PREVENT
THIS FROM
HAPPENING
WATER NEEDS
TO FLOW AWAY
FROM THE HOME**

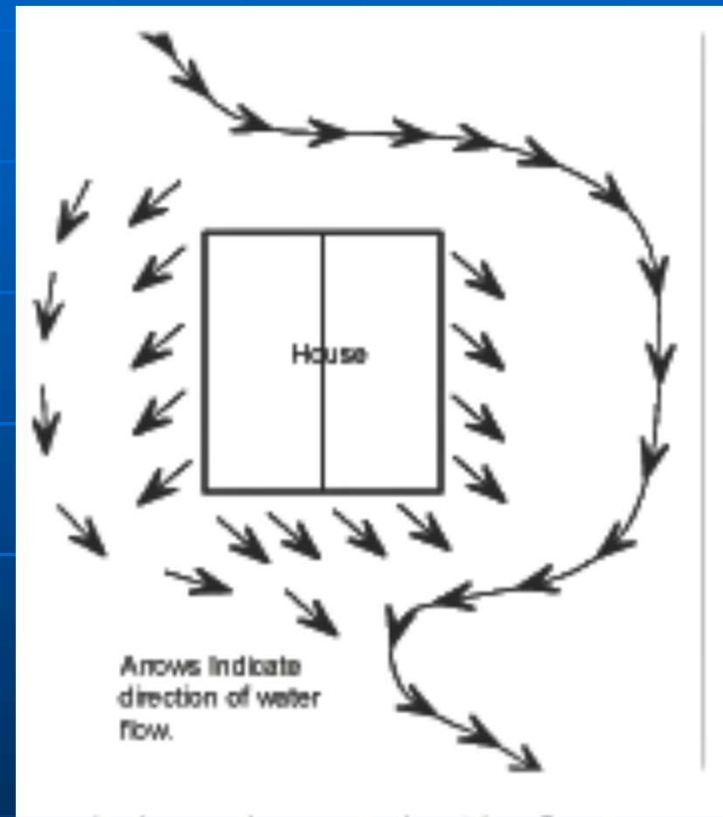


**STANDING
WATER UNDER
THE HOME CAN
VOID THE HOME
WARRANTY**



Grade the Site

- WHERE PROPERTY LINES, WALLS, SLOPES, OR OTHER PHYSICAL CONDITIONS PROHIBIT THIS SLOPE, PROVIDE THE SITE WITH DRAINS, SWALES, OR GRADING TO DRAIN WATER AWAY FROM THE STRUCTURE.



GRADE THE SITE – CON'T

- **ANY FILL** REQUIRED TO GRADE THE SITE SHOULD BE INORGANIC “CONTROLLED FILL” APPLIED IN A MAXIMUM OF FOUR INCH LAYERS, **COMPACTED** BETWEEN EACH LAYER TO AT **LEAST 90%** OF ITS MAXIMUM RELATIVE DENSITY.
- **DIRECT RUNOFF AWAY FROM THE SITE USING DITCHES AND BERMS**

GRADING THE SITE

- IF THE HOME WILL HAVE SKIRTING, **START GRADING FROM TWO FEET IN FROM THE EDGE OF THE HOME**
- GRADE THE GROUND SO THAT WATER UNDER PORCHES, DECKS, AND RECESSED ENTRIES **FLOWS AWAY FROM THE HOME.**
- IF PROPER **GRADING IS NOT POSSIBLE,** USE OTHER METHODS SUCH AS A DRAIN TILE AND AUTOMATIC SUMP PUMP SYSTEM TO REMOVE ANY WATER THAT MAY COLLECT UNDER THE HOME.

DETERMINE SOIL CONDITIONS

- EXAMINE THE SOIL TYPE UNDER THE PROPOSED HOME LOCATION TO MAKE SURE IT IS SUITABLE FOR PLACEMENT OF A HOME
- THE DESIGN OF THE HOME'S SUPPORT SYSTEM, INCLUDING FOOTINGS/PIER SPACING AND SIZE, WILL IN PART BE DETERMINED BY THE BEARING CAPACITY OF THE SOIL, AND IF GROUND ANCHORS ARE USED, BY THE SOIL'S WITHDRAWAL STRENGTH.

DETERMINE THE SOIL CONDITION

THE SOIL UNDER EVERY PORTION OF THE
SUPPORT SYSTEM MUST MEET THE
FOLLOWING CRITERIA:

- THE SOIL MUST BE FIRM AND UNDISTURBED
(NOT PREVIOUSLY EXCAVATED) OR FILL
**COMPACTED TO AT LEAST 90% OF ITS
MAXIMUM RELATIVE DENSITY.**
UNCOMPACTED FILL WILL SETTLE OVER TIME,
CAUSING THE HOME TO SHIFT AND BECOME
UNLEVEL

DETERMINE THE SOIL CONDITIONS

- FILL MUST NOT CONTAIN LARGE DEBRIS. THIS TOO WILL SETTLE OVER TIME
- THE SOIL MUST NOT BE COMPRISED OF ORGANIC CLAYS OR PEAT. ORGANIC MATERIAL CAN DECAY, CAUSING SETTLEMENT, AND ALSO MAY HARBOR PESTS THAT CAN INFEST THE HOME



**INSTALLING
IN MUD IS
NOT A GOOD
IDEA!**

DETERMINE SOIL CONDITIONS

- THE WATER TABLE MUST BE BELOW THE LOWEST LEVEL OF THE PLANNED SUPPORT SYSTEM/FOUNDATION.
- A SOIL'S BEARING CAPACITY CAN BE GREATLY REDUCED WHEN IT IS SATURATED WITH WATER.
- NOTE THAT WATER TABLES MAY VARY WITH SEASONAL OR CLIMACTIC CONDITIONS. CONSULT A GEOLOGIST OR THE LOCAL AUTHORITIES HAVING JURISDICTION IF YOU ARE UNSURE OF THE WATER TABLE LEVEL

DETERMINE SOIL CONDITIONS

- THE SOIL MUST NOT BE A HIGHLY EXPANSIVE TYPE. EXPANSIVE SOILS CAN EXPAND WHEN THEY BECOME SATURATED WITH WATER, CAUSING THE HOME TO SHIFT AND BECOME UNLEVEL.
- IF SOILS ARE EXPANSIVE, CONTACT A REGISTERED ENGINEER TO ASSIST WITH THE DESIGN OF THE FOUNDATION SYSTEM

DETERMINE SOIL BEARING CAPACITY AND FROST LINE

THE SOIL UNDER A HOME MUST BE CAPABLE OF WITHSTANDING THE LOADS IMPOSED BY THE WEIGHT OF THE HOME, IT'S SUPPORT SYSTEM AND FURNISHINGS, AS WELL AS ANY LOADS IMPOSED BY WIND, SNOW, OR OTHER CLIMACTIC CONDITIONS

SOIL BEARING CAPACITY

- DETERMINE THE SOIL-BEARING CAPACITY IN POUNDS PER SQUARE FOOT (PSF) BEFORE DESIGNING A SUPPORT SYSTEM.
- THE HIGHER THE CAPACITY (PSF), THE MORE WEIGHT THE SOIL CAN HOLD WITHOUT UNDULY COMPRESSING.
- AS THE SOIL-BEARING CAPACITY INCREASES, FOOTINGS CAN BE REDUCED IN SIZE AND SPACED FARTHER APART!

SOIL BEARING CAPACITY

USE ONE OR MORE OF THE FOLLOWING METHODS TO DETERMINE THE SITE'S SOIL BEARING CAPACITY

- TEST THE SOIL
- OBTAIN SOIL RECORDS
- **CONDUCT A POCKET PENETROMETER TEST**
- DETERMINE SOIL-BEARING VALUE BY VISUAL EXAMINATION
- USE DEFAULT CAPACITY

LIMITATIONS OF POCKET PENETROMETERS

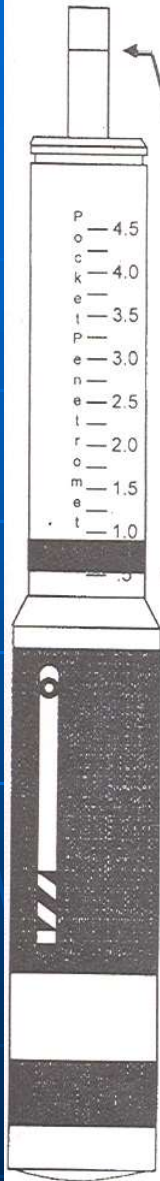
- POCKET PENETROMETERS DO NOT WORK ON SAND OR GRAVEL. IF YOU ENCOUNTER A LAYER OF GRAVEL, TEST THE SOIL UNDER THE GRAVEL. DO NOT PUT THE PENETROMETER ON STONES LARGER THAN ITS TIP AS THIS WILL PROVIDE AN INACCURATE READING.

Pocket Penetrometer

Tons per ft. ²

Reading the Pocket penetrometer

1. Hold the pocket penetrometer at right angles to the soil.
2. Slide the red ring against the instrument handle.
3. Push the tip of the penetrometer into the soil to the red groove located 1/4" from the top.
4. Take the reading at the lower side of the red ring.
5. The reading will be in tons per square foot.



Procedure to Determine the Soil Bearing Capacity

The following method is suggested for determining the allowable soil bearing capacity to be used in the sizing of footings. Such a method is only an approximation, and the results should be properly interpreted.

1. Obtain a pocket penetrometer
2. Test an area adjacent to, or within 10 feet of, the perimeter of the house
3. Dig down to undisturbed soil a minimum of 4 inches
4. Using the pocket penetrometer, take at least seven readings.
5. Take an average of the middle five readings, disregarding the highest and the lowest readings. Round this average down to the nearest soil bearing value. Use this value for determining minimum footing sizes.
6. Drive a wooden stake beside the test area so that an inspector will be able to verify the results, should the inspector desire to do so.
7. Verify the test results are in agreement with the description of soil table.

SOIL BEARING CAPACITY

- SUPPORT SYSTEMS ON SOILS WITH BEARING CAPACITIES LESS THAN 1,000 PSF MUST BE DESIGNED BY A REGISTERED ENGINEER OR REGISTERED ARCHITECT AND APPROVED BY THE LOCAL AUTHORITIES HAVING JURISDICTION

USE OF DEFAULT CAPACITY

- USE AN ALLOWABLE PRESSURE OF 1,500 PSF, UNLESS SITE-SPECIFIC INFORMATION REQUIRES THE USE OF LOWER VALUES BASED ON SOIL CLASSIFICATION AND TYPE

➤ NOTE THAT SOIL TYPES MAY VARY ACROSS A HOME SITE.

➤ IN THIS CASE, THE SOIL WITH THE LOWEST BEARING CAPACITY SHOULD BE ASSUMED WHEN DESIGNING THE SUPPORT SYSTEM.

➤ KEEP A RECORD OF THE SOIL-BEARING CAPACITY VALUE...IT WILL BE USED LATER TO DESIGN THE HOME'S SUPPORT SYSTEM

TYPICAL SOIL BEARING CAPACITY

CLASS OF MATERIALS	ALLOW FOUNDATION PRESSURE (PSF)
Massive Crystalline Bedrock	4000
Sedimentary and Foliated Rock	3000
Sandy Gravel and/or gravel (GW and GP)	2000
Sand, Silty Sand, Clayey Sand, Silty Gravel and Clayey Gravel (SW, SP, SM, SC, GM and GC);	1500
Clay, Sandy Clay, Silty Clay and Clayey Silt (CL, ML, MH and CH)	1000

**FOOTING SIZE TABLE (MINIMUM)
(SOIL BEARING CAPACITY)**

1000	1500	2000	3000	4000 & Over	FOOTING SIZE
—	—	—	0001-2600	0001-3500	16x8x8
—	—	001-2500	2501-3900	3501-5200	16x12x8
—	0001-2500	2601-3400	3901-5200	5201-7000	16x16x8
—	2501-3200	3401-4300	5201-6500	7001-8700	20x15x8
—	3201-3800	4301-5200	6501-7800	8701-10500	24x16x8
0001-2500	3801-3900	5201-5300	7801-8100	10501-10900	20x20x8
2501-3000	3901-4700	5301-5400	8101-9700	10901-13100	24x20x8
3001-3600	4701-5600	5401-7600	9701-11600	13101-15600	24x24x8
3601-4500	5601-7000	7601-9500	11601-14500		30x24x8
4501-5400	7001-8400	9501-11400	—	—	35x24x8
5401-5700	8401-10500	11401-14200	—	—	36x30x8
6701-7900	10501-12400	14201-16800	—	—	36x36x10
7901-9200	12401-1440	16801-19600	—	—	42x36x10
9201-10700	14401-16800	—	—	—	42x42x10
10701-12300	16801-19250	—	—	—	48x42x10
12301-14000	—	—	—	—	48x48x10

NOTE: FOOTING CONCRETE MUST BE 3000 P.S.I. IN 28 DAYS

FROST LINE

IN CLIMATES SUBJECT TO GROUND FREEZING, CONSULT THE LOCAL JURISDICTION, A REGISTERED ENGINEER, OR REGISTERED ARCHITECT TO **DETERMINE THE DEPTH OF THE FROST LINE**

WHEN THERE IS NO SPECIFIC LOCAL DETERMINATION THE FOLLOWING CHART MAY BE USED AS A GUIDELINE

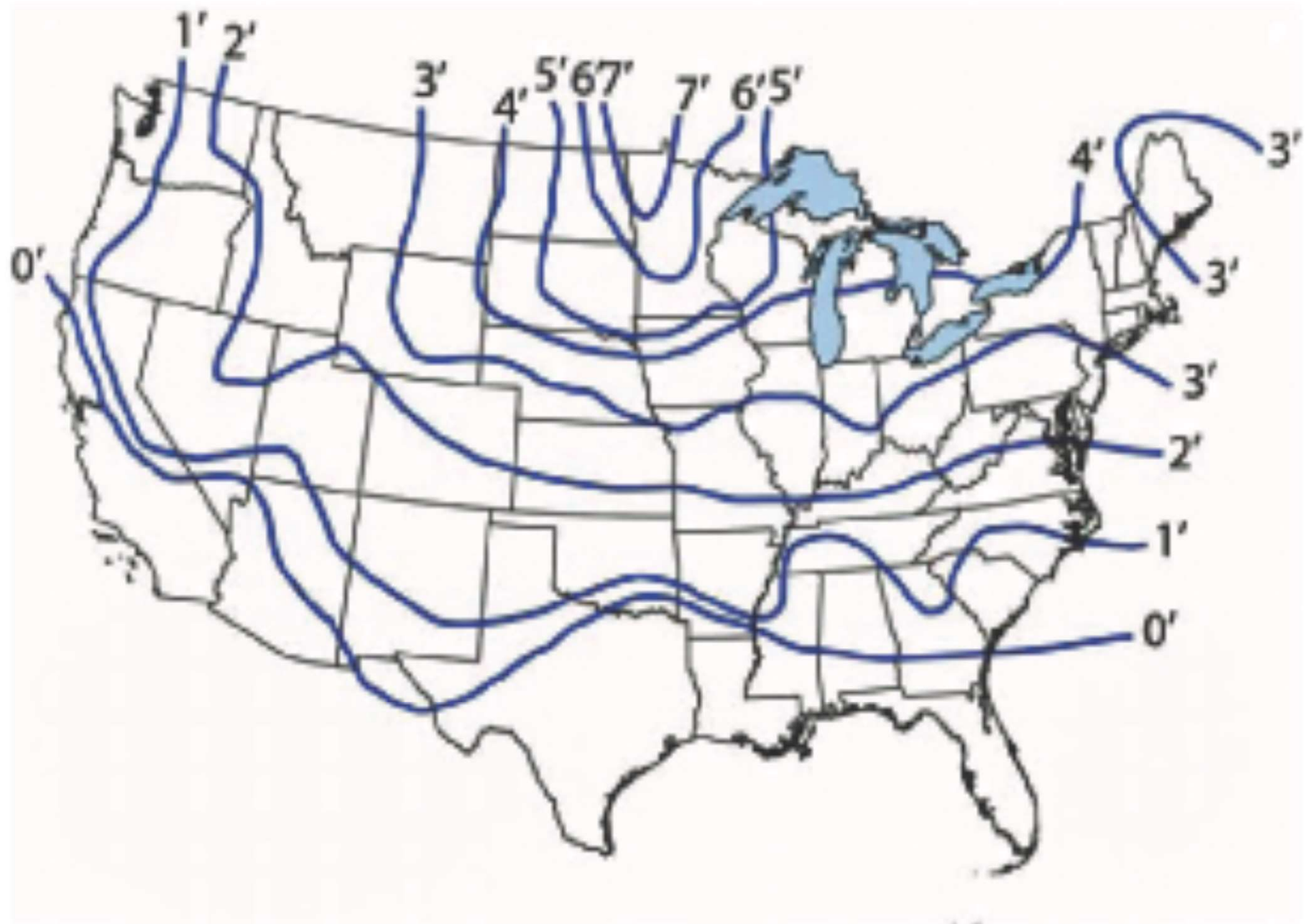




Figure 10-7. Average depths of **frost** penetration. (Courtesy U.S. Department of commerce, National Climatic Data Center, Asheville, N.C.)

DETERMINE GROUND ANCHOR HOLDING CAPACITY

- WHEN USING AUGER-TYPE ANCHORS TO TIE DOWN THE HOME, FIRST USE A TORQUE PROBE TO DETERMINE THE ANCHOR-HOLDING STRENGTH OF THE SOIL ON THE SITE
- USE A TORQUE PROBE WITH A SHAFT OF SUFFICIENT LENGTH TO TEST THE SOIL AT THE DEPTH OF THE ANCHOR HELICAL PLATE

TORQUE PROBE

- AUGUR THE PROBE INTO THE GROUND, AND FOLLOWING THE PROBE MANUFACTURER'S INSTRUCTIONS, TAKE THE TORQUE WRENCH READING IN THE AREA WHERE THE ANCHORS WILL BE INSTALLED AND AT THE DEPTH OF THE ANCHOR HELIX.
- IF THE SOIL VARIES IN CONSISTENCY ACROSS THE SITE, THEN USE THE LOWEST READING.
- BASED ON THIS READING, CONSULT THE ANCHOR MANUFACTURER'S CHARTS TO SELECT THE ANCHOR TYPE(S)

INSTALL FOOTINGS

This chapter provides instructions for the DESIGN and CONSTRUCTION of INDIVIDUAL FOOTINGS THAT TRANSFER THE LOAD FROM A SINGLE PIER TO THE GROUND.

A FOOTING AND PIER TOGETHER IS REFERRED TO AS A “SUPPORT”.

A FOOTING MAY ALSO BE DESIGNED TO CARRY THE LOAD OF MULTIPLE PIERS (OFTEN CALLED “STRIP” FOOTINGS).



DO NOT INSTALL A HOME ON FOOTINGS LIKE THESE – WALK AWAY!

REALLY BAD FOOTERS





**NICE HOUSE...BUT POOR PLANNING!
PIERS HAVE MISSED THEIR MARK ON THE
FOOTINGS**

**Blocks Must be Completely
on Footing**







**WHAT'S
WRONG
WITH
THIS
PICTURE?**

CANNOT GO
WRONG WITH
THESE
FOOTERS



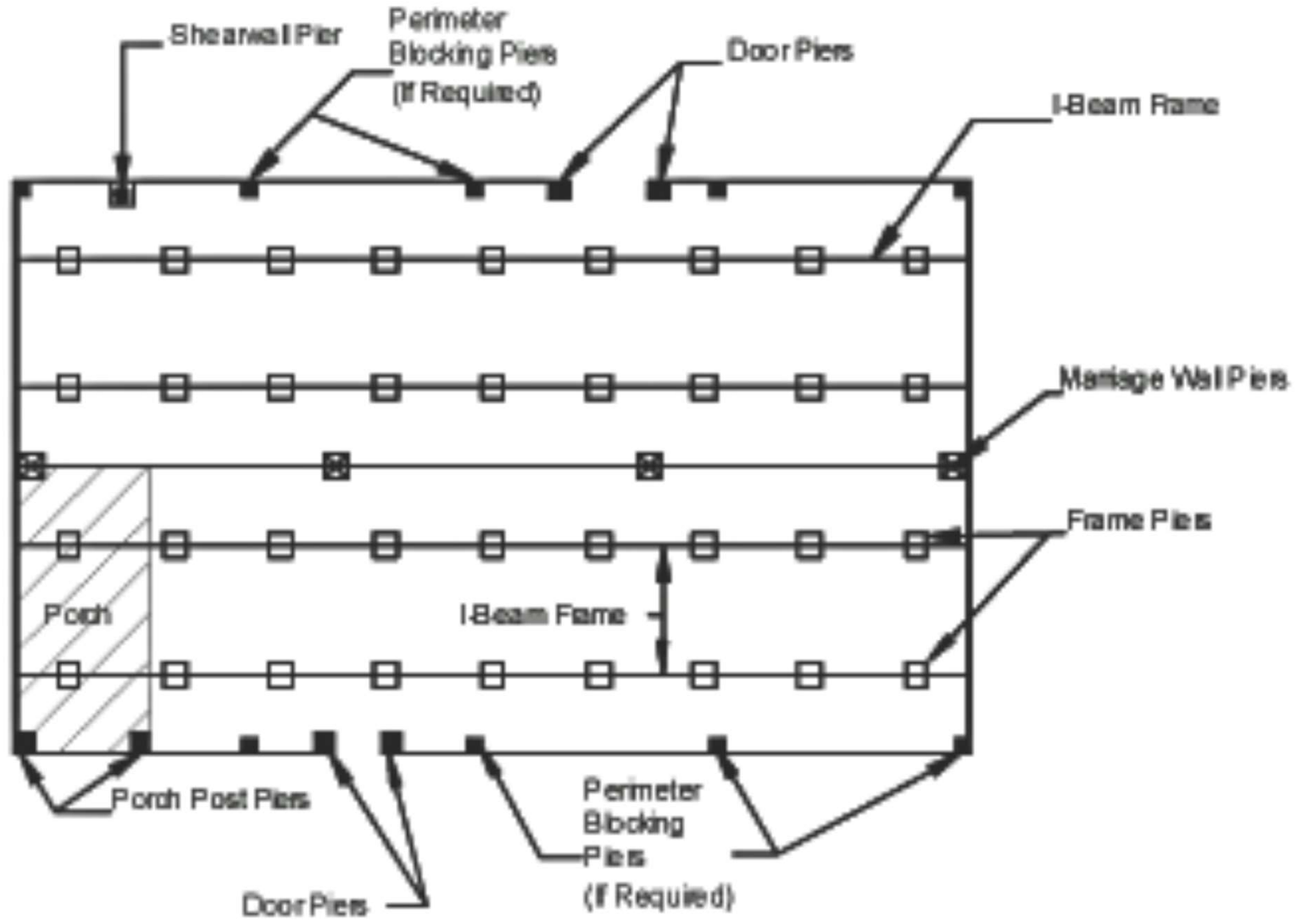
INSTALL FOOTINGS

DESIGN POINT LOAD SUPPORTS

- ALL HOMES WILL NEED SUPPORTS, AND THEREFORE FOOTINGS, UNDER THE FRAME, MARRIAGE LINE (FOR MULTI-SECTION HOMES), EXTERIOR WALL OPENINGS AND OTHER HEAVY POINT LOADS
- CREATE A SKETCH OF THE HOME THAT INCLUDES THE EXTERIOR WALLS, THE FRAME I-BEAMS AND THE MARRIAGE LINE(S) IF APPLICABLE

INSTALL FOOTINGS DESIGN POINT LOAD SUPPORTS (CON'T)

- THE SKETCH WILL BE USED IN THIS CHAPTER TO LOCATE EACH SUPPORT, AND NOTE THE SIZE OF THE CORRESPONDING FOOTING
- AS THE LOCATION AND LOAD FOR EACH SUPPORT IS DETERMINED, NOTE IT ON THE SKETCH. WHEN SELECTING LOCATIONS FOR SUPPORTS, KEEP IN MIND THAT INCREASING THE SPACING BETWEEN SUPPORTS WILL INCREASE THE LOAD ON THAT SUPPORT AND THE SIZE OF THE REQUIRED FOOTING.

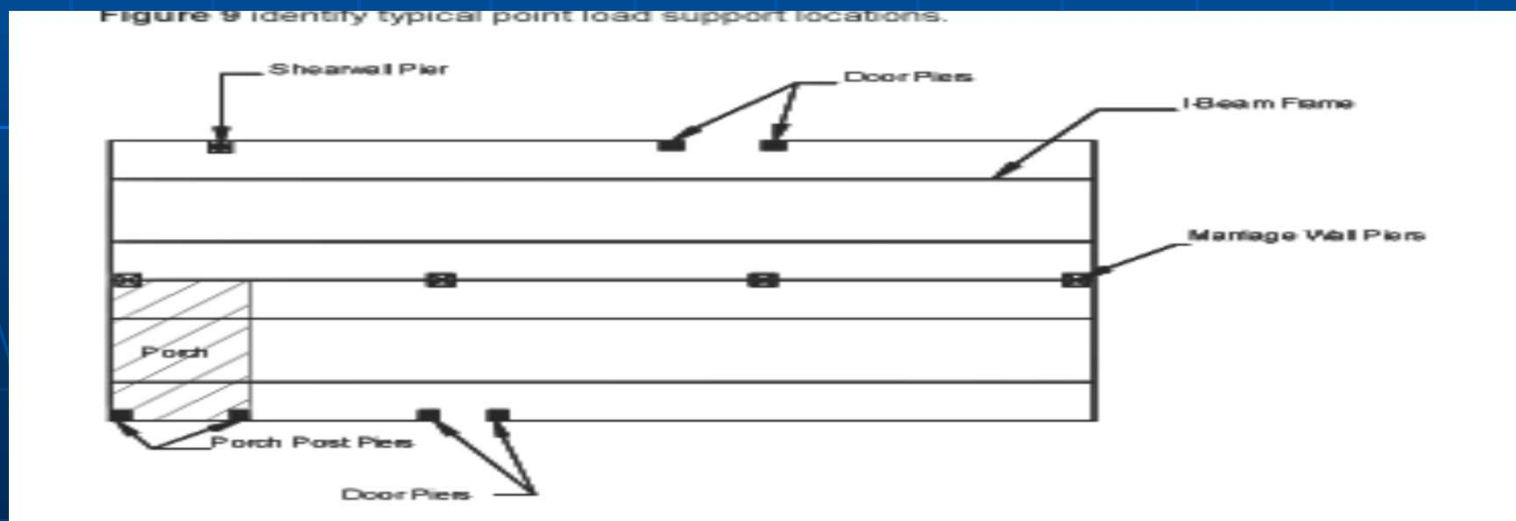


DETERMINE LOCATIONS

- POINT LOADS EXIST WHERE A BEARING/STRUCTURAL WEIGHT IS CONCENTRATED AND TRANSFERRED TO THE FOUNDATION AT A SPECIFIC POINT.
- LOCATE A SUPPORT UNDER EACH POINT LOAD, INCLUDING THE FOLLOWING EXAMPLES:

- EXTERIOR DOORS ON SIDE WALLS AT BOTH SIDES OF EACH DOOR
- OTHER EXTERIOR WALL OPENINGS FOUR FEET AND GREATER AT BOTH SIDES OF EACH OPENING
- MARRIAGE LINE OPENINGS FOUR FEET OR GREATER AT BOTH SIDES OF EACH OPENING (WHERE MARRIAGE LINE OPENINGS ARE GREATER THAN 10 FEET, INTERMEDIATE SUPPORTS MUST BE PLACED AT MAXIMUM 10 FEET ON CENTER)
- LOCATIONS WHERE THROUGH-THE-RIM CROSSOVER DUCTS PENETRATE THE RIM JOIST AT THE MARRIAGE LINE
- MARRIAGE LINE COLUMNS
- LOAD-BEARING PORCH POSTS
- UNDER HEAVY (400 LBS OR GREATER) ITEMS, SUCH AS HEAVY FURNITURE, WATERBEDS, FIREPLACES AND LARGE FISH TANKS

Mark the required point load support locations on the sketch. Supports are not required where the manufacturer has reinforced the floor and so noted in the manual with the home.



Calculate loads

- For each support, find the columns with the appropriate roof load zone and section width. Find the row(s) corresponding to the span.
- If a support is shared by spans on both sides, add the respective loads together to arrive at the total load under that point
- THE NUMBER IN THE COLUMNS UNDER THE "M" AND "P" HEADINGS ARE THE LOADS FOR SUPPORTS ALONG THE MARRIAGE LINE AND PERIMETER RESPECTIVELY

TABLE: LOAD ON POINT-LOAD FOOTINGS

Note the required loads next to each point-load support on the elevation.

TABLE 5. LOAD ON POINT-LOAD FOOTINGS

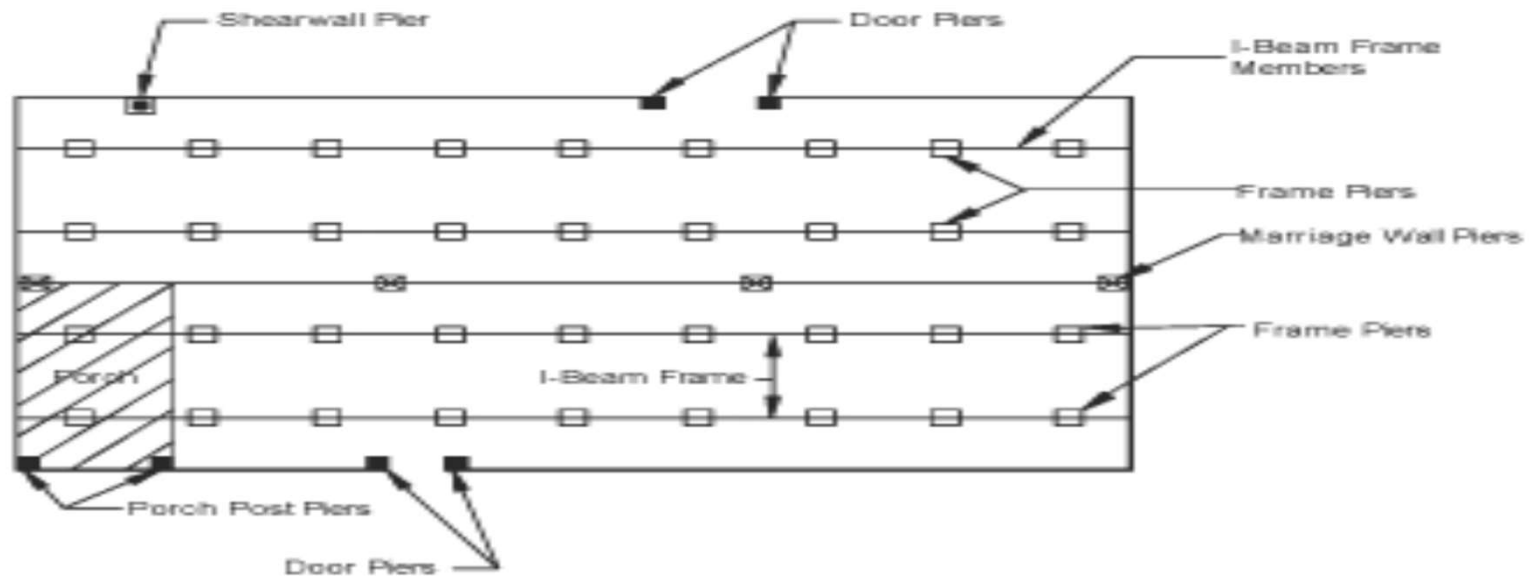
		Roof load zone and maximum section width																		
		South (20 psf)						Middle (30 psf)						North (40 psf)						
		12 ft		14 ft		16 ft		12 ft		14 ft		16 ft		12 ft		14 ft		16 ft		
Location*		M	P	M	P	M	P	M	P	M	P	M	P	M	P	M	P	M	P	
Span in feet	4																			
	8																			
	12																			
	16																			
	20																			
	24																			
	28																			
	32																			

M = Marriage line, P = Perimeter

DESIGN FRAME SUPPORTS

Homes WITHOUT Perimeter Blocking

- DETERMINE LOCATIONS - ALL HOMES REQUIRE REGULARLY SPACED SUPPORTS ALONG ALL MAIN FRAME I-BEAMS. SELECT SPACING BETWEEN SUPPORTS AND SKETCH THEM ON THE SUPPORT PLAN. KEEP IN MIND THAT **FRAME SUPPORTS UNDER HOMES WITH 8" DEEP I-BEAMS MAY BE NO MORE THAN 8 FEET APART. THOSE UNDER THE HOMES WITH 10" OR 12" DEEP I-BEAMS MAY BE NO MORE THAN 10 FEET APART.** GENERALLY, GREATER DISTANCES BETWEEN SUPPORTS WILL REQUIRE LARGER FOOTINGS.

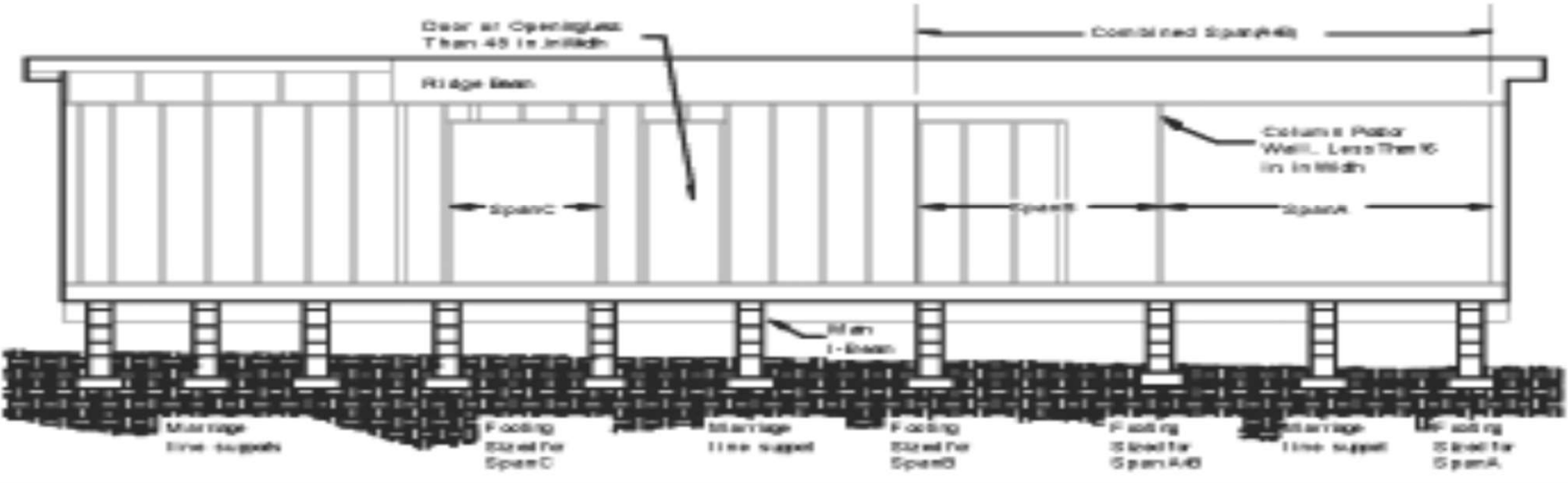
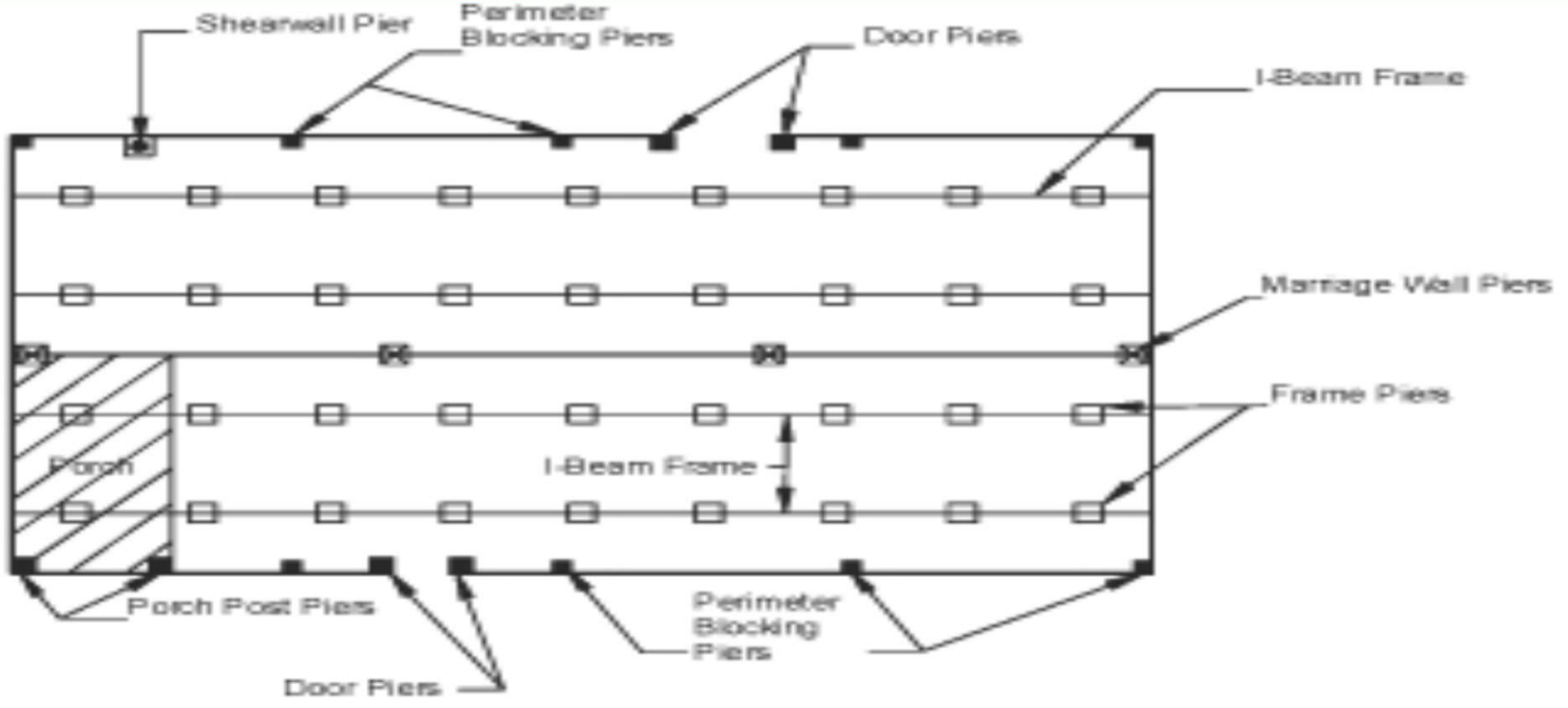


SPACING FRAME SUPPORTS

- **THERE MUST BE A SUPPORT
LOCATED NEAR THE END OF
EACH I-BEAM SUCH THAT
THERE IS NO MORE THAN 12
INCHES OF BEAM PAST THE
EDGE OF THE SUPPORT**

DESIGN FRAME AND PERIMETER SUPPORTS (HOMES WITH PERIMETER BLOCKING)

- DETERMINE LOCATIONS – DEPENDING ON DESIGN AND LOCATION, SOME HOMES REQUIRE REGULARLY SPACED PERIMETER SUPPORTS ALONG ALL OF THE SIDEWALLS AND MARRIAGE WALLS IN ADDITION TO FRAME SUPPORTS. THIS WILL BE INDICATED ON THE DATA PLATE AND/OR DOCUMENTS INCLUDED WITH THE HOME.
- IF REQUIRED, PERIMETER SUPPORT ARE ONLY NEEDED ON BEARING WALLS. BEARING WALLS ARE THOSE WALLS THAT SUPPORT THE ENDS OF ROOF TRUSSES OR RAFTERS
- TO MINIMIZE THE NUMBER OF REQUIRED PERIMETER SUPPORTS, SPACE THEM EVENLY BETWEEN POINT LOAD SUPPORTS AS SHOWN IN THE FOLLOWING FIGURE. THESE FIGURES IDENTIFY TYPICAL SUPPORT LOCATIONS FOR HOMES REQUIRING PERIMETER SUPPORTS.



CALULATE LOADS (HOMES WITH PERIMETER BLOCKING)

- USE THE NEXT TABLE TO DETERMINE THE LOADS ON FRAME AND PERIMETER SUPPORTS FOR HOMES REQUIRING PERIMETER BLOCKING. FIND THE COLUMN WITH THE APPROPRIATE ROOF LOAD AND SECTION WIDTH. FIND THE GROUP OF ROWS CORRESPONDING TO THE SELECTED SUPPORT SPACING. THE VALUES IN THE INTERSECTING CELLS ARE THE LOADS FOR THE FRAME, PERIMETER, AND MARRIAGE LINE SUPPORTS RESPECTIVELY.
- LOADS ON SUPPORTS OF A GIVEN TYPE (FRAME, PERIMETER, OR MARRIAGE) CAN BE ASSUMED TO BE EQUAL IF SUPPORT SPACING IS EQUAL. HOWEVER, IF DIFFERENT SUPPORT SPACINGS ARE USED THEN EACH SUPPORT WITH A DIFFERENT SPACING SHOULD BE CALCULATED SEPARATELY.

SELECT FOOTING MATERIAL

TABLE 8. FOOTING MATERIALS

Material	Appropriate Use	Specification
Poured concrete	All soil types	Minimum 6" thick poured-in-place concrete pads, slabs, or ribbons with at least a 28 day compressive strength of 3,000 psi. Cast-in-place concrete footings may also require reinforcing steel based on acceptable engineering practice, the design loads, and site specific soil conditions.
Pre-cast concrete	All soil types	Minimum 4" thick nominal precast concrete pads meeting or exceeding ASTM C 90-02a, Standard Specification for Load Bearing Concrete Masonry Units, without reinforcement, with at least a 28-day compressive strength of 2,500 psi.
ABS plastic	Stable soils	Use in accordance with the pad manufacturer's instructions. Must be certified for use in the soil classification at the site, listed and labeled for the required load capacity.
Proprietary systems	Consult system manufacturer	Consult system manufacturer.

SIZE FOOTINGS

Once the load on the footing and the soil-bearing capacity are known, calculate the size of each footing as follows:

1. From Table 9 determine if the pier is to be of single-stack blocks (8 inch x 16 inch) or double blocks (16 inch x 16 inch) pier

TABLE 9. PIER CONFIGURATION

Pier location	Height	Configuration	Maximum load
Frame	Less than 36 in (except corner piers more than 3 blocks high)	Single-stack blocks with long side perpendicular to I-beam	8,000 lbs.
	Between 36 in and 67 in and corner piers over 3 blocks high	Double, interlocked blocks	16,000 lbs.
	Over 67 in	Double, interlocked blocks	16,000 lbs.
Perimeter	54 in or less	Single-stack blocks with long side parallel to perimeter rail (rim joist)	8,000 lbs.
Marriage line	54 in or less	Single-stack blocks with long side perpendicular to the marriage line	8,000 lbs.

2. Locate the group of rows in Table 10 with the soil bearing capacity determined in Soil Bearing Capacity and Frost Line. Use the next lowest value if the exact value does not appear.
3. Read across the table to determine the minimum required footing area and the minimum footing thickness for the corresponding footing type (single or double-stacked blocks)
4. The required footing size may be changed selecting support spacing. (Table 6 or Table 7)

PIER CONFIGURATION

- PERIMETER AND MARRIAGE LINE PIERS CAN BE SINGLE STACKED TO 54 INCHES OR LESS
- **FRAME PIERS CAN BE SINGLE STACKED TO 36 INCHES OR LESS**
- FRAME PIERS BETWEEN 36 AND 67 INCHES CAN HAVE DOUBLE, INTERLOCKED BLOCKS

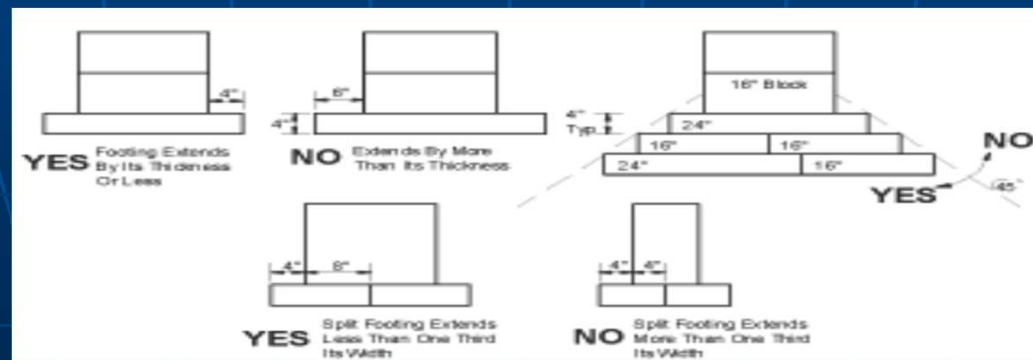
TABLE 10. FOOTING DIMENSIONS

Soil Bearing Capacity	Minimum Footing Area (sq. in.)	Minimum Footing Dimensions (in)	8 in. x 16 in. pier (single-stack blocks)		16 in. x 16 in. pier (double-stack blocks)	
			Unreinforced cast-in-place min. thickness (in.)	Maximum footing capacity (lbs)	Unreinforced cast-in-place min. thickness (in.)	Maximum footing capacity (lbs)
1000						
1500						
2000						
2500						
3000						
4000						

Note: The capacity values listed have been reduced by the dead load of the concrete footing.

Design footings to comply with the following additional requirements:

- Design each footing at least slightly larger than the base of the pier it supports
- To keep footings directly under I-beam and other support points, size them slightly larger than the minimum required area to allow slight adjustments of the pier locations
- Design footings with a footing extension (projection beyond the base of the pier) no greater than the footing thickness. Increase footing thickness if necessary



- The footing sizes shown are for square pads and are based on the surface area (square inches). Design non-square footings such that the area and depth is equal to or greater than the area and depth of the square footing shown in Table 10, and the distance from the edge of the pier to the edge of the footing is not more than the thickness of the footing
- For four-inch thick un-reinforced precast concrete footings, use the minimum footing size for the six-inch cast-in-place footing from Table 10.

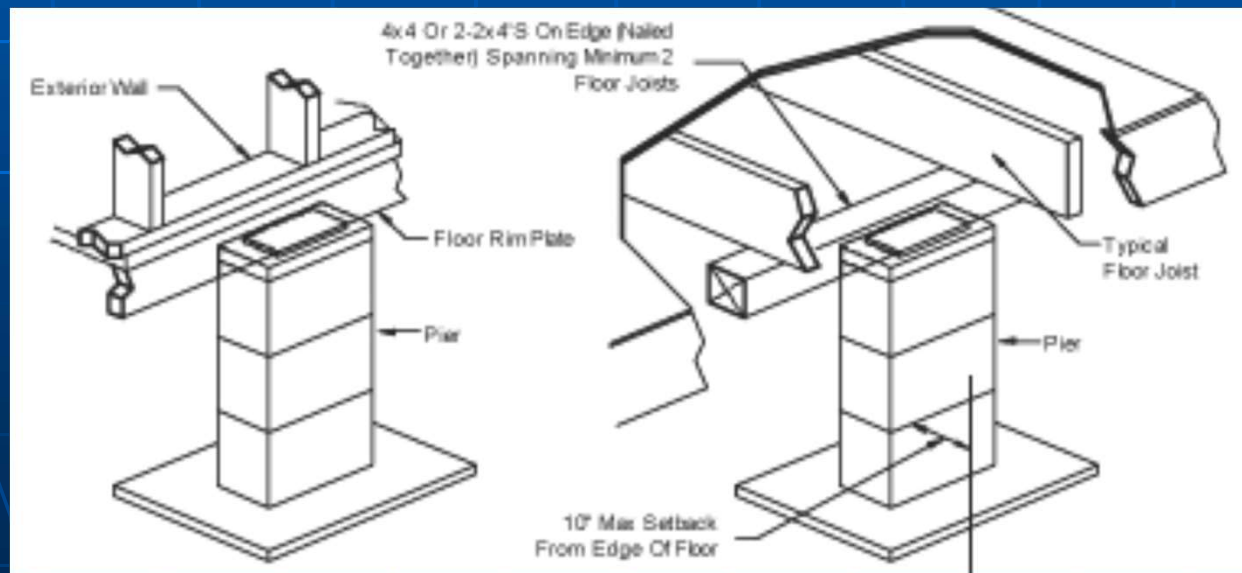
INSTALL FOOTINGS

Construct the footings as follows:

- Maintain the distance between adjacent piers to within 10% of the tabulated spacing and so the average distance between any adjacent spans is equal to or less than the tabulated spacing.
- Whenever possible, place point load supports directly under the required locations. If plumbing, electrical, mechanical equipment interferes, place supports no more than 6 inches in either direction of the support point

Construct footings con't

- Recess perimeter blocking supports and perimeter point load supports no more than 10 inches from the edge of the floor with added support as shown in Figure 14.



Construct footings con't

- If footings are rectangular, orient them so that the long side is perpendicular to the home's I-beam
- Place the bottom of footings on undisturbed soil or fill compacted to at least 90% of its maximum relative density
- In freezing climates protect footings from the effects of frost heave in accordance with any LAHJ requirements. Place the bottom of the footings below the frost line (insulated foundations and monolithic slabs are other frost protection options not covered in this manual)

Constructing footings con't

- Make sure the top surface of the footing is level, flat and smooth
- In accordance with the American Concrete Institute publication ACI-308, maintain curing measures before construction or installation onto the concrete footing begins, until a minimum of 70% of the specified 28-day compressive strength has been achieved. The ACI recommended time to attain this level of strength is seven days for ASTM C150 Type I mixtures and 10 days for Type II mixtures. Full design live and dead loads may not be applied until the 28-day duration has elapsed for achieving full strength.

CONSTRUCT FOUNDATION
For Homes With Load-Bearing
Perimeter Wall

Construct Foundation WITH LOAD-BEARING PERIMETER WALL

➤ Obtain a Foundation Design

- The foundation perimeter bearing wall must be supported with a concrete slab or continuous strip footing around the perimeter of the home. Interior piers must be supported by a slab or footings. If footings are used under interior piers, they may be design as in Prepare Footings, page 18.
- Slabs must extend to the edges of the home
- Footings and slabs must be protected from the effects of frost heave by extending the footings to or below the frost heave by extending the footings to or below the frost line or by using a frost protected shallow foundation design

Excavate

Excavate for the foundation,
properly disposing of the
earth that is not needed
for backfill or site-grading
purposes.

Construct the Footing or Slab

- Construct the foundation according to the approved design, including the perimeter foundation wall, drainage system, footing(s), and/or slab

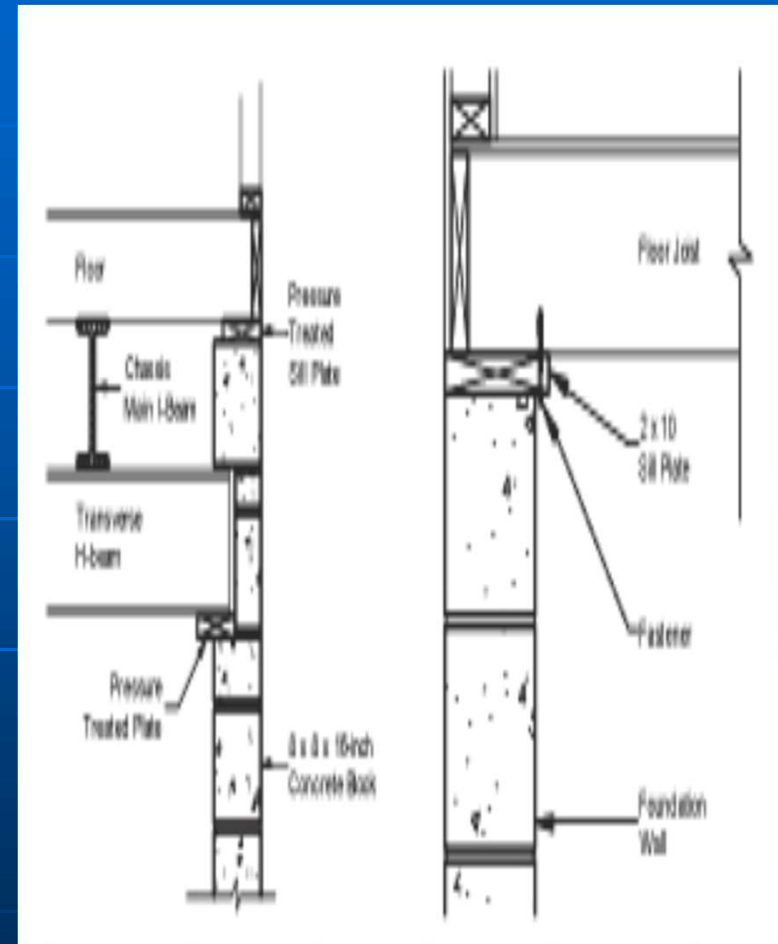
Construct the Perimeter Wall

- Unless the approved design requires otherwise, construct the perimeter wall with mortared and reinforced concrete blocks or reinforced poured-in-place concrete. Install reinforcement according to the approved design or LAHJ. Install ventilation and access openings according to the approved design, or if not specified, according to the requirements in COMPLETE UNDER THE HOME, STEP 3 INSTALL SKIRTING (PAGE 99)



Construct the Perimeter Wall

- When constructing pockets for an H-beam system, measure the beam depth and locate the pockets carefully. It is critical that when the home's frame rests on top of the H-beam, the perimeter of the floor rests squarely on the foundation wall sill plate (Figure 15)
- Leave room for two-inch nominal, pressure treated wood spacer on top of the all pockets (to prevent corrosion, the steel beams must not be in direct contact with concrete)



Construct the Perimeter Wall

Bolt a pressure treated wood sill plate (minimum 2x6) to the top of the foundation wall. If the home's siding cannot be nailed through, use a 2x10 sill plate that extends into the foundation 1 ¼ inches. The home can then be connected to the foundation by fastening the sill plate into the floor joists from below. Connect the home to the foundation according to the approved design. Recess nuts into the sill plate and cut off the ends of bolts so they do not project above the sill plate and interfere with the placement of the home

INSTALL INTERIOR SUPPORTS

INSTALL PIERS,
COLUMNS AND H-
BEAMS TO SUPPORT
THE INTERIOR OF THE
APPROVED DESIGN

DAMP PROOF FOUNDATION WALL

- DAMP PROOF THE FOUNDATION WALL NO LESS THAN UP TO THE HEIGHT OF THE PLANNED BACKFILL

BACKFILL AND GRADE

- BACKFILL AGAINST THE FOUNDATION WALL TO THE HEIGHT OF THE DAMP PROOFING. TAKE CARE TO NOT DAMAGE THE DRAINAGE SYSTEM. GRADE THE BACKFILL APPROPRIATELY.

SET THE HOME

PREPARE THE SITE

- BEFORE BEGINNING THE HOME SET, COMPLETE THE FOLLOWING:
 - Confirm that the site is properly cleared and graded
 - Ensure that the footings are in place and properly located
 - Install any utilities that will be difficult to install
 - Secure or remove from the home all ship loose items
 - Inspect the home interior, exterior and all provided materials, appliances and equipment. IMMEDIATELY REPORT ANY DAMAGE OR SHORTAGES TO THE MANUFACTURER
 - **THE GROUND MOISTURE RETARDER MAY BE INSTALLED NOW OR AFTER THE HOME IS COMPLETE**

FOR PERIMETER BEARING WALL FOUNDATION

- Check that the length and width of the home match with the foundation walls
- Check that the two main diagonal measurements of the foundation are equal
- Check that the foundation walls and other support points are within $\frac{1}{4}$ inch of level overall and within $\frac{1}{8}$ inch of level within any four foot distance

FOR PERIMETER BEARING WALL FOUNDATION – con't

- For multi-section homes, find the electrical bonding lugs on the front or rear outriggers. Reverse them to the inside of the outrigger using star washers so they will be accessible after the home is placed on the foundation walls
- If using an H-beam system, remove the frame's shackle hanger if it will interfere with proper placement of the beam

POSITION HOME SECTION

- POSITION THE HOME SECTION IN ITS FINAL LOCATION (IF POSSIBLE, MOVE THE HEAVIEST SECTION OF THE HOME INTO PLACE FIRST).
- THEN PLACE MATERIALS NEEDED TO CONSTRUCT SUPPORT PIERS NEAR THEIR FINAL LOCATIONS UNDER THE HOME AS DETERMINED IN **PREPARE FOOTINGS**

LIFT HOME

THERE ARE THREE PRIMARY METHODS AVAILABLE TO PLACE THE HOME ON THE FOUNDATION

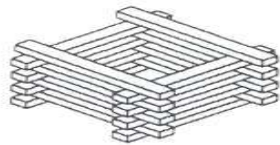
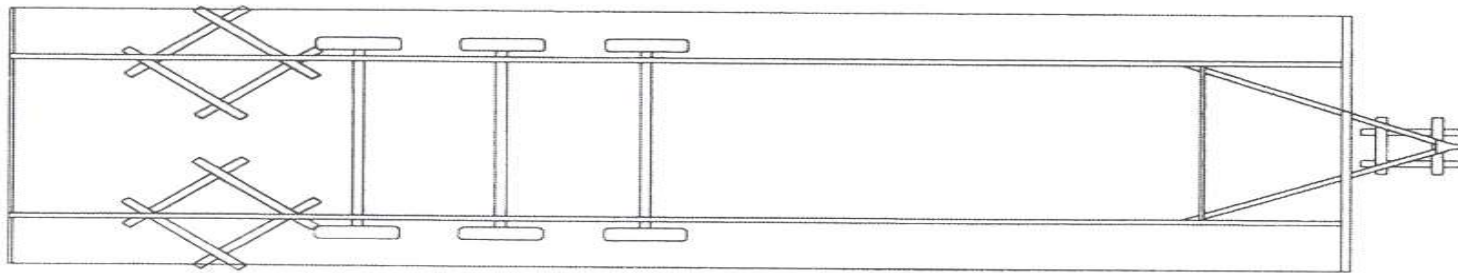
- 1. JACKING** – OFTEN WITH ROLLER SYSTEMS, TYPICALLY PIER AND ANCHOR FOUNDATIONS
- 2. ROLLING SYSTEMS-** CRAWLSPACE FOUNDATIONS WITH LOAD BEARING PERIMETER WALLS
- 3. CRANING** – MOST COMMON FOR BASEMENT FOUNDATIONS

JACKS

- ✓ No one should be under the home
- ✓ Use jacks only for raising the home
- ✓ Raise the home only on one side. Leave the hitch connected
- ✓ Obey all OSHA regulations
- ✓ **Use safety cribbing**
- ✓ Use a minimum of two commercial quality jacks, each with a rating at least 12 tons
- ✓ Jack only on the main chassis I-beam, centering jacks directly under the beam
- ✓ **DO NOT JACK ON A SEAM**
- ✓ Use a firm support under the jack base to prevent tipping. A minimum 16"x16" or larger wood is recommended
- ✓ **NEVER USE CONCRETE BLOCKS AS A SUPPORT FOR A JACK**

AVOID OVERSTRESSING STRUCTURAL MEMBERS

- ✓ Block wheels. Block the wheels so the house does not roll
- ✓ **Install cribbing!**



TYPICAL BLOCKING
USE 4X6 TIMBERS FIVE FOOT
LONG, STACK AS SHOWN.

CAUTION

WHEN WORKING UNDER THE HOME USE BLOCKING TO PROTECT THE WORKERS FROM THE HOME ACCIDENTALLY SLIDING OFF THE JACKS. BLOCKING IS RECOMMENDED BEHIND THE AXLE AREA AND AT THE HITCH END OF THE UNIT, AS SHOWN.

UTILIZE PROPER CRIBBING

- MANUFACTURED HOMES WEIGH SEVERAL TONS.
- NO ONE SHOULD BE UNDER THE HOME (WHETHER IT IS MOVING OR STATIONARY) UNLESS PROPER CRIBBING IS IN PLACE
- FAILURE TO UTILIZE PROPER CRIBBING MAY RESULT IN SERIOUS INJURY OR DEATH

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92
Mobile home falls,
kills Checotah man

A 47-year-old Checotah man died when a mobile home he was setting up slipped off a jack and fell on him, authorities said.

The accident occurred just off Lottawatah Road north of Interstate 40 on Friday, March 19.

Buford Clyde Emberson was pronounced dead at the scene, McIntosh County Sheriff Jeff Coleman said.

Emberson worked for Checotah High School as a custodian and handled maintenance of the football field. He worked football games and the annual graduation ceremonies.

Coleman said Emberson helping his son set up the mobile home. Emerson's son and two other family members were help-

See EMBERSON on Page 2

DON'T LET
THIS
HAPPEN TO
YOU OR
YOUR
EMPLOYEES

JACKS – CON'T

- ✓ Level lengthwise – Locate one jack at the hitch and level the section lengthwise
- ✓ Locate frame jacks – Place a minimum of one jack just forward of the first spring hanger and another just behind the last spring hanger of the I-beam on the side of the home that is lowest. Place jacks no more than 20 feet apart
- ✓ Lift the home – Operating the jacks simultaneously, lift the home section until it is slightly higher than the final desired pier height

ROLLER SYSTEMS

- ✓ ESTABLISH STAGING AREA
- ✓ SETUP ROLLERS
- ✓ FASTEN BUMP BLOCKS
- ✓ ROLL HOME
- ✓ REMOVE BUMP BLOCKS

CRANES

- ✓ Position the home section(s) and crane
- ✓ Use enough properly sized straps
- ✓ Place straps under walls or posts. DO NOT POSITION LIFTING STRAPS UNDER MARRIAGE WALL OPENINGS
- ✓ Use a properly sized spreader bar to maintain vertical lift
- ✓ Connect a rope to at least one point on the home so it can be controlled while aloft
- ✓ Make provisions to retrieve the straps/cables
- ✓ Always set the home section farthest from the crane

CRANE SET



Thanks to Oakcreek
for this photo!

CONSTRUCT PIERS

- For the side of the home section that is up on jacks, place piers on footings or pads following home manufacturer's blocking plan. If no plan was provided, use the support plan developed in **INSTALL FOOTINGS**.

TABLE 11. PIER MATERIAL MINIMUM SPECIFICATIONS

Component	Specification
Concrete Block	Nominal dimensions of at least 8" x 8" x 16"; minimum load 8,000 lbs; conforming to ASTM designation C90, grade N.
Caps	Solid masonry (nominal 4" x 8" x 16" pre-cast concrete without reinforcement); pressure treated lumber (nominal 2" x 8" x 16"); or steel (minimum 1/2" thick, corrosion protected by a min. of a 10 mil coating of an exterior paint or equivalent).
Spacers	Nominal 2" thick boards.
Shims (also called wedges)	Hardwood, minimum 4" width by minimum 6" length by maximum 1" thick (nominal); plastic must be listed with maximum load capacity; used in pairs.
Commercial metal or pre-cast concrete piers	Available in various sizes stamped with maximum load capacity and listed or labeled for the required vertical load capacity, and where required by design, for the appropriate horizontal load capacity. Metal or other manufactured piers must be provided with protection against weather deterioration and corrosion at least equivalent to that provided by a coating of zinc on steel of .30 oz per sq. ft of surface coated.
Pressure treated wood	With a water borne preservative, in accordance with AWWA Standard U1-04 for Use Category 4B ground contact applications.



**WHAT'S
WRONG
WITH THIS
PICTURE?**

PIER MATERIAL SPECIFICATIONS

- CONCRETE BLOCK – 8X8X16 – MINIMUM LOAD 8,000 LBS, ASTM DISIGNATION OF C90...GRADE N
- *CAPS* – SOLID MASONRY (4x8x16); **PRESSURE TREATED LUMBER** (NOMINAL 2"X8"X16") OR STEEL
- *SPACERS* – NOMINAL 2" THICK BOARDS (HARDWOOD OR PRESSURE TREATED)

PIER MATERIAL SPECIFICATIONS

- *SHIMS* (ALSO CALLED WEDGES) – **HARDWOOD**, MINIMUM 4" WIDTH BY MINIMUM 6" LENGTH BY MAXIMUM 1" THICK (NOMINAL); PLASTIC MUST BE LISTED WITH MAXIMUM LOAD CAPACITY; USED IN PAIRS
- COMMERCIAL METAL OR PRECAST CONCRETE PIERS
- PRESSURE TREATED WOOD – FOR GROUND CONTACT APPLICATIONS

HARDWOOD VS. SOFTWOOD

WHAT TREES ARE IN THE HARDWOOD
FAMILY NATIVE TO OKLAHOMA?

BASSWOOD, BEECH, CHERRY/BLACK,
ELM/WHITE, HICKORY, MAPLES, OAK
(RED & WHITE), SYCAMORE &
WALNUT/BLACK

WHAT TREES ARE THE SOFT WOODS
IN OKLAHOMA? CEDAR, FIR & PINE

TABLE 12. PIER CONSTRUCTION

Pier location	Height	Configuration	Maximum offset top to bottom	Maximum load	Mortar and reinforcement
Frame	Less than 36 in (except corner piers more than 3 blocks high)	Single-stack blocks with long side perpendicular to I-beam	½"	8,000 lbs.	Not required
	Between 36 in and 67 in and corner piers over 3 blocks high	Double, interlocked blocks	1" (½" up to 36" high)	16,000 lbs.	Not required
	Over 67 in	Designed by a registered engineer or registered architect			
Perimeter	54 in or less*	Single-stack blocks with long side parallel to perimeter rail (rim joist)	½" up to 36" high, 1" over 36" high	8,000 lbs.	Not required
Marriage line	54 in or less*	Single-stack blocks with long side perpendicular to the marriage line	½" up to 36" high, 1" over 36" high	8,000 lbs.	Not required

* Construct perimeter and marriage line piers over 54 inches according to the requirements for frame piers of the same height.

Start at one end of the home section and work toward the other noting the required pier material specifications and procedure

CONSTRUCT PIERS

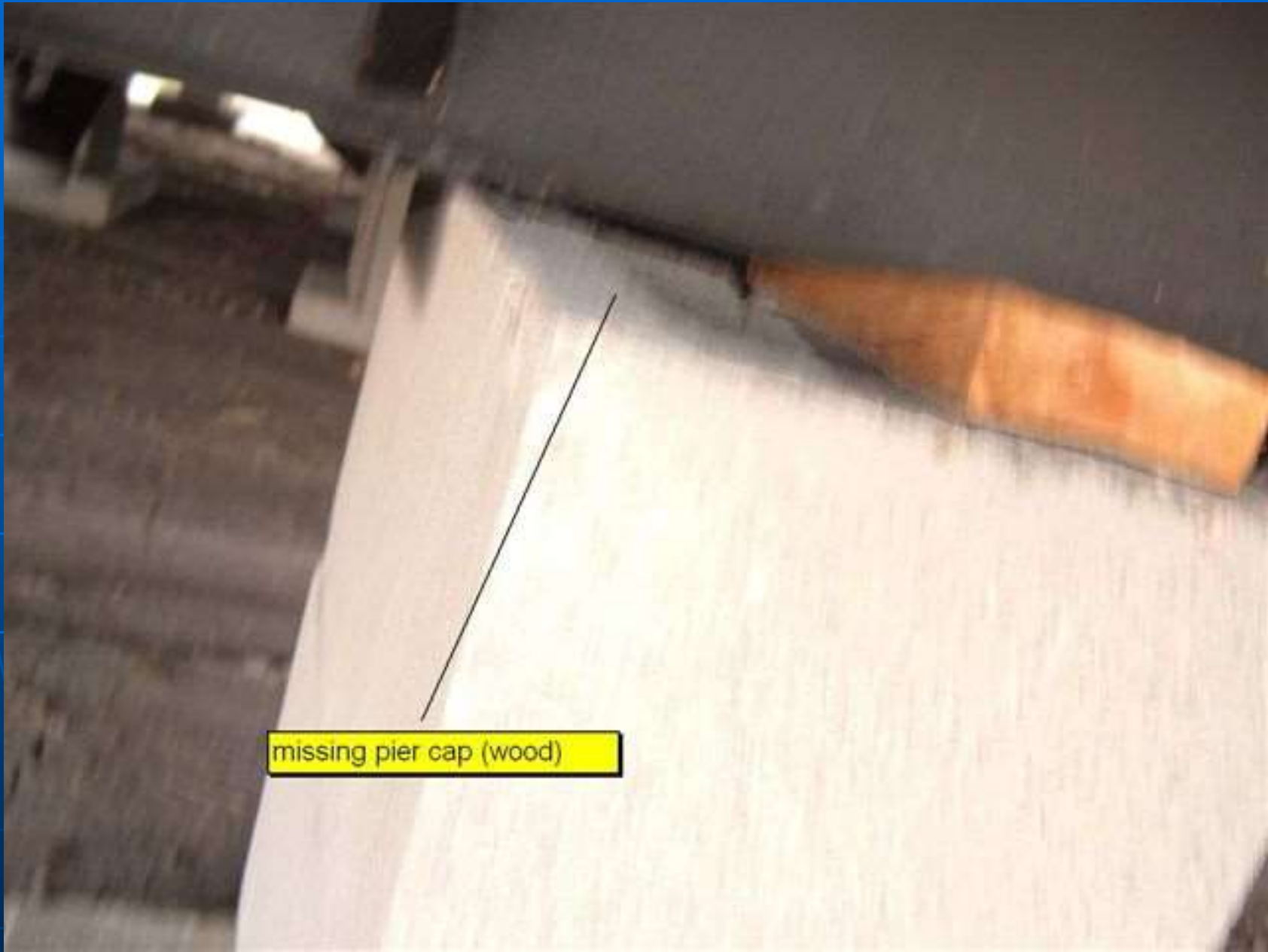
- PREPARE FOOTING SURFACE
- STACK BLOCKS – Stack concrete blocks with their hollow cells aligned VERTICALLY. When piers are constructed of blocks stacked side-by-side, orient each layer at right angles to the previous one and plan blocks so that split caps will be perpendicular to the blocks they rest on and to the I-beam



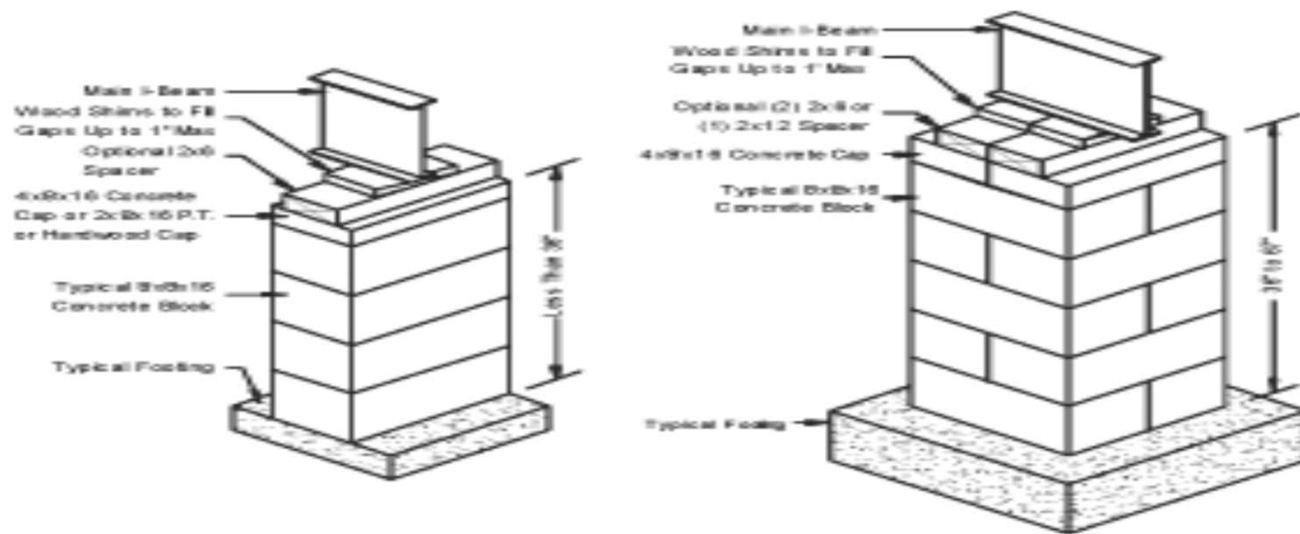
**THIS WILL
NOT PASS
INSPECTION!**

WHAT IS WRONG WITH THIS PICTURE?





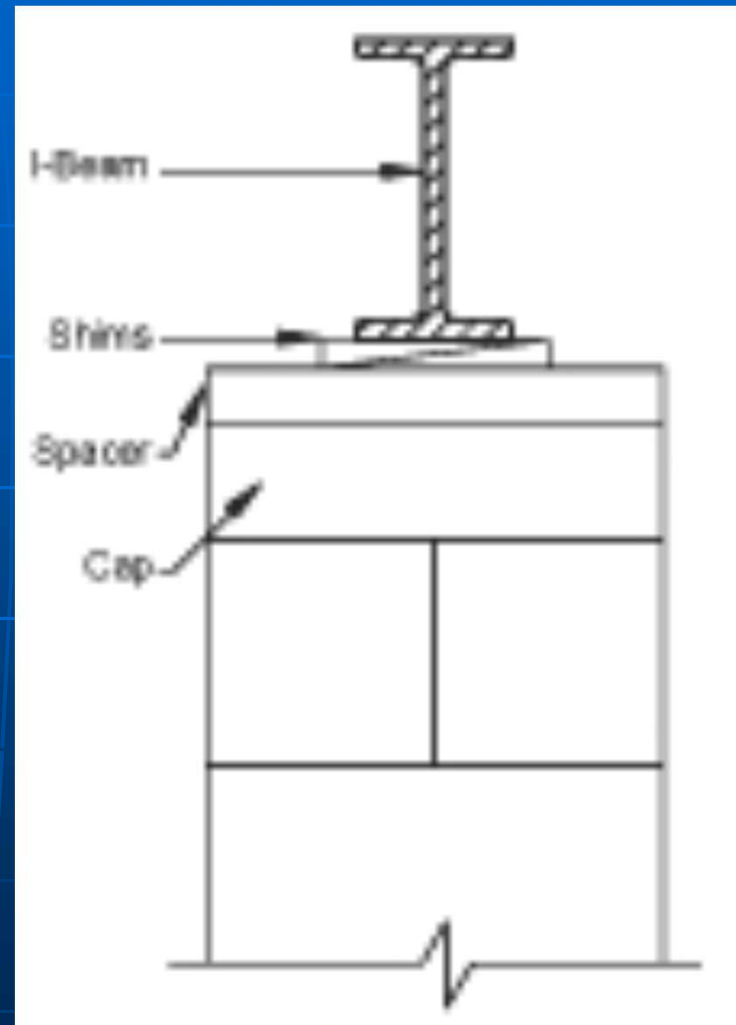
missing pier cap (wood)



Cap piers – Place a cap on hollow block piers to evenly distribute the structural load. Use caps the same length and width as the piers they rest upon. When using SPLIT CAPS on double-stacked block piers, install the caps with the long dimension perpendicular to the joint in the blocks below and to the main I-beam

INSTALL SHIMS

- Use shims to level the home and fill any gaps between the base of the I-beam and the top of the pier cap. Always use shims in pairs. Drive them in tightly so they do not occupy more than 1 inch of vertical space.



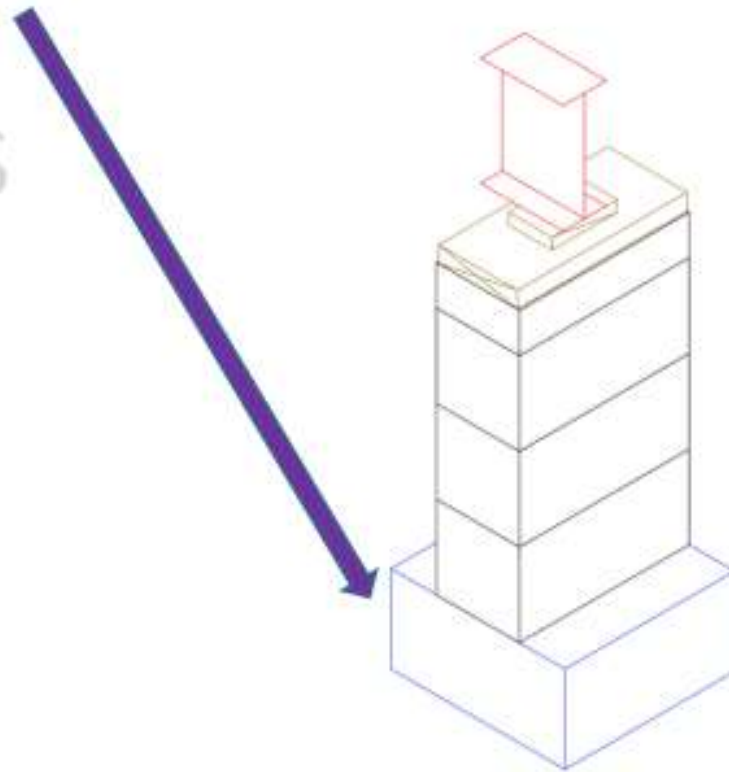
SHIMS (CON'T)

- When the space to be shimmed is greater than one inch and less than the minimum thickness of available caps or concrete blocks, use hardwood dimensional lumber (two inches maximum thickness) or 2" or 4" thick concrete block. For split caps, install shims and dimensional lumber/blocks over each individual cap

PIER REVIEW

5 INGREDIENTS OF A TYPICAL PIER FOUNDATION

- **FOOTING**
- PIER BLOCKS
- CAP BLOCK
- GAP FILLER
- SHIMS



“FOOTING” IS THE BOTTOM-
MOST SUBSTANCE
TOUCHING THE EARTH,
UPON WHICH THE HOME
WILL ULTIMATELY REST

COMMON FOOTING

Pre-cast concrete pads - 16 x 16 x 4 (solid) OR three 8 x 16 x 4 blocks (2 parallel and one perpendicular across the two parallel blocks)

- **ABS pads used to pad mfg specifications**
- **Pre-poured concrete pads - individual or in a strip ("runners")**
- **Slab foundation**
- **ALTERNATIVE: Site specific engineered foundation from licensed professional engineer**

WARNING ABOUT RUNNERS OR PRE-POURED FOOTINGS:

These must be poured so they will match the beams and perimeter where support blocks must go

Whoever pours the runners or footings must have the specifications for the house

This leaves little room for error in measurement or actual placement of the home

PREPARING THE GROUND FOR FOOTING

- REMOVE ALL VEGETATION AND DEBRIS FROM AROUND THE AREA WHERE THE FOOTING WILL BE
- PLACE FOOTING ON UNDISTURBED SOIL OR SOIL COMPACTED TO 90% RELATIVE DENSITY

THIS VEGETATION INDICATES THE BASE
PAD WAS PLACED ON THE GROUND
WITHOUT ANY PREPARATION



THEY DID NOT DIG DOWN BELOW
VEGETATION FOR FOOTING



SOIL QUALITY AND COMPACTION WHEN USING CONCRETE OR ABS BASE PADS (i.e. not pre- poured foundation)

- Determine soil bearing capacity in pounds per square foot (psf)
- The higher the psf, the more weight the soil can hold
- The lower the psf, the larger the footing must be
- Ways to determine:
 - 1) professional soil tests;
 - 2) Soil records from the county or local jurisdiction;
 - 3) pocket penetrometer;
 - 4) visual;
 - 5) **allowed default: assume capacity of 1500 psf**

Soil conditions across the entire pad often vary. Using the **LOWEST** psf reading from any one area for the entire site

SOIL TYPE	ALLOWABLE PRESSURE (PSF)
ROCK OR HARD PAN	4000 LBS PSF
SANDY GRAVEL and GRAVEL, VERY DENSE and/or CEMENTED SANDS, COURSE GRAVEL/COBBLES, PRELOADED SILTS,, CLAYS and CORAL	2000 LBS PSF
SAND, SILTY SAND, CLAYEY SAND, MEDIUM DENSE COURSE SANDS, SANDY GRAVEL, VERY STIFF SILT, SANDY CLAYS	1500 LBS PSF
CLAY, SANDY CLAY, SILTY CLAY, CLAYEY SILT	1000 LBS PSF
UNCOMPACTED FILL, PEAT, ORGANIC CLAYS	PROFESSIONAL TESTING REQUIRED

CALCULATING FOOTING SIZE

The size of the footing depends on:

- the weight bearing capacity of the soil
- The amount of weight each pier will need to hold
- Manufacturer's manuals will have tables to factor in roof load, home weight, home size, pier location, soil bearing capacity, etc. to help you calculate the footing size and number

**HERE IS AN EASY RULE OF THUMB:
6 FT ON CENTER 16 x 16 x 4 BASE PADS**

GENERALLY SAFE RULE OF THUMB:

- ASSUME **1500 psf** soil bearing capacity
- BLOCK 6 ft ON CENTER
- USE 16 x 16 x 4 INCH concrete base pads

YOU WILL ALMOST ALWAYS BE SAFE
WITH THIS INSTALLATION

HERE'S WHY THIS RULE OF THUMB WORKS:

The largest home you will probably see will be a 32 x 86 ft double wide, which could weigh up to 80,000 lbs.

A home that size, blocked 6 ft on center, has 75 piers. The weight is even across all piers.

That means each pier must bear 1,066 lbs ($80,000 \text{ lbs} / 75 = 1,066$)

A 16 in x 16 in base pad = 1.333 ft x 1.333 ft, thus covers 1.77 sq ft

On 1000 psf soil (the worst soil you will encounter) each base pad will hold **1770 lbs** (1.77×1000)

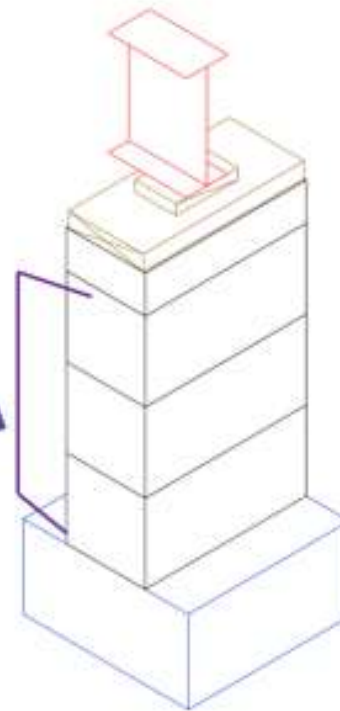
This is far MORE than the 1,066 lbs it needs to hold

Thus, a footing system of 16 x 16 x 4 concrete blocks set 6 ft on center could support a **135,000 lb** house on the worst soil!

(1770 lbs per pier x 75 piers)

5 INGREDIENTS OF A TYPICAL FOUNDATION

- FOOTING
- **PIER BLOCKS**
- CAP BLOCK
- GAP FILLER
- SHIMS



TYPES OF PIERS

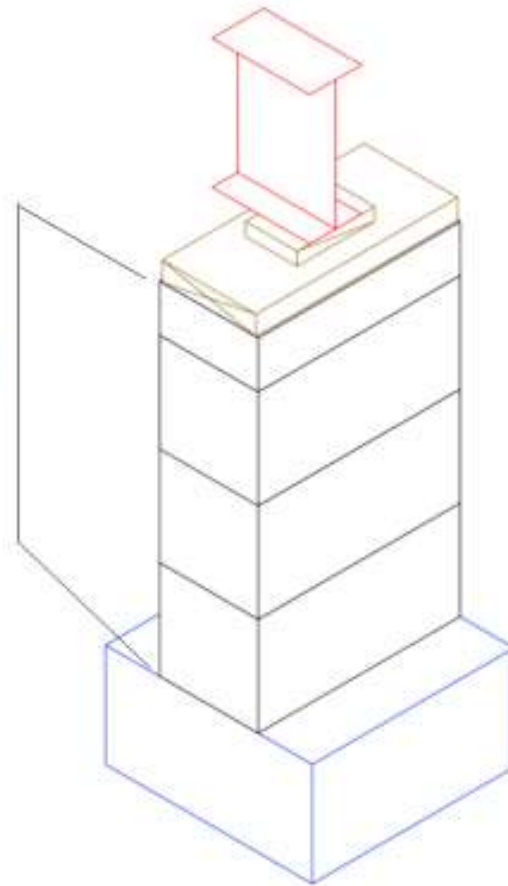
- **FRAME PIERS:** The support under the frame of the home.
- **RIDGE BEAM PIERS (MARRIAGE LINE PIERS):** Support along the marriage line, providing certain roof support (i.e. column support)
- **PERIMETER PIERS:** The support under all exterior doors on the sidewall of the home and under all sidewall openings areas 4 ft wide or wider. Also under any other part of the perimeter, if required by the manufacturer.

PIER MATERIALS

- **Concrete blocks 8 x 16 with hollow cells aligned vertically**
- **Whether you use single blocks or double blocks depends on height and load**
- **Pre-poured piers**

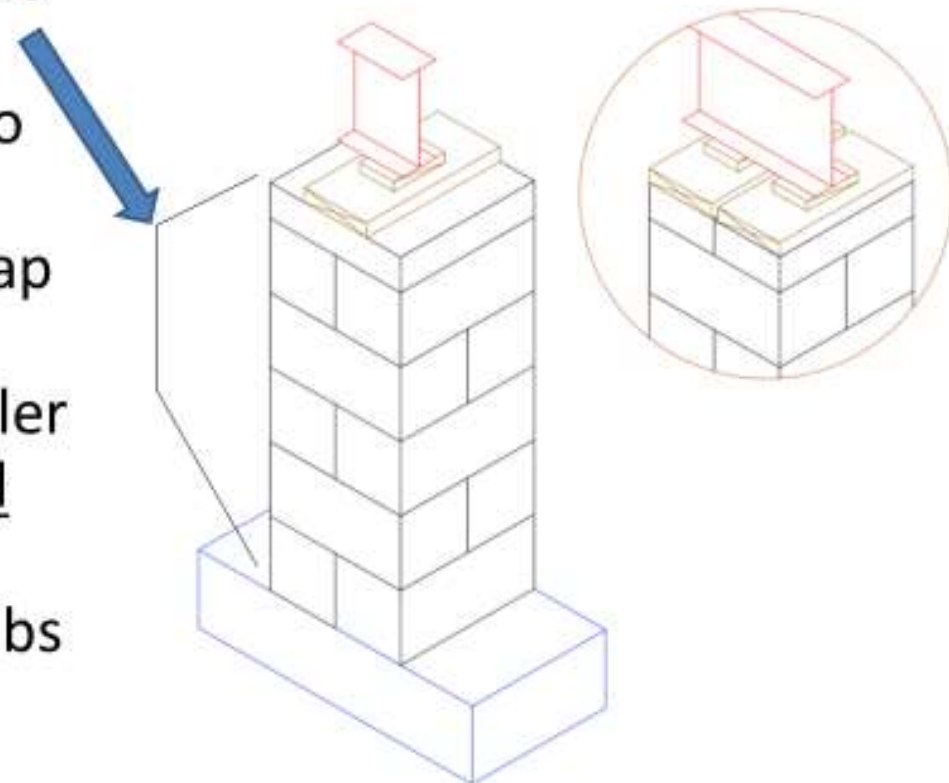
PIER HEIGHT FOR SINGLE STACK FRAME PIERS

maximum height 36
inches from top of
footing to top of pier
(counting the cap block
but not counting gap
filler and shims); and
weight not to exceed
8,000 lbs



PIER HEIGHT FOR DOUBLE STACK FRAME PIERS

maximum height
67 inches from
top of footing to
top of pier
(counting the cap
block but not
counting gap filler
and shims); and
weight not to
exceed 16,000 lbs



**PERIMETER PIER and
MARRIAGE WALL
PIER HEIGHT**

single stacked up to 54 inches;

double stacked up to 67 inches

**NO PIER CAN BE OVER 67 INCHES
WITHOUT A SITE SPECIFIC
SUPPORT SYSTEM BEING
ENGINEERED BY LICENSED
PROFESSIONAL ENGINEER**

CHIPPED OR BROKEN BLOCKS CANNOT BE USED



FINISHING THE PIER

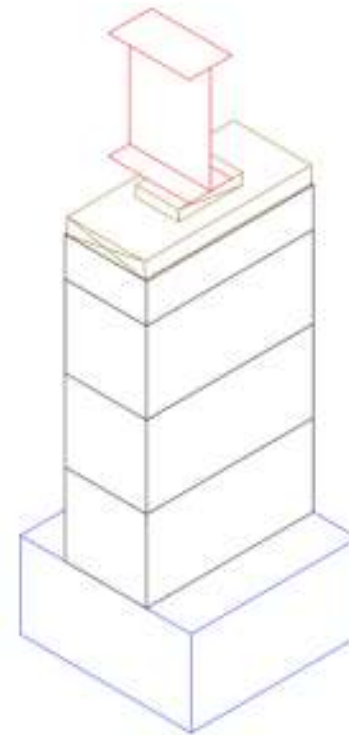
FILLING THE SPACE
BETWEEN THE PIER AND
THE FRAME

PIERS MUST MEET THE FRAME



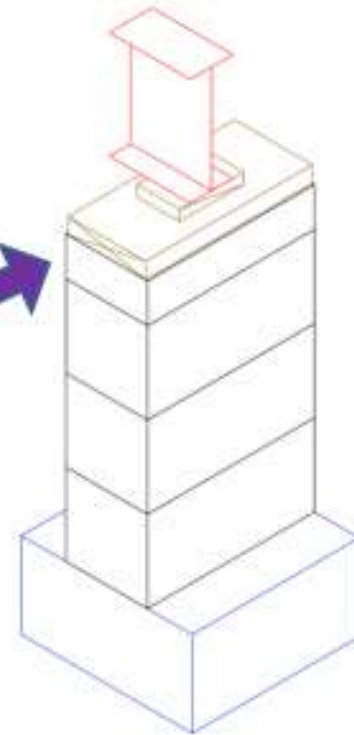
ITEMS USED TO FINISH THE PIER

- FOOTING
- PIER BLOCKS
- **CAP BLOCK**
- **GAP FILLER**
- **SHIMS**



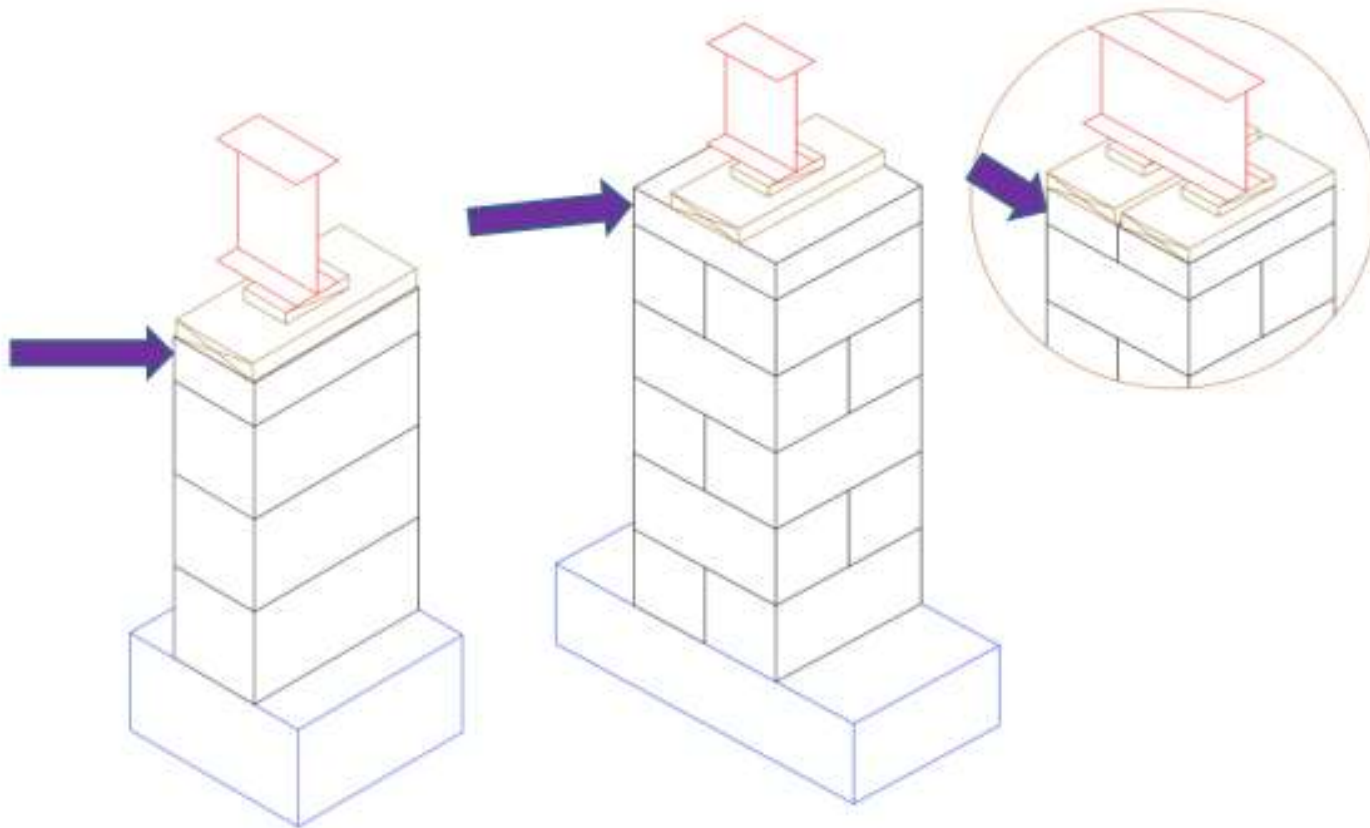
FINISHING THE PIER

- FOOTING
- PIER BLOCKS
- **CAP BLOCK**
- GAP FILLER
- SHIMS



CAP BLOCKS: A concrete, wood or steel cap on top of the concrete block piers

-ALL PIERS MUST HAVE A CAP BLOCK-



CAP BLOCK MATERIALS

1/2 x 8 x 16 Steel plate

-or-

**2 x 8 x 16 hardwood cap
(nominal)**

-or-

Minimum 4 x 8 x 16 concrete

CAP BLOCK RULES

ONLY ONE LAYER OF METAL, WOOD OR CONCRETE BLOCK ON TOP OF THE PIER IS CONSIDERED A CAP. ANYTHING ON TOP OF THAT IS CONSIDERED GAP FILLER

WHEN INSTALLING SPLIT CAPS ON DOUBLE STACK PIER, PLACE THE LONG DIMENSION PERPENDICULAR TO THE I-BEAM

PROPER SINGLE PIER CAP BLOCKS

2 x 8 x 16 HARDWOOD

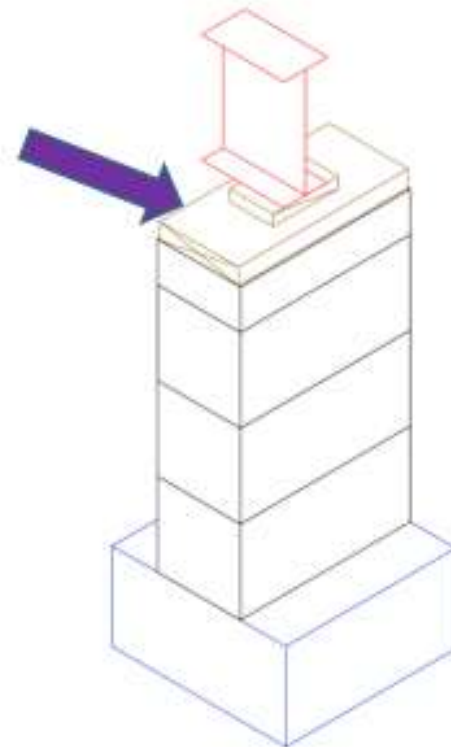


4 x 8 x 16 concrete



FINISHING THE PIER

- FOOTING
- PIER BLOCKS
- CAP BLOCK
- **GAP FILLER**
- SHIMS

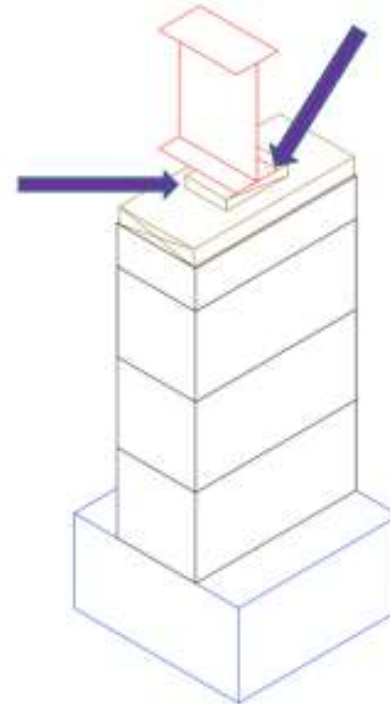


GAP FILLER

- *concrete or wood between the top of the cap block and the bottom of the frame*
- must be no more than 4 inches thick (nominal)
- must be solid concrete blocks or hardwood lumber
- Not required, but best practice is to have wood between the metal frame and the concrete pier

FINISHING THE PIER

- FOOTING
- PIER BLOCKS
- CAP BLOCK
- GAP FILLER
- **SHIMS**



SHIMS

HARDWOOD

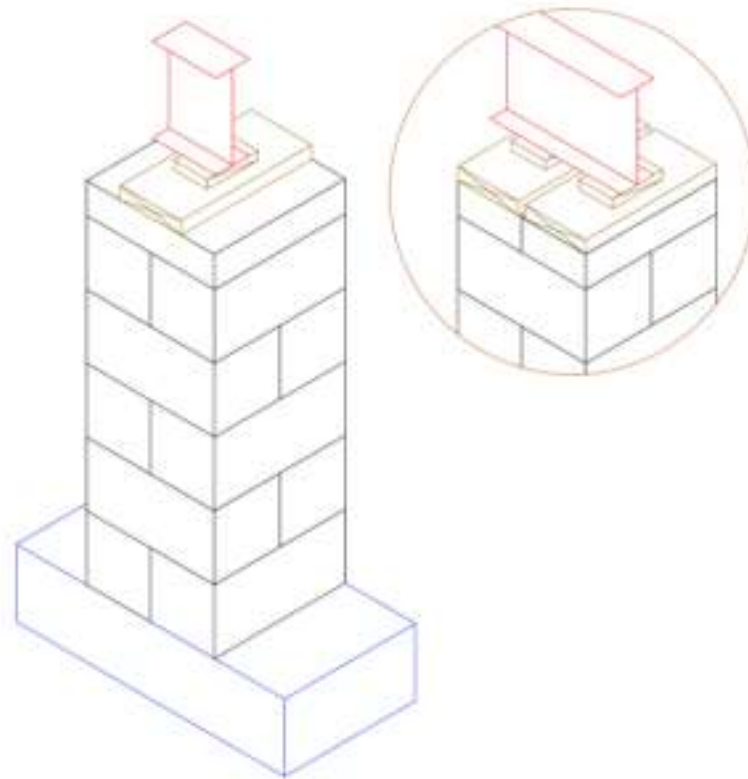


ABS



- MINIMUM SIZE: Nominal 6 inch long
x 4 inch wide
x 1 inch thick
- USE IN PAIRS
- DRIVE IN FROM OPPOSITE DIRECTIONS AND OVERLAP
- TIGHT FIT WITH BOTTOM OF FRAME
- SHIM EACH SIDE OF FRAME
- If shimming double blocks with a solid cap, must have a minimum of 1 pair (2)
- If shimming double blocks with a split cap, must have a minimum of 2 pair (4)

1 pair of shims for the solid cap
2 pair of shims for the split cap



Proper shimming



SHIMS TOO HIGH



NO BUENO



SPACING FRAME PIERS and MARRIAGE LINE PIERS on **NEW** HOMES

- FOLLOW MANUFACTURER'S MANUAL FOR PLACEMENT AND LOCATION
- REMEMBER the **6 FT ON CENTER using 16 x 16 x 4 inch base pad RULE OF THUMB**. This generally meets or exceeds manufacturer specifications.
- **NOTE: A PIER SUPPORT MUST BE LOCATED NO MORE THAN 24 INCHES FROM EACH END OF THE HOME**
- **NOTE: MINIMUM CLEARANCE OF 12 INCHES UNDER THE HOME IS REQUIRED**

SPACING FRAME PIERS and MARRIAGE LINE PIERS on **USED** HOMES

- Maximum of 6 ft on center
- **REMEMBER the 6 FT ON CENTER using 16 x 16 x 4 inch base pad RULE OF THUMB.**
- **NOTE: A PIER SUPPORT MUST BE LOCATED NO MORE THAN 24 INCHES FROM EACH END OF THE HOME**
- **NOTE: MINIMUM CLEARANCE OF 12 INCHES UNDER THE HOME IS REQUIRED**

PERIMETER SUPPORT ALWAYS REQUIRED IN THESE AREAS OF THE HOME:

Exterior doors on side walls - piers on both sides of the door

Exterior sidewall openings 4 feet or greater - piers on both sides of the opening

Marriage line openings 4 feet or greater – piers on both sides of the opening

Where marriage line openings are greater than 10 feet, intermediate supports to be placed at maximum 10 feet on center, spaced evenly

Locations where through-the-rim crossover ducts penetrate the rim joist at the marriage line

**DETERMINING WHICH
OPENINGS MUST BE BLOCKED
CAN BE TRICKY**

CONSULT THE MANUFACTURER'S DRAWING TO
DETERMINE HOW LARGE THE UNSUPPORTED
OPENING IS

DOOR BLOCKED CORRECTLY, BUT
WINDOW MUST ALSO BE BLOCKED



PERIMETER SUPPORT

ALWAYS REQUIRED IN SOME AREAS
OF THE HOME

SOMETIMES REQUIRED IN OTHER
AREAS AROUND THE PERIMETER
OF THE HOME

(varies by manufacturer and/or home
model – consult the manual)

THE DOOR MUST BE BLOCKED

-the piers you see are frame piers, not perimeter piers-



Perimeter blocks must be on each side of the door – this is proper because the pier on the left is under the joist



RECESSED DOORS
BLOCK THE OPENING, NOT THE DOOR



**-OBSTRUCTIONS-
COMMON SENSE MUST BE THE RULE
GIVE SUPPORT AS CLOSE AS YOU CAN**



SET UP WATER LEVEL

A water level is a standard device for leveling the home

The level consists of the following components:

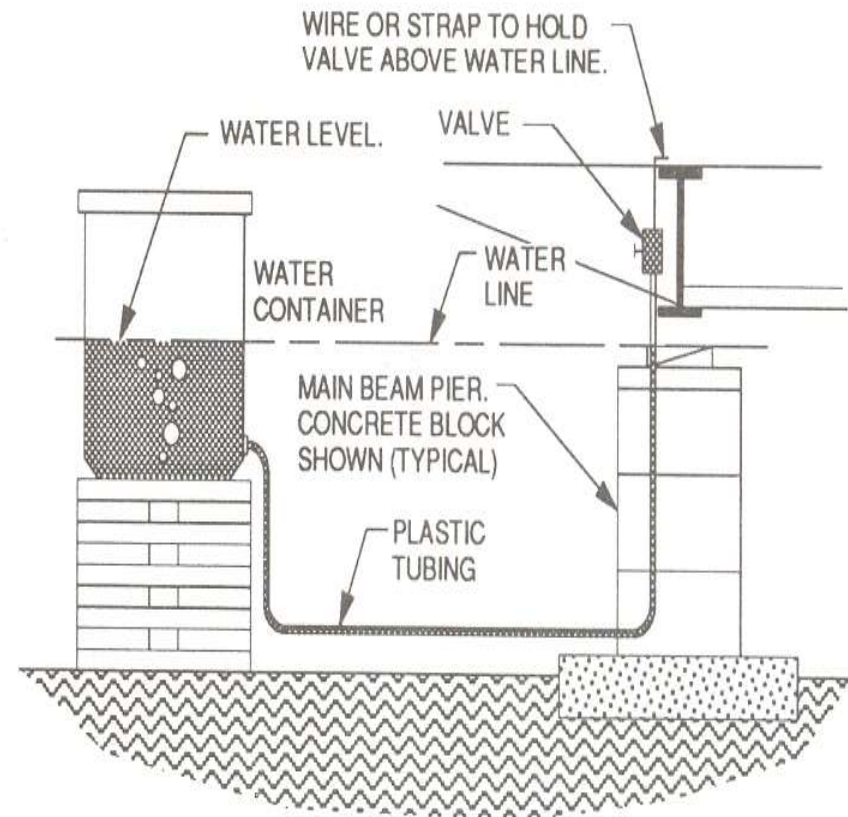
- One container (five gallon bucket or one gallon jug)
- 150 feet of ½ inch diameter plastic tubing
- Fittings for container to tubing
- Valve for terminal end of tubing
- Liquid for system: colored water in warm climates, windshield washing fluid in cold climates

LEVEL THE HOME

- THE HOME IS ADEQUATELY LEVELED IF THERE IS **NO MORE THAN 1/4 INCH DIFFERENCE BETWEEN ADJACENT PIER SUPPORTS (FRAME AND PERIMETER) AND THE EXTERIOR DOORS AND WINDOWS OF THE HOME DO NOT BIND AND CAN BE PROPERLY OPERATED**

PROCEDURE ON USING A WATER LEVEL

1. Position water container adjacent to the section that permits length of plastic tubing and valve to reach all pier locations.
2. Lay out plastic tubing, away from traffic areas, checking to make sure it is not compressed or kinked. Make sure installation materials are not placed on tubing.
3. Fill container with colored water.
4. Hold the valve below the level of the water container, open the valve to bleed out any air. Close valve.
5. Locate the tubing adjacent to a pier that is set to the desired final height of the home. Position the valve above the pier and open the valve. Move the water container up or down to where the water level in the tubing is at the desired final height of the pier. Maintain the water container at that position. Close valve.
6. Move tubing to the next pier. Locate the valve above the pier and open the valve. Set the pier height to the level of the water in the tubing. Close the valve. Repeat this step until all piers are at the same level.
7. Lower section onto piers.



WATER LEVEL APPLICATION

CLEARANCES UNDER THE HOME

- **AFTER THE HOME IS LEVELED, THE RESULTING DISTANCE BETWEEN THE BOTTOM OF THE ENTIRE CHASSIS MAIN FRAME BEAM AND THE GROUND MUST BE NO LESS THAN 12 INCHES!**

COMPLETE THE OPPOSITE SIDE

- JACK THE OTHER SIDE OF THE SECTION UP AND INSTALL PIERS. AT THE COMPLETION OF THIS STEP, THE SECTION SHOULD BE LEVEL FROM FRONT TO REAR AND FROM SIDE TO SIDE

COMPLETE MULTI- SECTION SET

INSTALL MARRIAGE LINE ANCHORS

If the home is in Wind
Zone II or III, install
ground anchors along
the marriage line now

REMOVE PROTECTIVE SHIPPING MATERIALS

- Remove all shipping protection and associated fasteners from both home sections to be joined, including plastic used to close up the open sides during transportation. Do not remove the temporary supports holding up the ceilings at major openings

COMPLETE HINGED ROOF

- If the home has a hinged roof that has been folded down for shipping, raise the roof using a crane or roof jacks following the procedure below:
 1. Position lift points
 2. Remove fasteners
 3. Lift roof

Hinged Roof – con't

4. Secure king posts



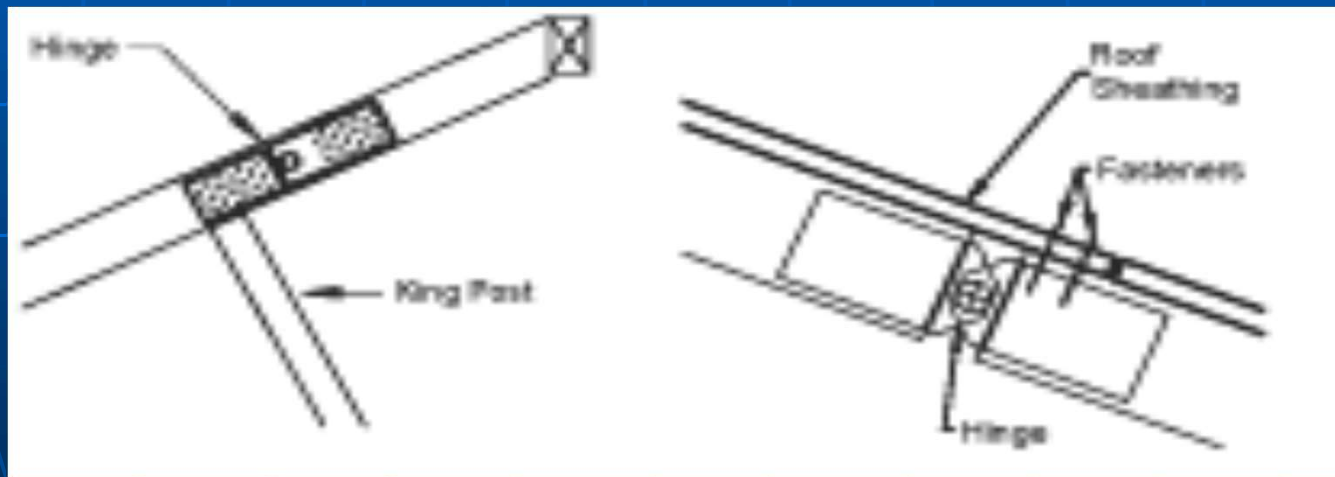
5. Install Bracing



Hinged Roof – con't

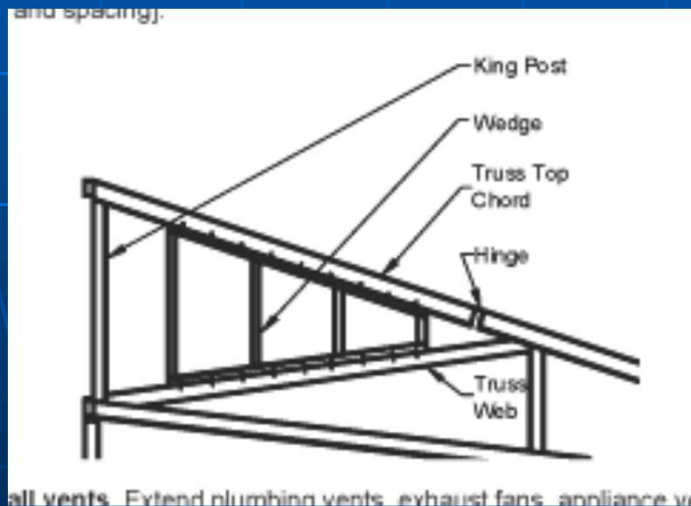
6. Unfold double hinge

7. Fasten sheathing

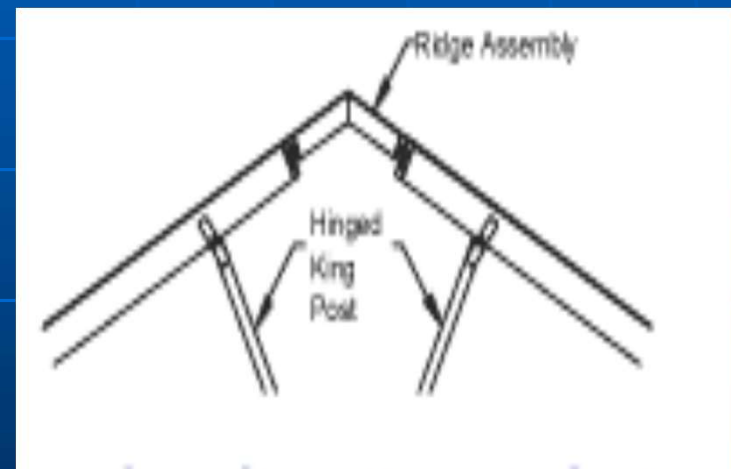


Hinged Roof – con't

8. Redistribute Insulation
9. Install gable walls

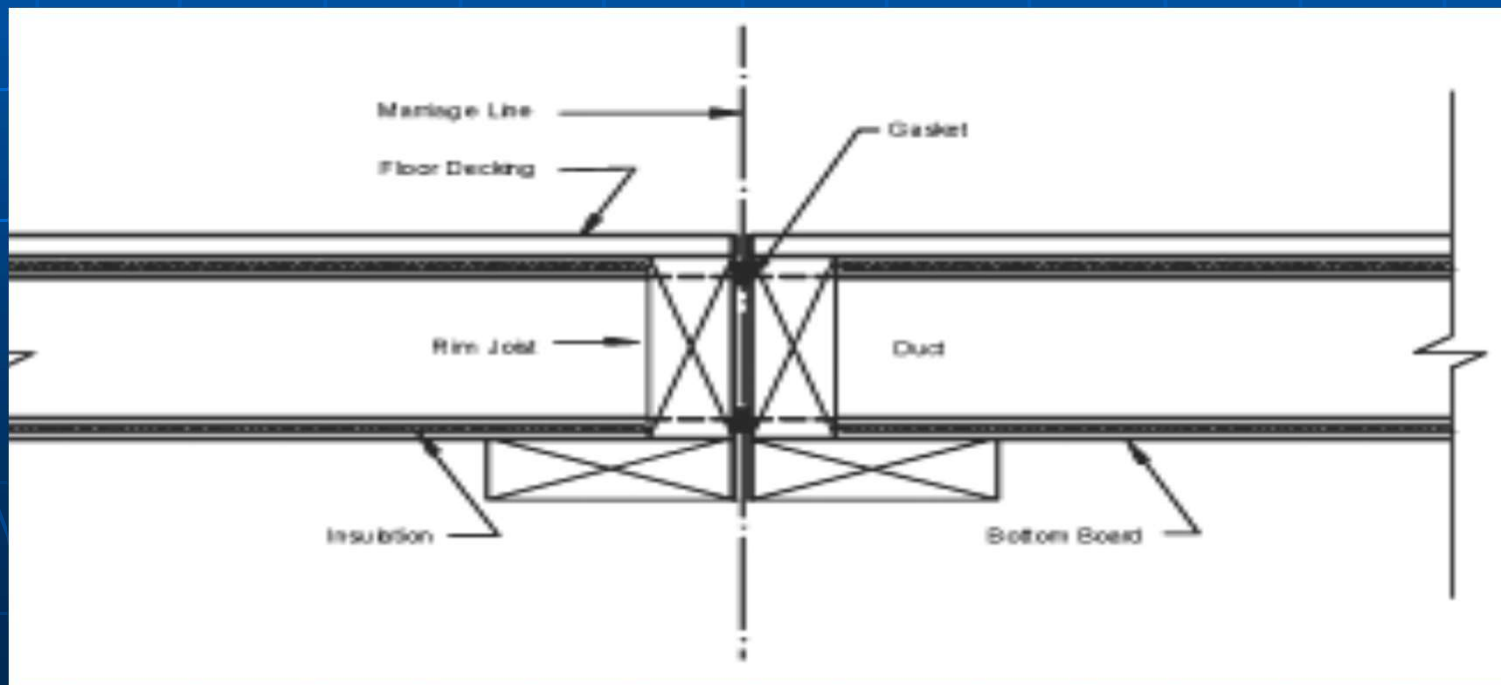


10. Install vents



REPAIR OR INSTALL MARRIAGE LINE GASKET

A continuous, non-porous gasket creating a permanent air barrier must be installed on at least one side of the marriage line; along the floor, end walls and ceilings



POSITION ADDITIONAL HOME SECTIONS

- Remove obstructions
- Complete Crossovers
- Position section
- Construct piers
- Level section
- Shim gaps

SEALING GAPS

- PRIOR TO COMPLETION OF THE EXTERIOR CLOSEUP, **GAPS THAT DO NOT EXCEED 1 INCH ARE PERMITTED** BETWEEN STRUCTURAL ELEMENTS PROVIDED THAT THE GAPS ARE CLOSED BEFORE COMPLETION OF CLOSE-UP, THE HOME SECTIONS ARE IN CONTACT WITH EACH OTHER, AND THE MARRIAGE GASKET PROVIDES A PROPER SEAL!

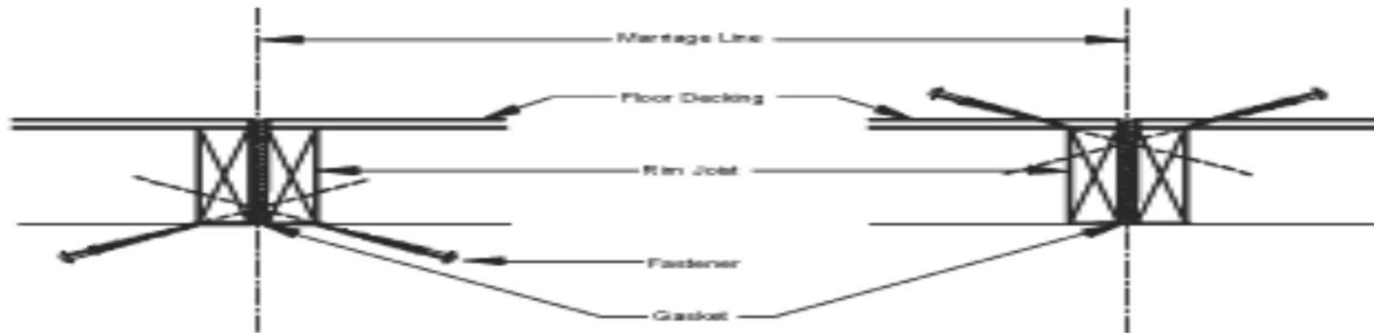
CONNECT FLOORS

- **METHOD 1: INSTALL TOED FASTENERS THROUGH BOTTOM BOARD OR FLOOR DECKING** – Install fasteners at approximately a 45 degree angle (+/-5 degrees) from horizontal as shown in Figure 28 using the fastener type, size, and spacing indicated on Table 13.

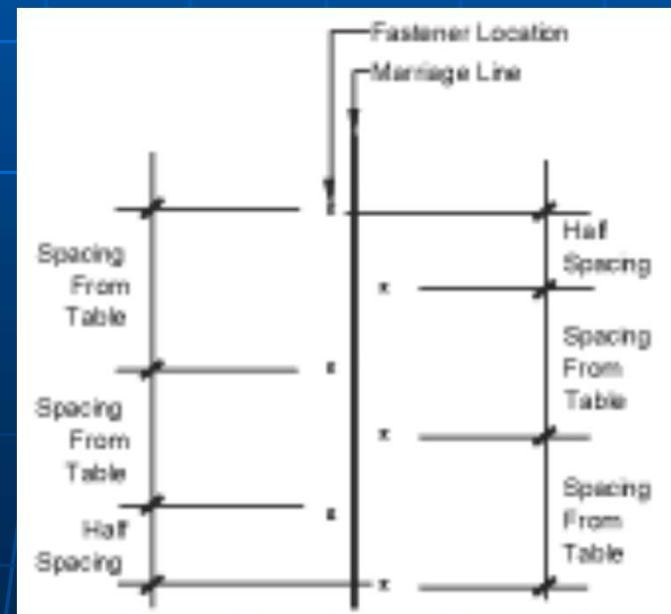
TABLE 13. FLOOR CONNECTION FASTENING SPECIFICATIONS

Fastener		Spacing		
Type	Size	Wind Zone I	Wind Zone II	Wind Zone III
Lag screw with washer	5/16" x 4-1/2"*	36 in.	20 in.	16 in.
Wood screw	#8 x 4"*	32 in.	16 in.	16 in.

* Increase fastener lengths by 3 inches for double rim joists.



Stagger fasteners on either side of marriage line and offset them by half the spacing distance



FLOOR CONNECTIONS

- **FLOOR LAGS (5/16" X 4 1/2") WITH WASHER IN WIND ZONE 1 ARE NO MORE THAN 36 INCHES APART**
- **WOOD SCREWS (#8X4") ARE 32 INCHES APART IN WIND ZONE 1**

Install additional fasteners as indicated below, making sure to repair any openings in the bottom board with tape specially made for that purpose (may be provided)

- Install two additional fasteners at each end of the home at approximately a 45 degree angle from horizontal
- If the home has a through-the-rim crossover duct, install one additional fastener at each side of the duct opening

➤ Except where marriage walls exist on both sides of the marriage line, insert 16d nails eight inches o.c. toed from above across the marriage line into opposing rim joist

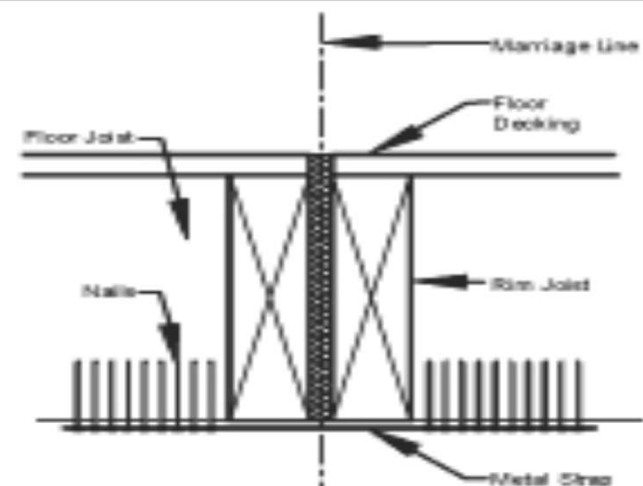
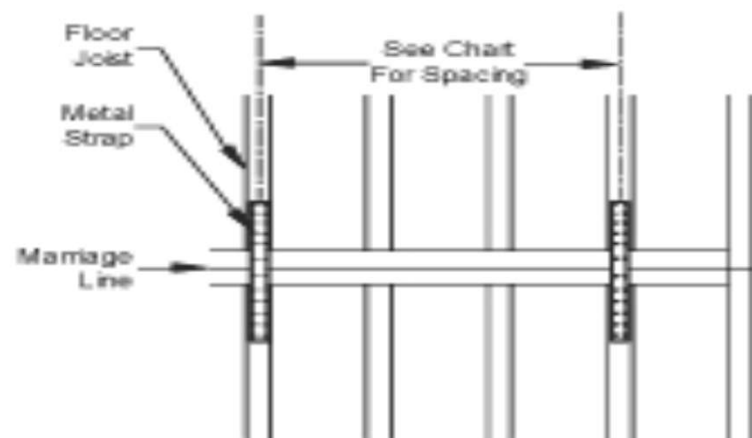
➤ In Wind Zone II and III, fasten metal straps of minimum 26 gauge, 1 ½” wide galvanized steel spaced per Table 14 and fastened per Table 15 to the underside of the floor Joists (figure 30).
Select strap length sufficient to hold the required fasteners. STRAPS ARE NOT REQUIRED FOR WIND ZONE 1

TABLE 14 MAXIMUM STRAP SPACING

Roof slope	Wind Zone II	Wind Zone III
Up to 4-in-12	96 in.	80 in.
Over 4-in-12	48 in.	48 in.

TABLE 15. STRAP FASTENING MINIMUM SPECIFICATIONS

Fastener type	Size	Number
Galvanized staples 16ga	7/16" x 1" penetration	12 each side
Roofing nails	1-1/2" long	9 each side

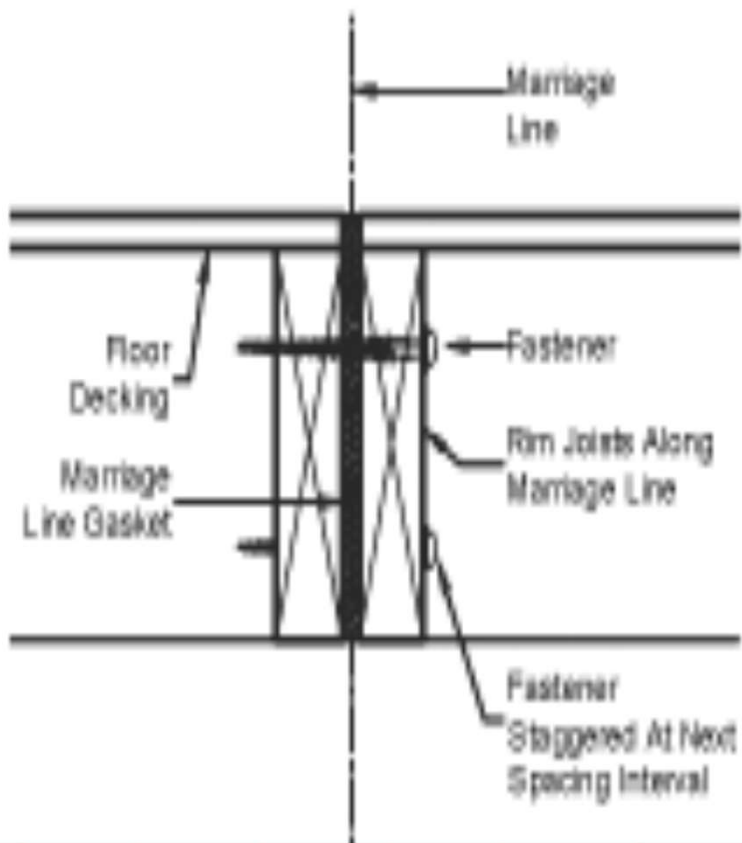


Method 2: Install horizontal fasteners through rim joist

Insert 5/16" x 3" lag screws spaced per **Table 16** horizontally through rim joists and staggered top to bottom as in **Figure 31**. After installation of fasteners, repair tears or holes in the bottom board using tape specially made for that purpose.

TABLE 16. HORIZONTAL RIM JOIST FASTENER SPACING

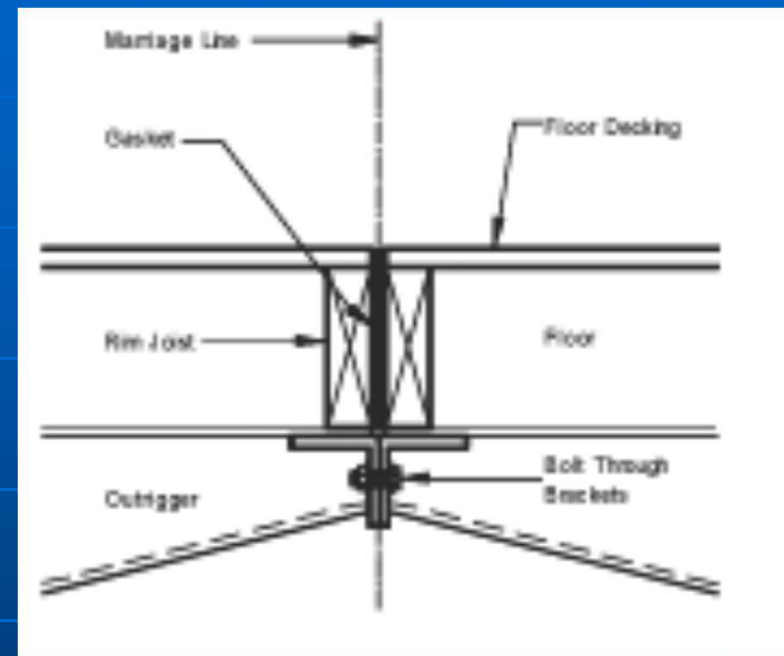
Wind Zone I	Wind Zone II	Wind Zone III
18 in.	10 in.	8 in.



METHOD 3: INSTALL THROUGH BRACKETS AT ENDS OF FRAME OUTRIGGERS

This method is available only if the brackets have been provided by the manufacturer

Insert 1/2" bolts, washers and nuts at each outrigger connection bracket. Repair tears or holes in the bottom board after installation of fasteners using tape specially made for that purpose



CONNECT ROOF

- If the marriage line along the roof is not snug, position jacks every 20 feet or less along the outside I-beam and uniformly lift the section until the roof area is tight.
- Check to make sure the ceiling joint is flush before installing the connections. If not, use a jack and tee to raise whichever ceiling is low, starting at the front and working to the rear of the home. Fasten the roof along the marriage line using one of the methods below for either double or triple-section homes

CLOSING THE ROOF GAP

- Level and fasten the marriage line joint at the floor before jacking to tighten a roof gap. **DO NOT USE ROOF FASTENERS TO CLOSE ANY GAPS.**

Separation of the ridge beams and trusses may occur.

METHOD 1: Install toed fasteners through roof sheathing

- Install the fasteners through the roof deck into the ridge beams at an approximately 45 degree angle from horizontal according to the fastener spacing and specifications in Table 17. Stagger fasteners on each side of marriage line and offset them by half the spacing distance. Spacing indicated is on-center, both sides of ridge. Make sure fasteners penetrate the ridge beam/rail by a minimum of 1 ½ inches both sides of ridge

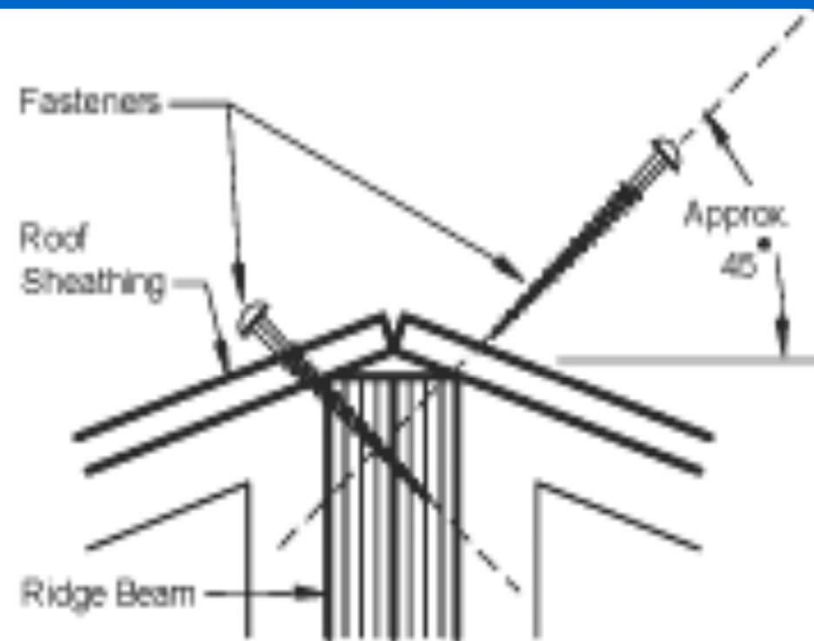


TABLE 17. ROOF CONNECTIONS SPECIFICATIONS

Fastener		Spacing		
Type	Size	Wind Zone I	Wind Zone II	Wind Zone III
Lag screw with washer	5/16" x 6"	28 in.	20 in.	12 in.
Wood screw	#10 x 5"	24 in.	12 in.	12 in.



TABLE 18. ROOF CONNECTION SPECIFICATIONS

Fastener		Spacing		
Type	Size	Wind Zone I	Wind Zone II	Wind Zone III
Bolt with 5/16" washer both ends	1/2" x 4-1/2"	24 in	XX in	XX in
Lag screw with washer	3/8" x 5"	XX in	XX in	XX in

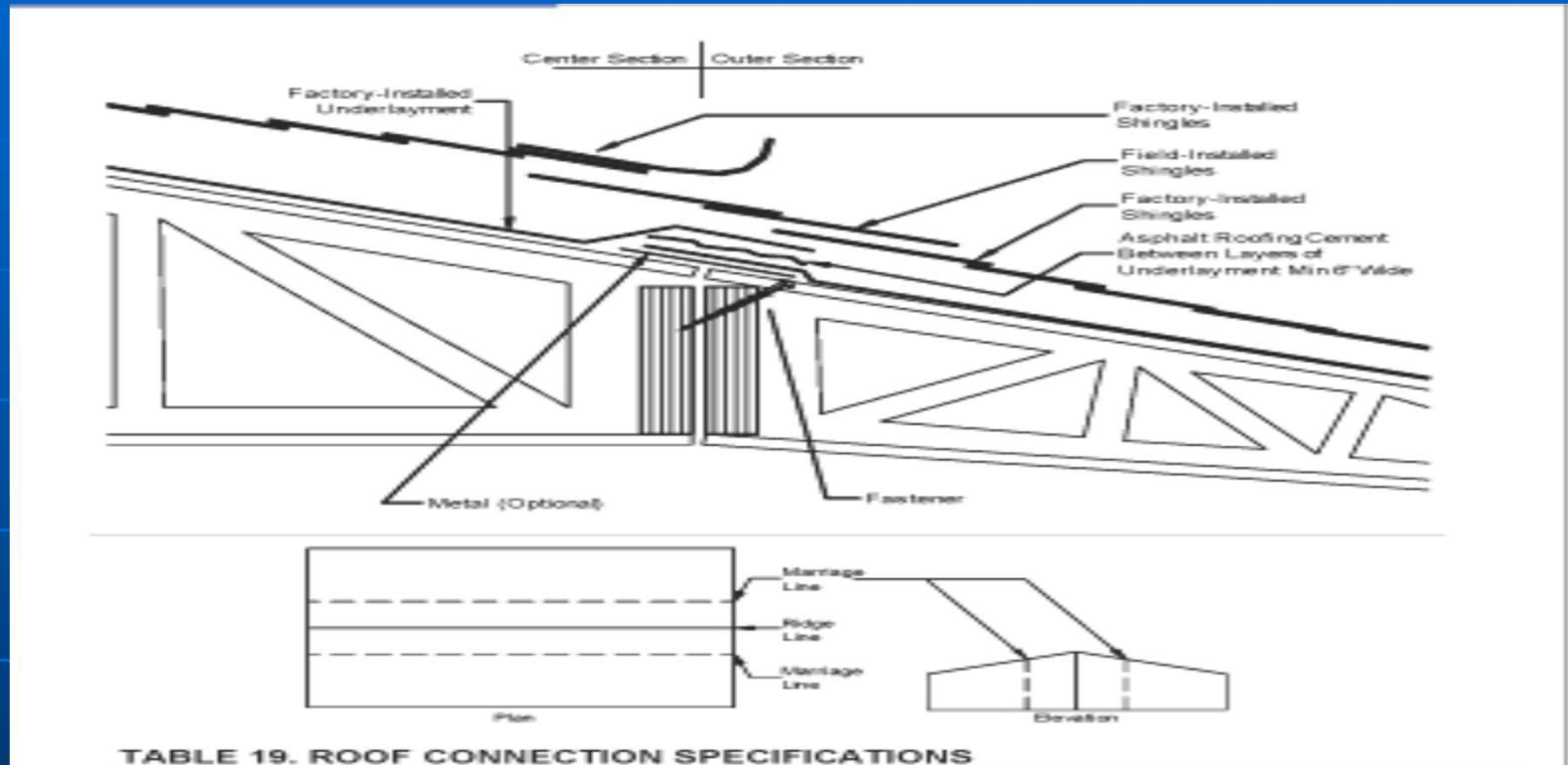
ROOF FASTENERS THROUGH RIDGE BEAM

FASTENER – BOLT WITH 5/16" WASHER BOTH ENDS 1/2" X 4 1/2" ARE ALLOWED ONLY 24 INCH APART IN WIND ZONE 1

METHOD 2: INSTALL FASTENERS THROUGH RIDGE BEAM

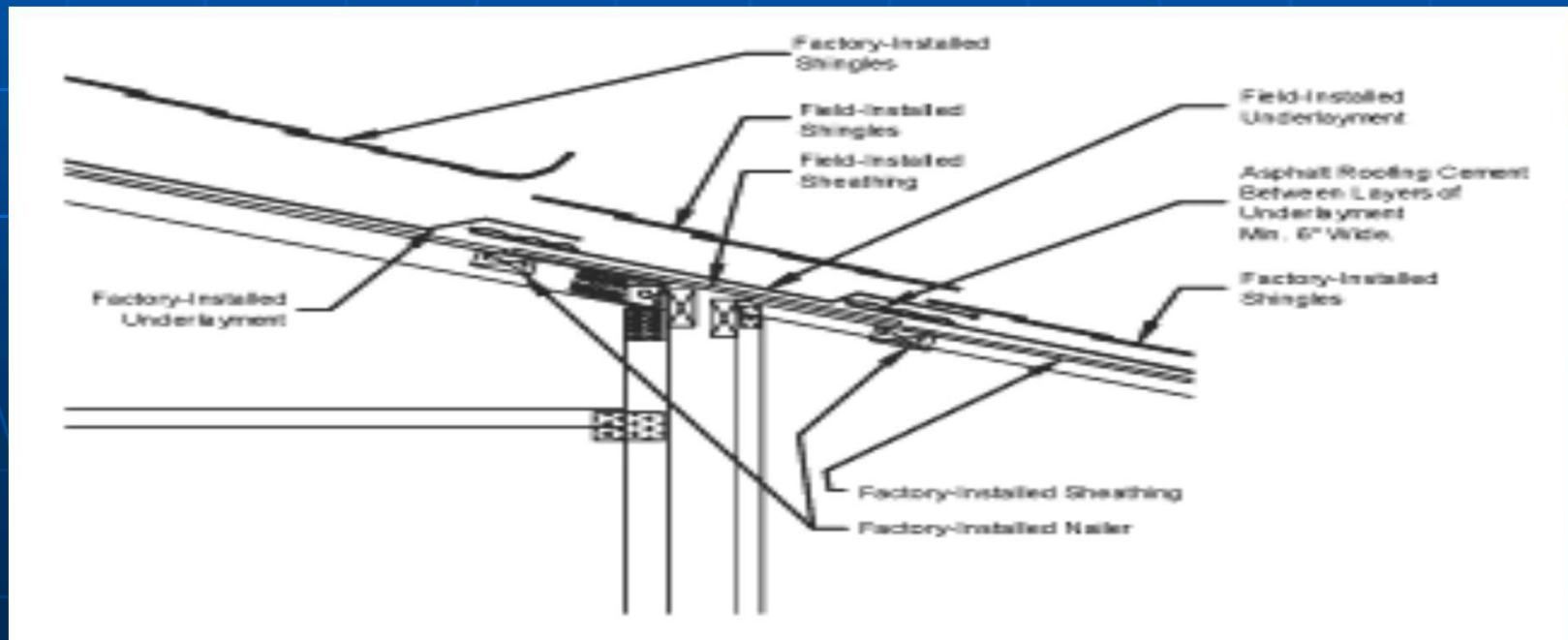
- Access beam
- Install fasteners
- Install caps/straps
- Replace sheathing – Replace roof sheathing access panels using minimum 15 ga x 7/16" x 1 1/2" staples or 6d nails spaced six inches o.c. on all sides of the panel where supporting structural members are present

TRIPLE-SECTION HOMES



Fastener		Spacing		
Type	Size	Wind Zone I	Wind Zone II	Wind Zone III
Lag screw	5/16" x 6"	14in.	10in.	6in.
Wood screw	#10 x 5"	12in.	6in.	6in.

Install fasteners with ship loose sheathing
For homes where sheathing is shipped loose to be installed on site, fasten field-installed sheathing to all underlying blocking and framing with 15 ga 7/16" x 1 1/2" staples at four inches o.c. in field and perimeter



CONNECT WALLS

- Once the home is secured along the marriage line floor and roof, secure end walls, interior doorways, and marriage line partitions according to the appropriate method

END WALLS

- METHOD 1: Install toed fasteners through sheathing

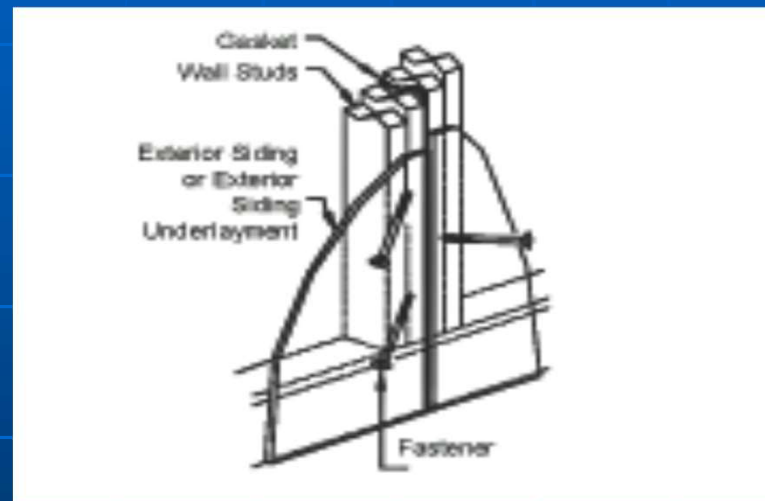


TABLE 21. END WALL CONNECTION SPECIFICATIONS – FROM BEHIND SHEATHING

Fastener type	Size	Locations
Lag screw with washer	5/16" x 5"	Top, center, bottom
Bolt and nut with washers both sides	3/8" x 7" or 1/2" x 7"	Top, center, bottom (pre-drill holes)

METHOD 2: Install bolts or lags through end stud framing

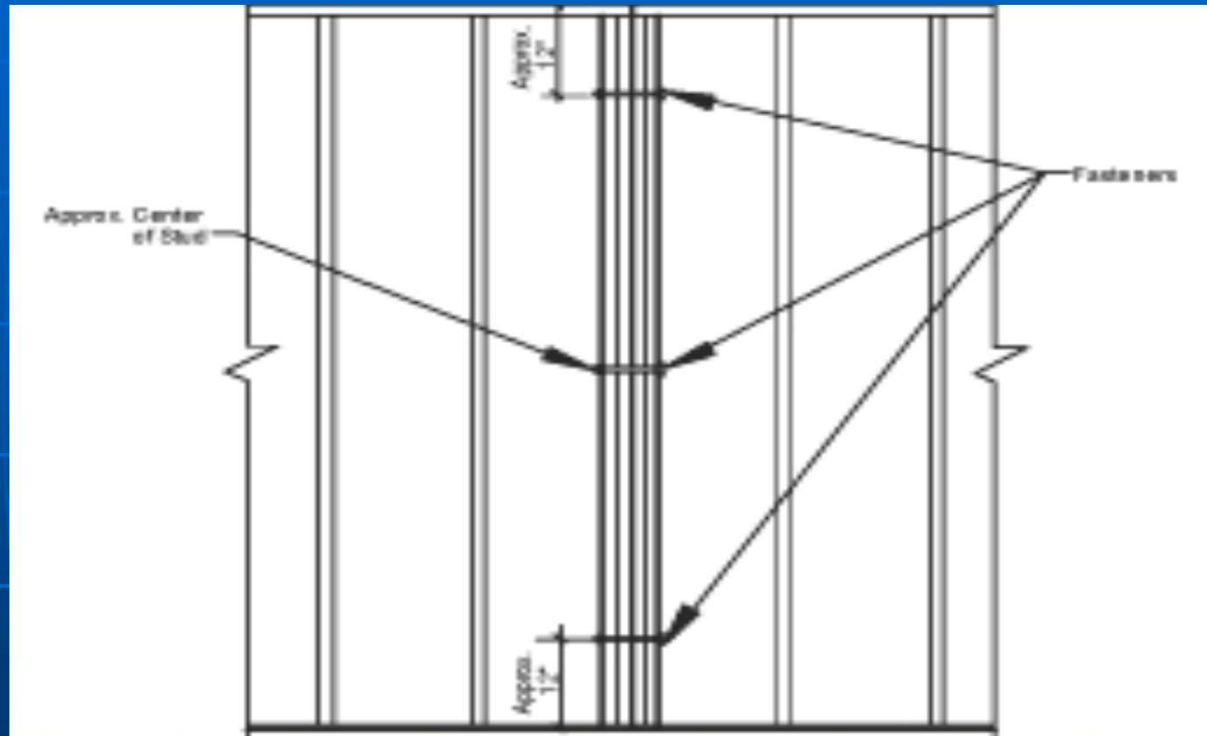


TABLE 21. END WALL CONNECTION SPECIFICATIONS – FROM BEHIND SHEATHING

Fastener type	Size	Locations
Lag screw with washer	5/16" x 5"	Top, center, bottom
Bolt and nut with washers both sides	3/8" x 7" or 1/2" x 7"	Top, center, bottom (pre-drill holes)

MARRIAGE WALL COLUMNS, OPENINGS AND INTERIOR PARTITIONS

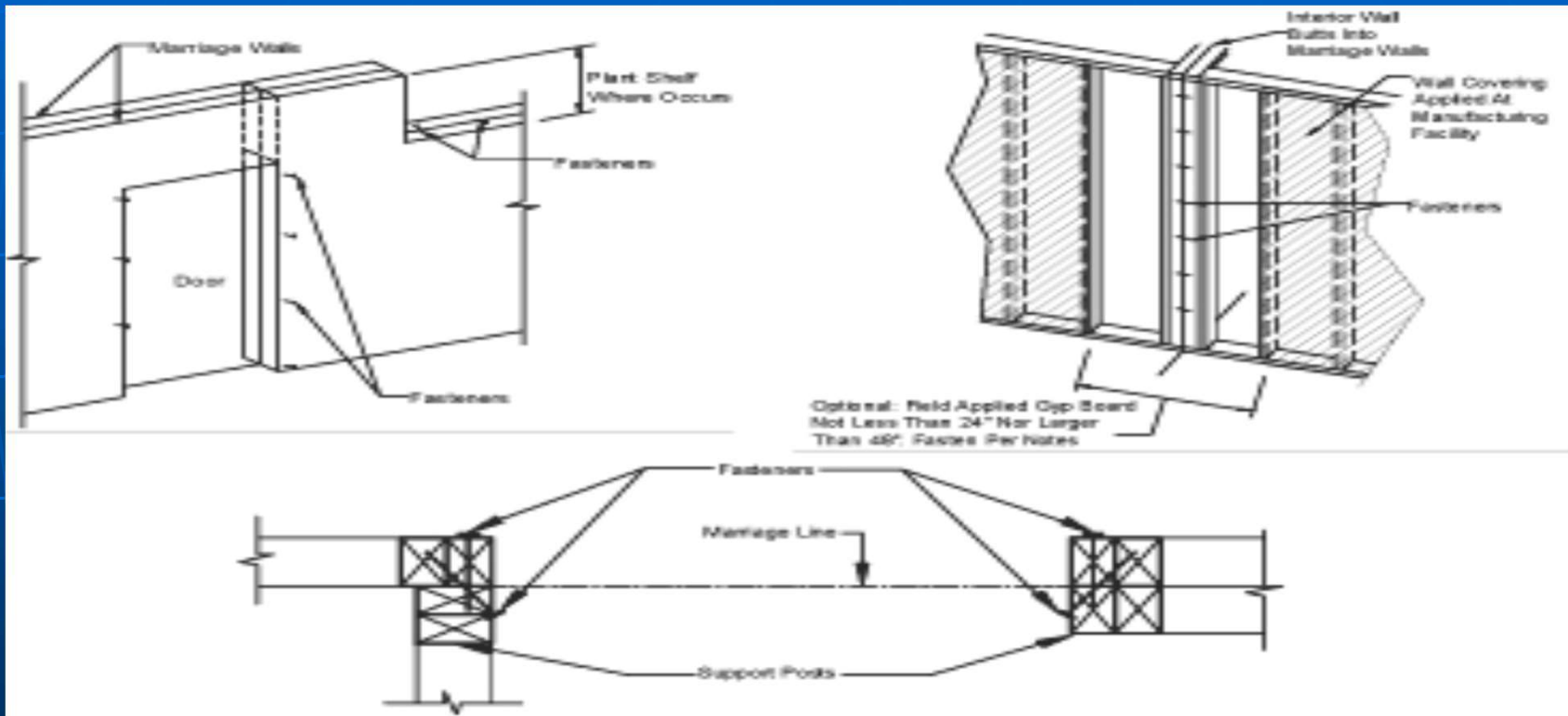


TABLE 22. MARRIAGE WALL CONNECTION SPECIFICATIONS

Fastener type	Size	Spacing
Wood screw	#8 x 4"	16 in. o.c.

ATTACH TAG UNITS

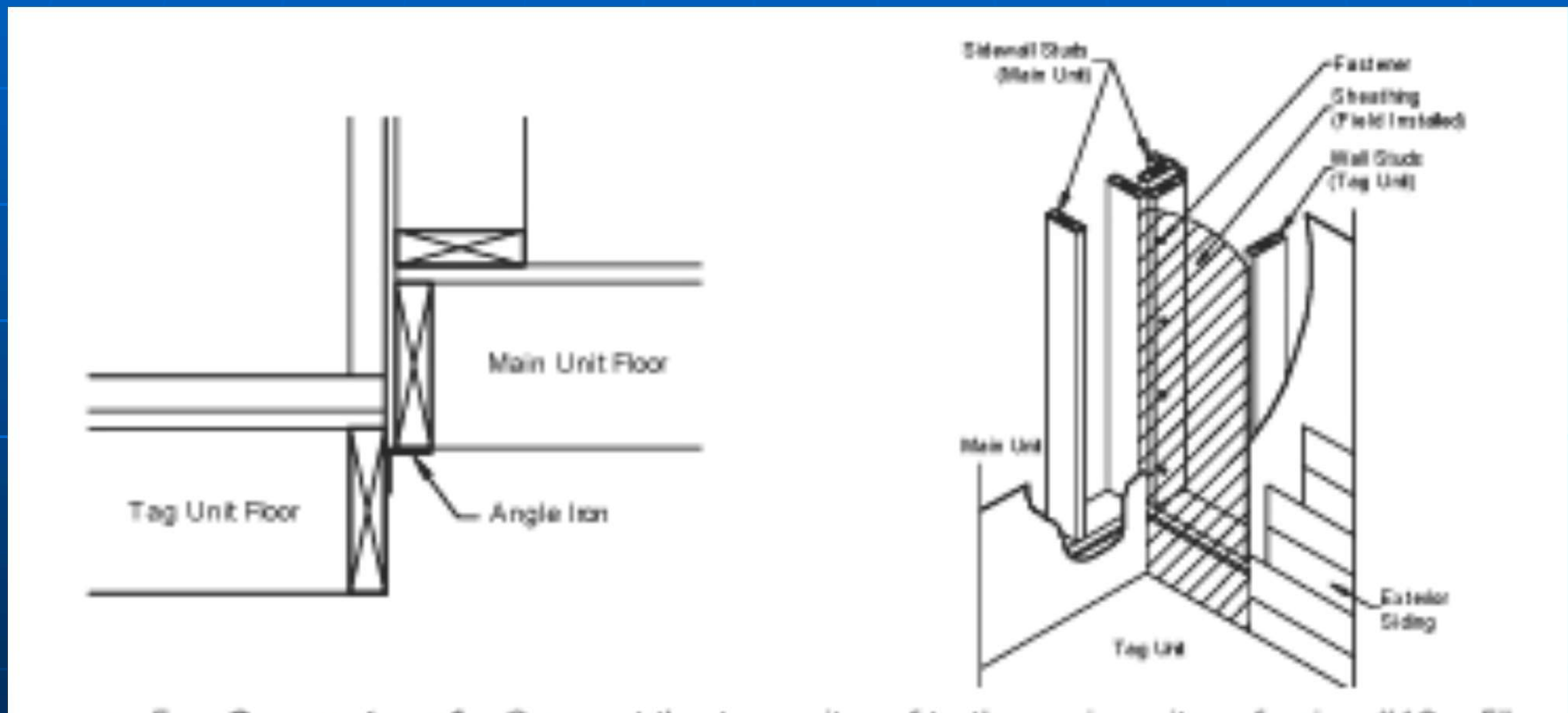
After the main unit has been set on its foundation, install all tag units according to the following procedure

- Position and block the tag
- Level the unit

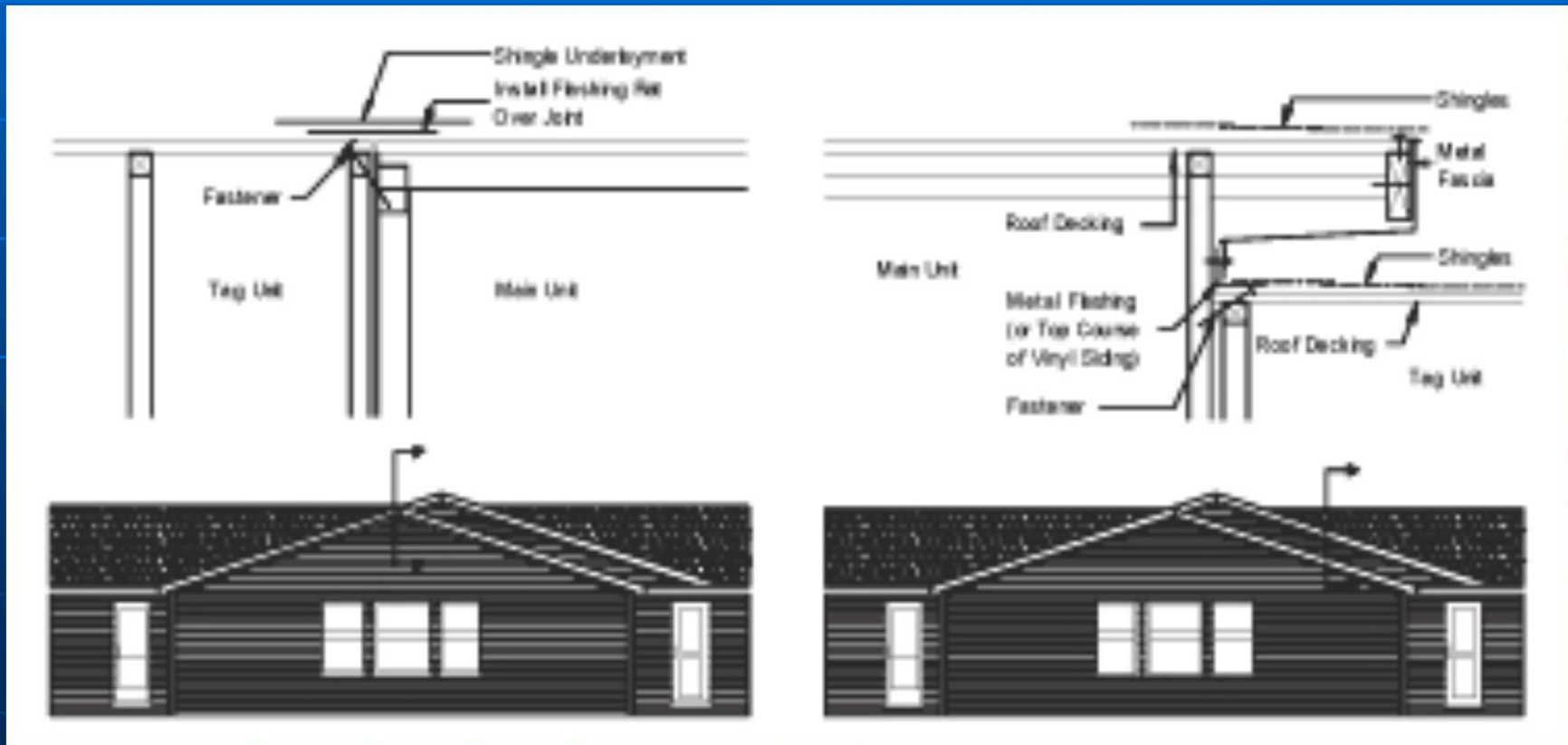
PIERS UNDER TAG UNITS

- SOME TAG UNITS HAVE SPECIAL PIERING NEEDS DUE TO THE ROOF AND/OR FLOOR CONSTRUCTION.
- THESE WILL BE DETAILED IN SUPPLEMENTAL PIER PLANS SUPPLIED WITH THE HOME
- **NOTE THAT TAG UNIT END WALLS ARE TYPICALLY LOAD BEARING RATHER THAN SIDE WALLS**

- Connect the floors
- Connect the walls



➤ Connect roofs – Connect the tag unit roof to the main unit roof using #10x5” screws or 3/8” x 6” lag screws, toe screwed at each main unit vertical structural member location



- REMOVE TEMPORARY ITEMS
- FASTEN HOME TO FOUNDATION
- BACKFILL AND GRADE
- BUILD STAIRS

CUTTING THE CHASSIS

- DO NOT CUT, NOTCH, BEND, OR ALTER IN ANY MANNER BEAMS, CROSS-MEMBERS, AND OTHER PARTS OF THE STEEL CHASSIS

COMPLETE ROOF AND EXTERIOR WALLS

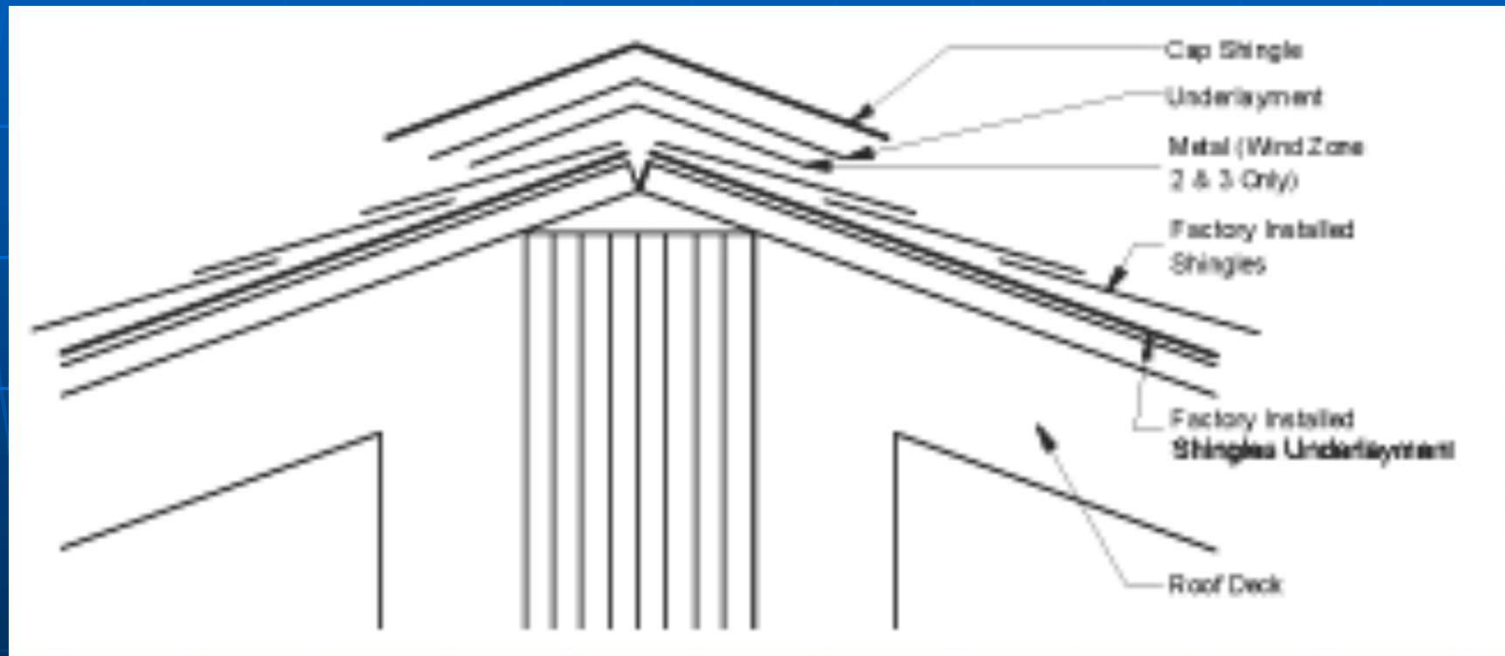
WEATHERPROOFING

- **IT IS VITALLY IMPORTANT TO CLOSE UP THE HOME QUICKLY TO PROTECT THE INTERIOR FROM DAMAGE DUE TO INCLEMENT WEATHER**



COMPLETE ROOF

➤ RIDGE CLOSEUP



WHAT IS WRONG WITH THIS PICTURE?



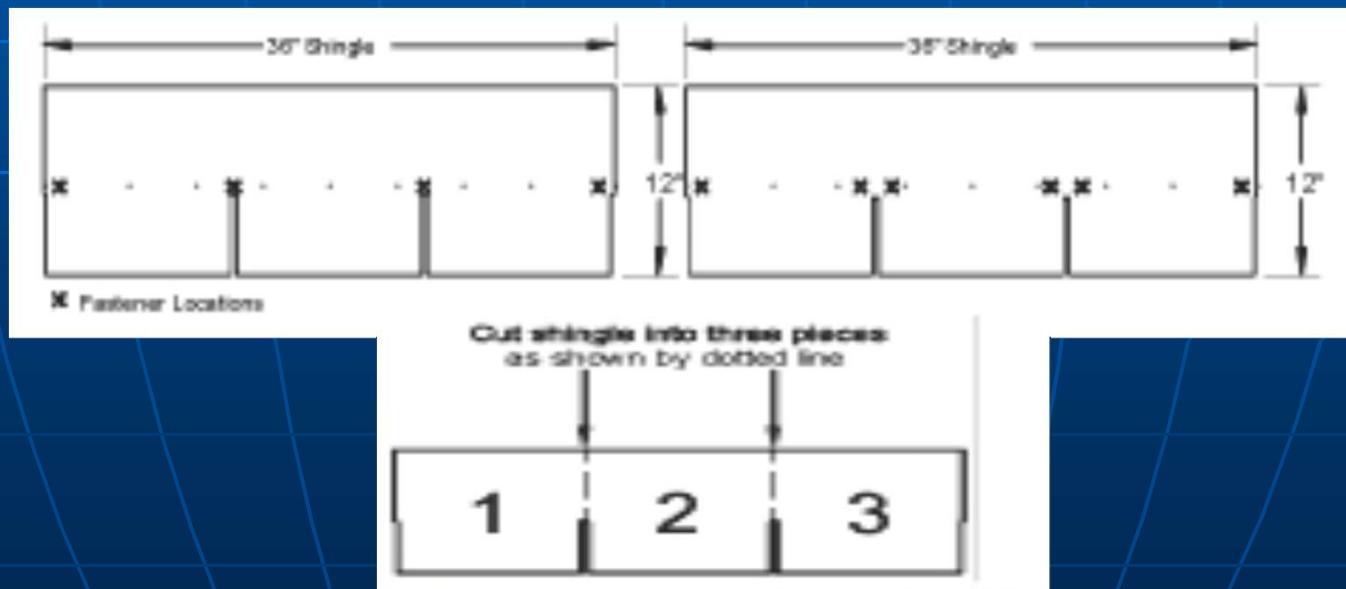


WHAT IS
WRONG
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PICTURE?

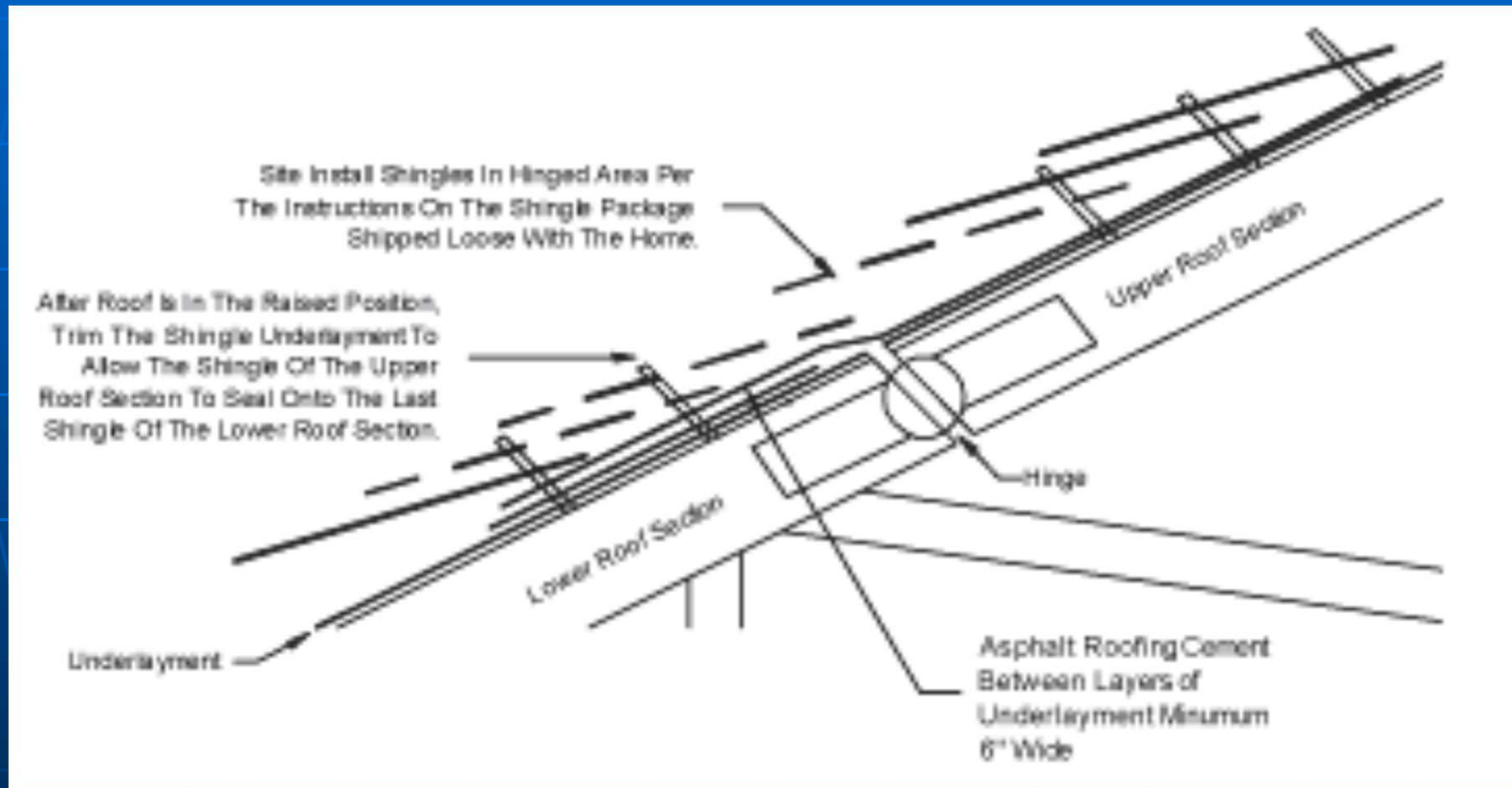
WHAT CAUSED THIS?



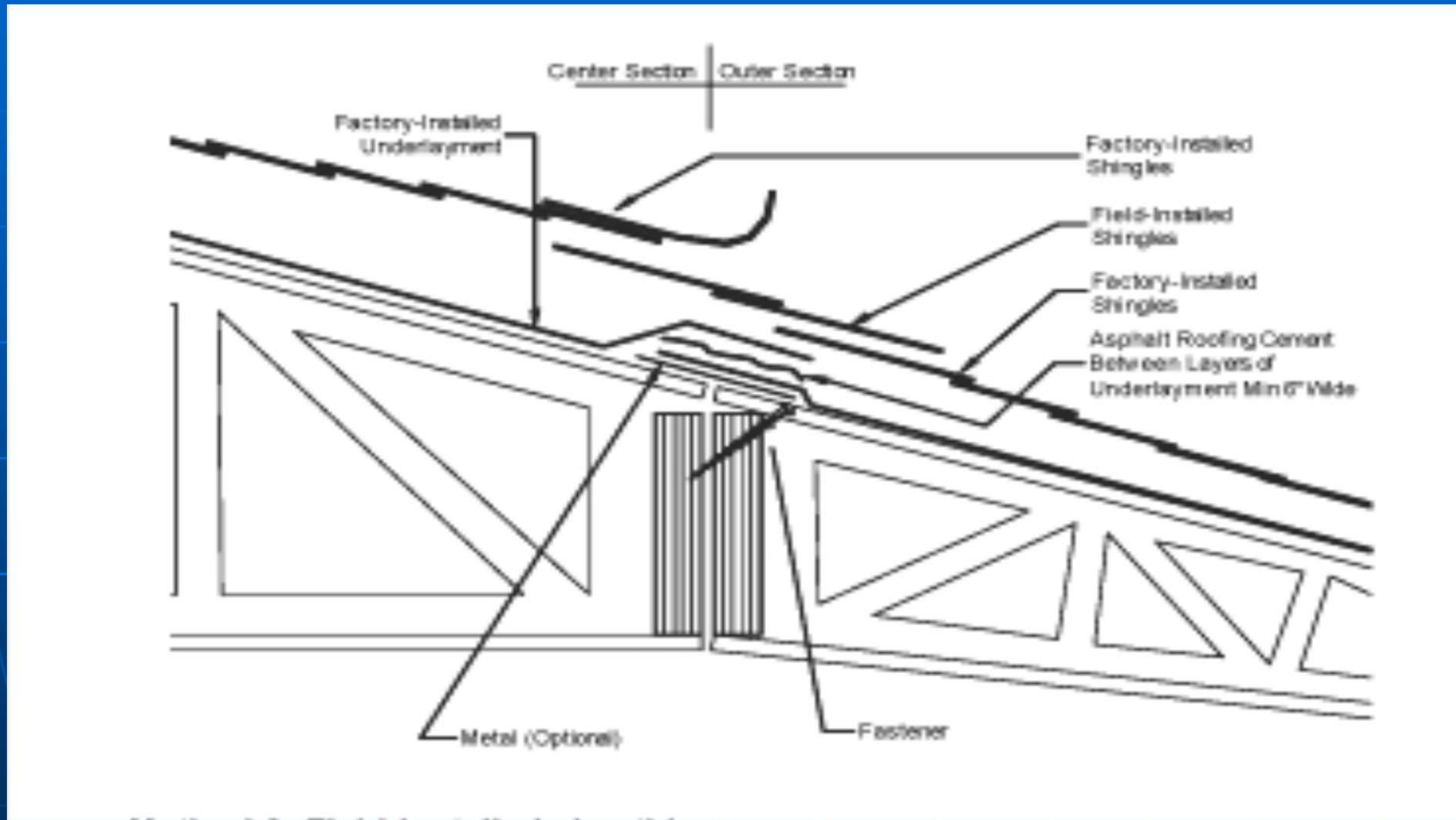
- Install under layment
- Install Shingles
- Install Underlayment
- Install shingle cap



Hinge Roof Close-Up

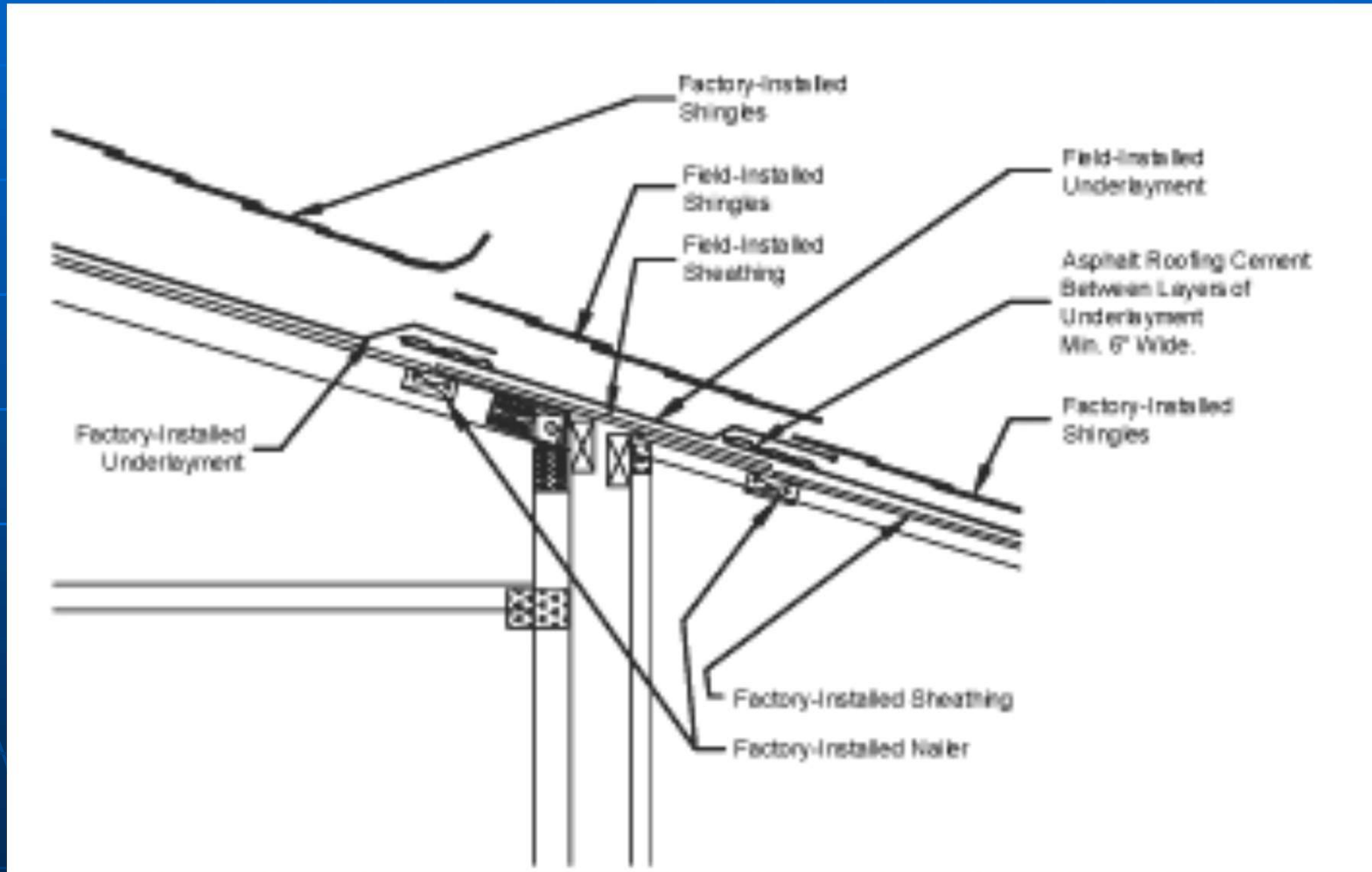


Complete Triple-Section Roofs

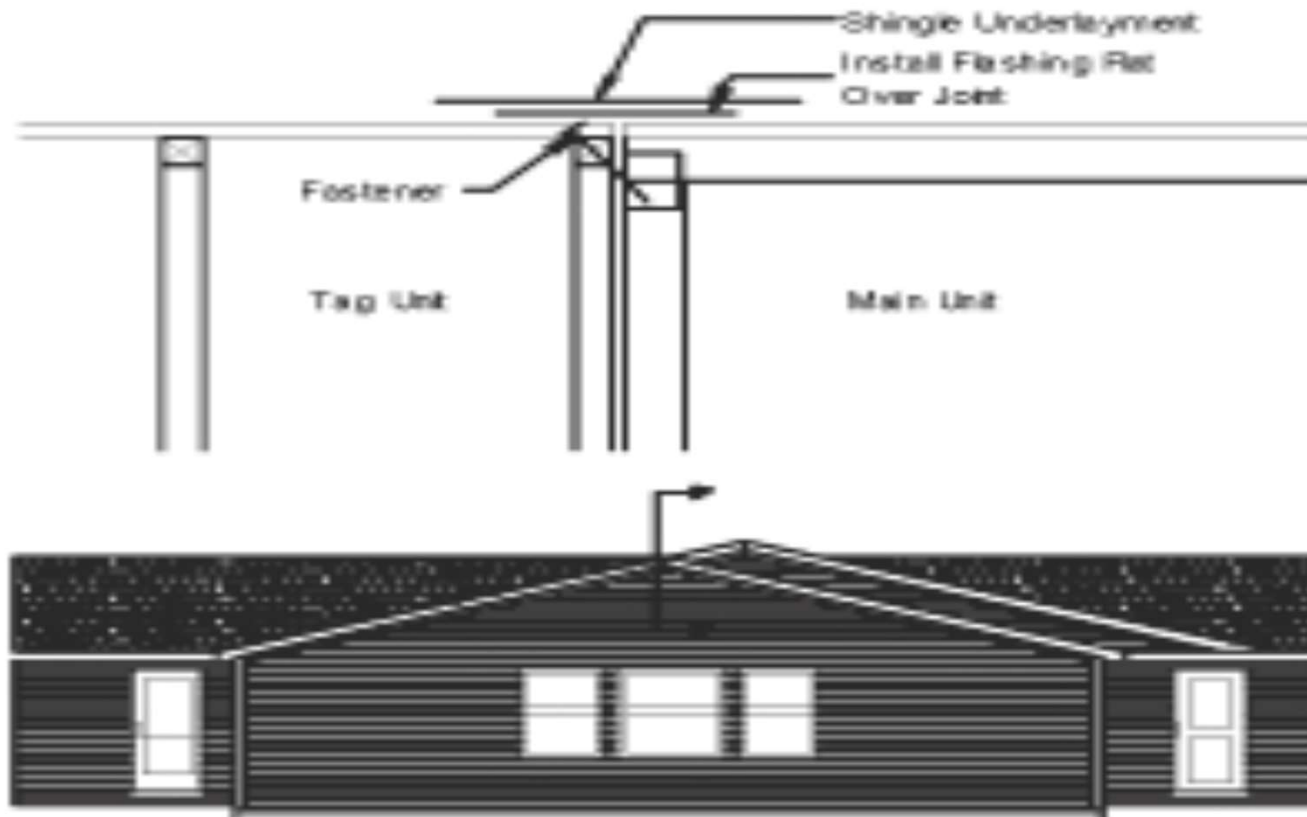


Method 1: Dual Ridge beams

Method 2: Field installed sheathing



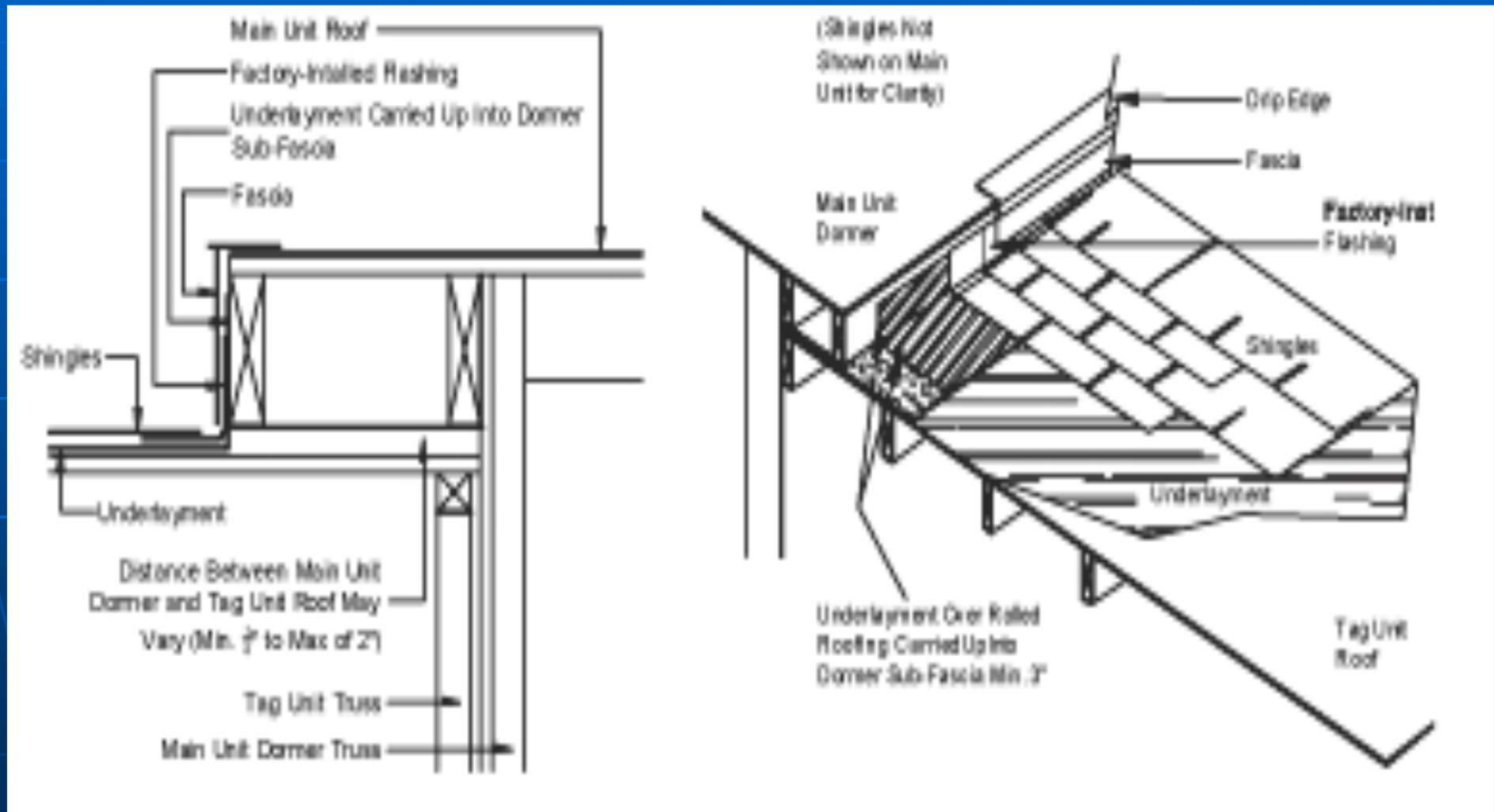
Complete Tag Unit Roof



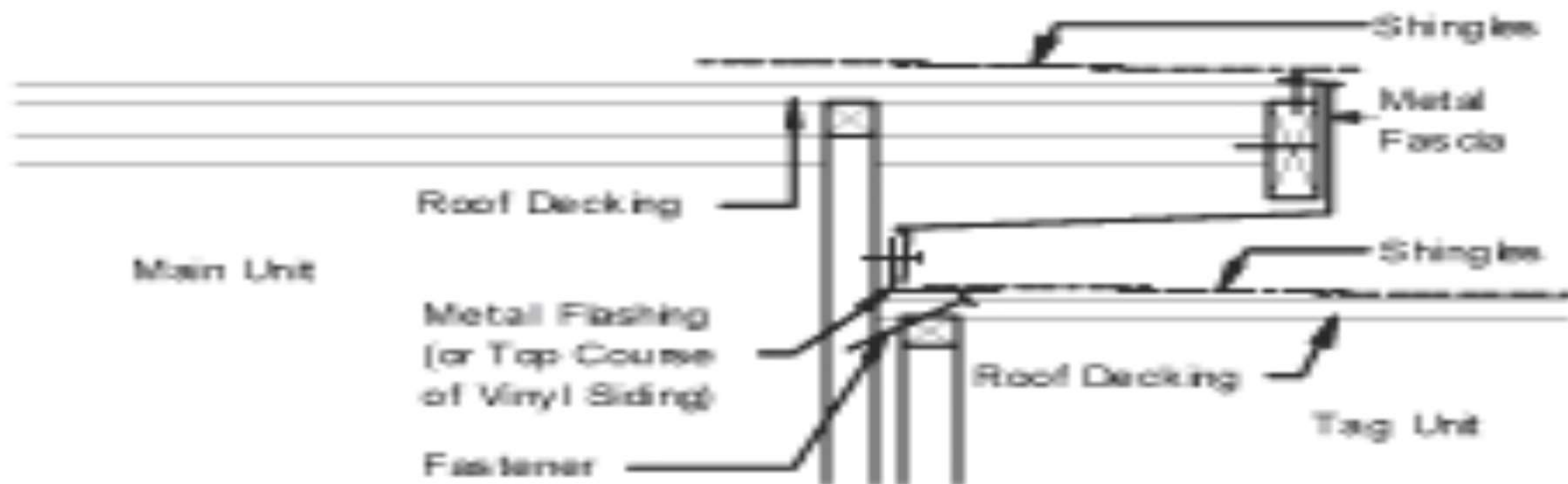
line

of 4x install metal flashing (minimum 30" or minimum 6" wide)

OFFSET ROOFS



Tag Unit Offset Roof Connection



COMPLETE SIDE WALLS

- Remove shipping protection
- Complete crossovers
- Install siding
- Install close-up of strips
- Install trim
- Seal penetrations

CONNECT CROSSOVERS

 **Page 54 in workbook**

CONNECT DUCTS

THERE ARE **THREE MAIN TYPES** OF DUCT CROSSOVER CONNECTIONS.

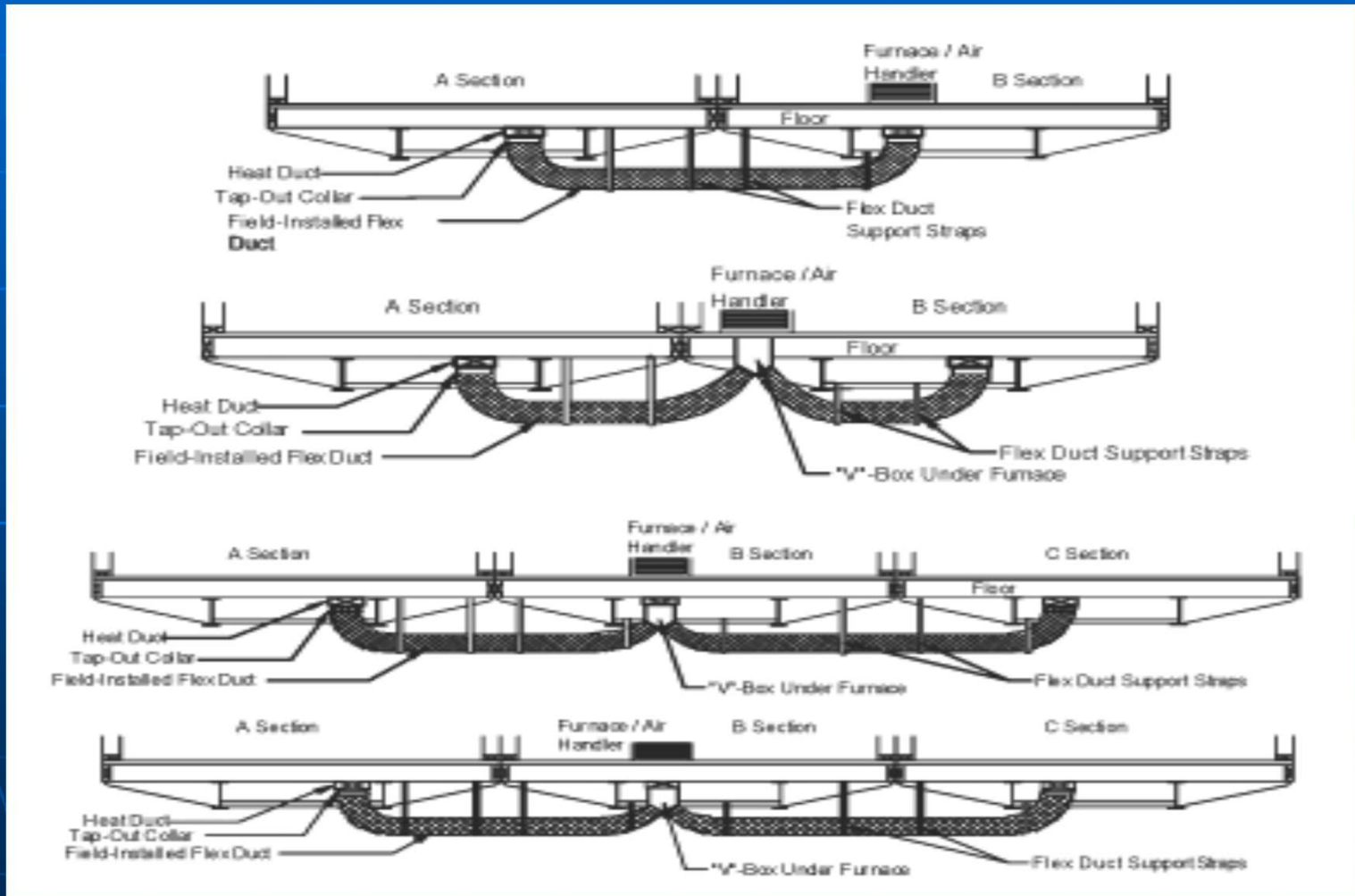
- UNDER THE FLOOR
- IN THE ROOF CAVITY
- IN FLOOR, THROUGH-THE-RIM JOIST

CONNECT DUCTS – CON'T

To prevent air leakage, seal all ductwork connections, including duct collars using one of more of the following materials:

- GALVANIZED METAL STRAPS
W/GALVANIZED SHEET METAL SCREWS
- FOR RIGID AIR DUCTS AND
CONNECTORS, TAPE AND MASTIC LISTED
TO UL 181A
- FOR FLEXIBLE AIR DUCTS AND
CONNECTORS, TAPE AND MASTICS
LISTED TO UL181B

UNDER FLOOR FLEXIBLE CROSSOVER DUCT



AVOID GROUND CONTACT

- **INSTALLED CROSSOVER DUCTS MUST NOT BE IN CONTACT WITH THE GROUND!**
- **SUPPORT THE CROSSOVER DUCTS(S) ABOVE THE GROUND USING NYLON OR GALVANIZED METAL STRAPS AND SADDLES SPACED EVERY 48 INCHES O.C. OR LESS**

WHAT'S WRONG WITH THIS PICTURE?



UNOBSTRUCTED AIRFLOW

- EXCESS LENGTH, KINKS AND BENDS IN THE CROSSOVER DUCT WILL RESTRICT AIRFLOW AND DEGRADE THE HOME'S HVAC SYSTEM PERFORMANCE

FOLLOW THESE STEPS

- LOCATE COLLARS
- INSTALL INNER DUCT
- CONNECT DUCT INSULATION
- PULL DUCT WRAP
- INSTALL ZIP-TIE
- TRIM DUCT
- CONNECT OTHER END
- SEAL JOINTS
- SUPPORT DUCT

ROOF CAVITY CROSSOVER DUCT

- ACCESS DUCT
- JOIN DUCTS
- FASTEN DUCTS
- REINSTALL PANEL



WRONG!



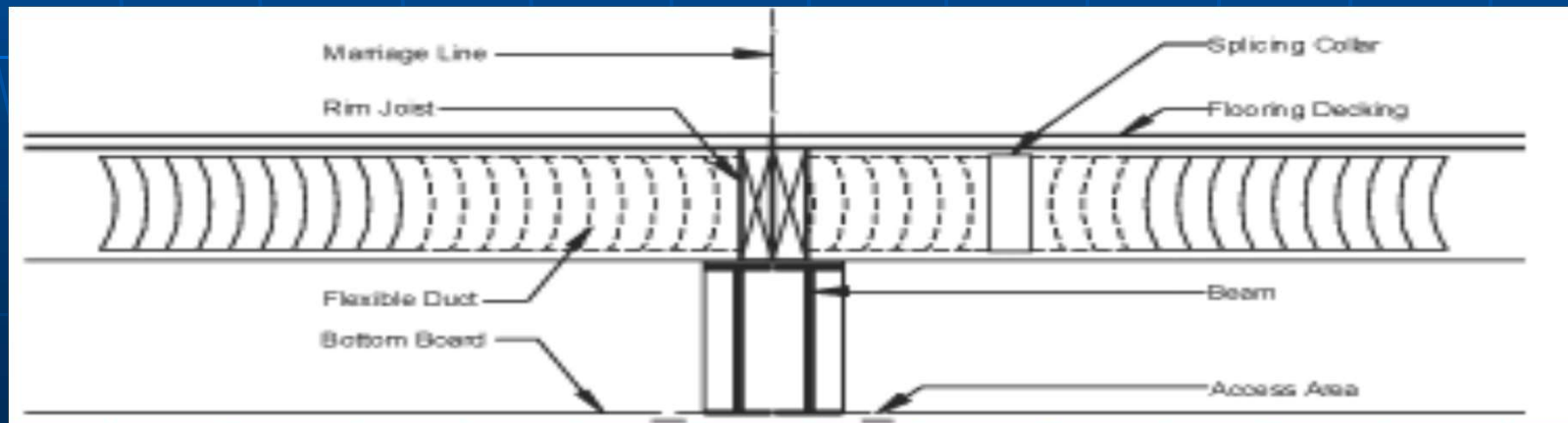
WRONG!



CORRECTED!

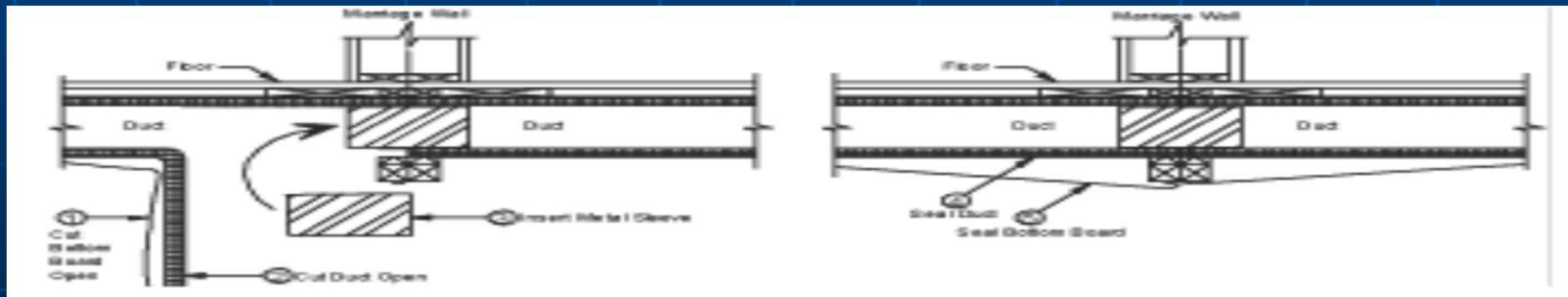
IN THE FLOOR CROSSOVER DUCT

- ACCESS DUCT
- EXTEND DUCT
- CONNECT DUCT
- SEAL BOTTOM BOARD



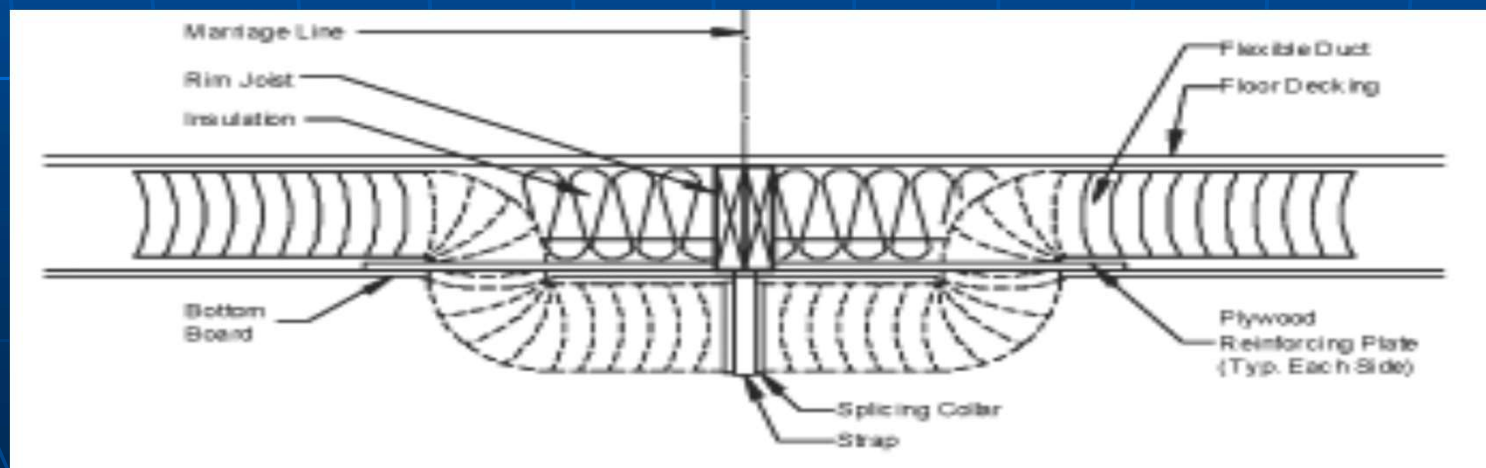
DUCT BOARD WITH SLEEVE

- OPEN BOTTOM BOARD
- OPEN DUCT
- INSERT SLEEVE
- SEAL DUCT
- SEAL FLOOR



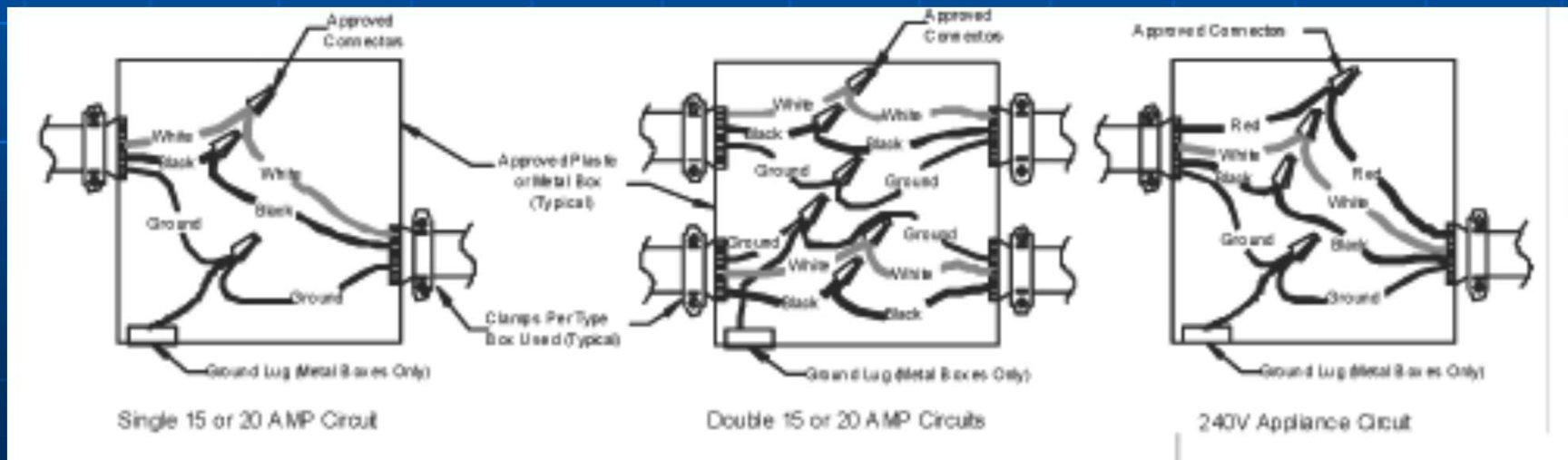
UNDER THE RIM JOIST

- In this configuration, flexible crossover ducts from adjoining sections pass through the floor and dip under the rim joist at the marriage line where they are joined



CONNECT ELECTRICAL CROSSOVERS

- STRIP WIRES
- CONNECT WIRES
- REPLACE COVER

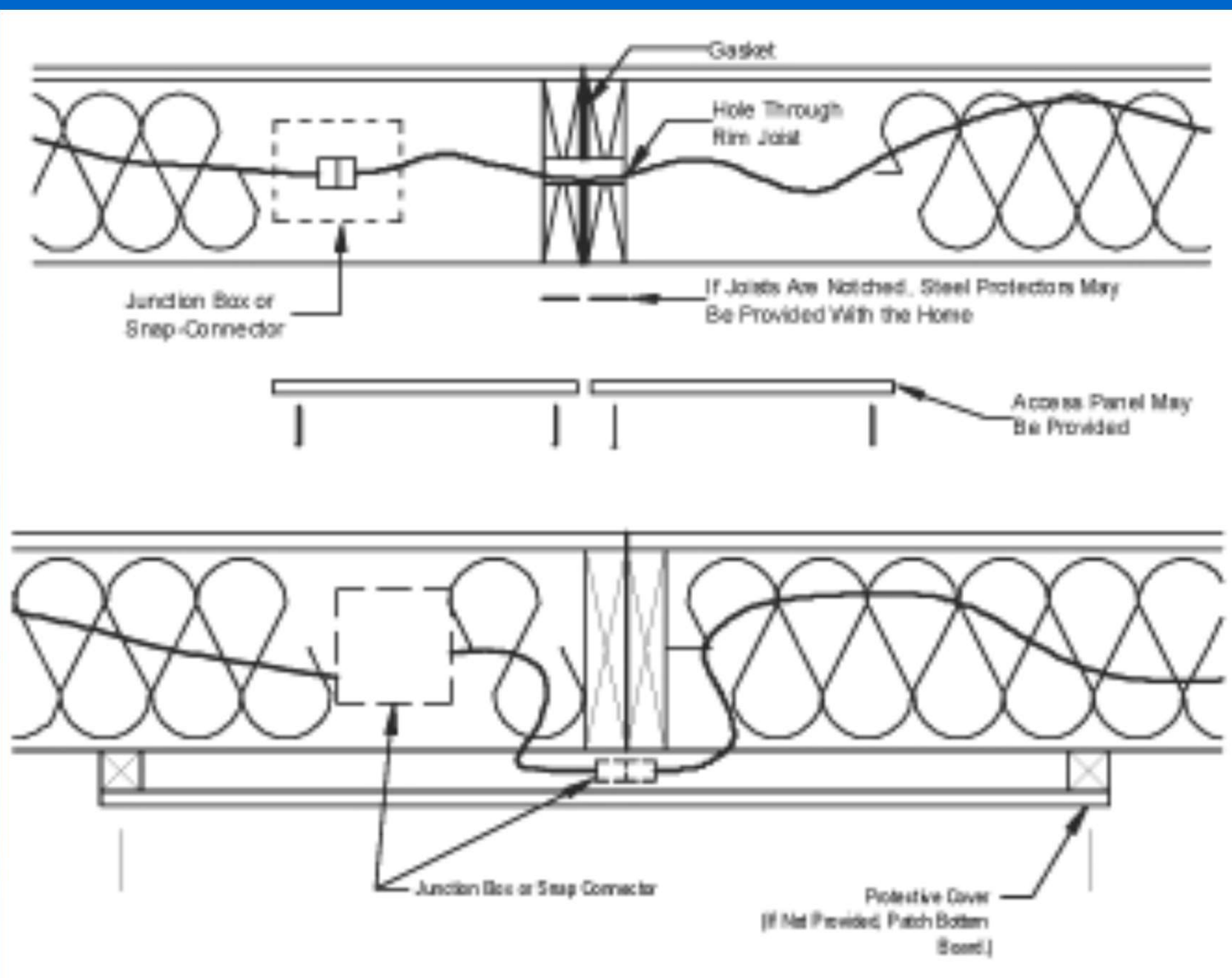


JOINING WIRES

- **TWO TYPES OF ELECTRICAL CONNECTIONS** MAY BE PRESENT AT THESE LOCATION – **SNAP CONNECTORS AND JUNCTION BOXES**. THESE WILL BE CODED FOR IDENTIFICATION. CONNECT SNAP CONNECTORS ACCORDING TO THE CONNECTORS MANUFACTURER'S INSTALLATION INSTRUCTIONS, INCLUDING FASTENER REQUIREMENTS

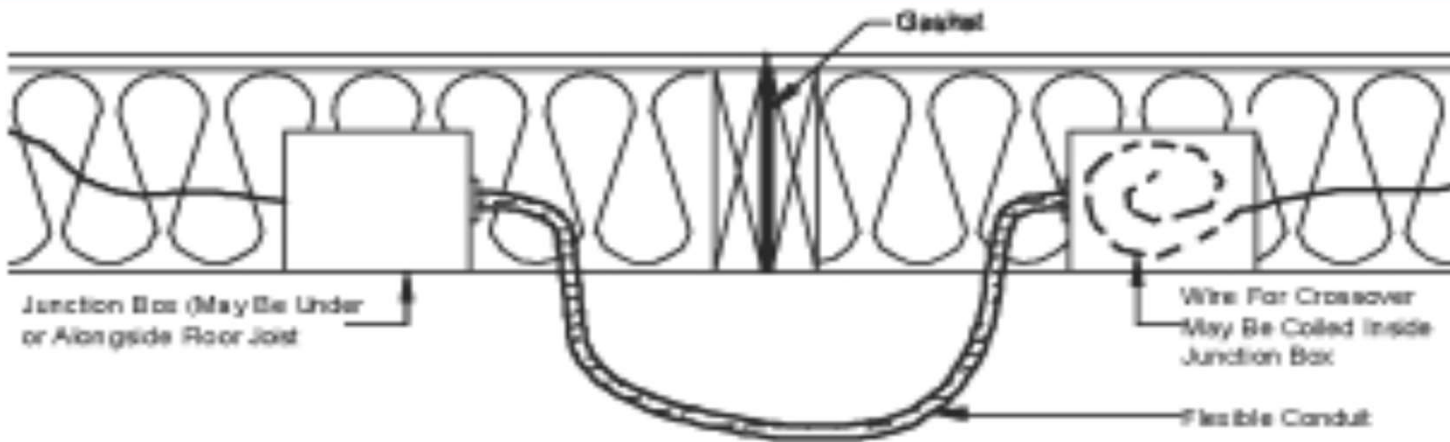
FLOOR CROSSOVER

- ACCESS WIRES
- ROUTE WIRES
- CONNECT WIRES
- SECURE WIRES
- INSTALL SMASH PLATES
- **SEAL BOTTOM BOARD- REPLACE INSULATION AND RE-INSTALL ACCESS PANELS** AND/OR SEAL THE BOTTOM BOARD WITH TAPE SPECIALLY MADE FOR THAT PURPOSE

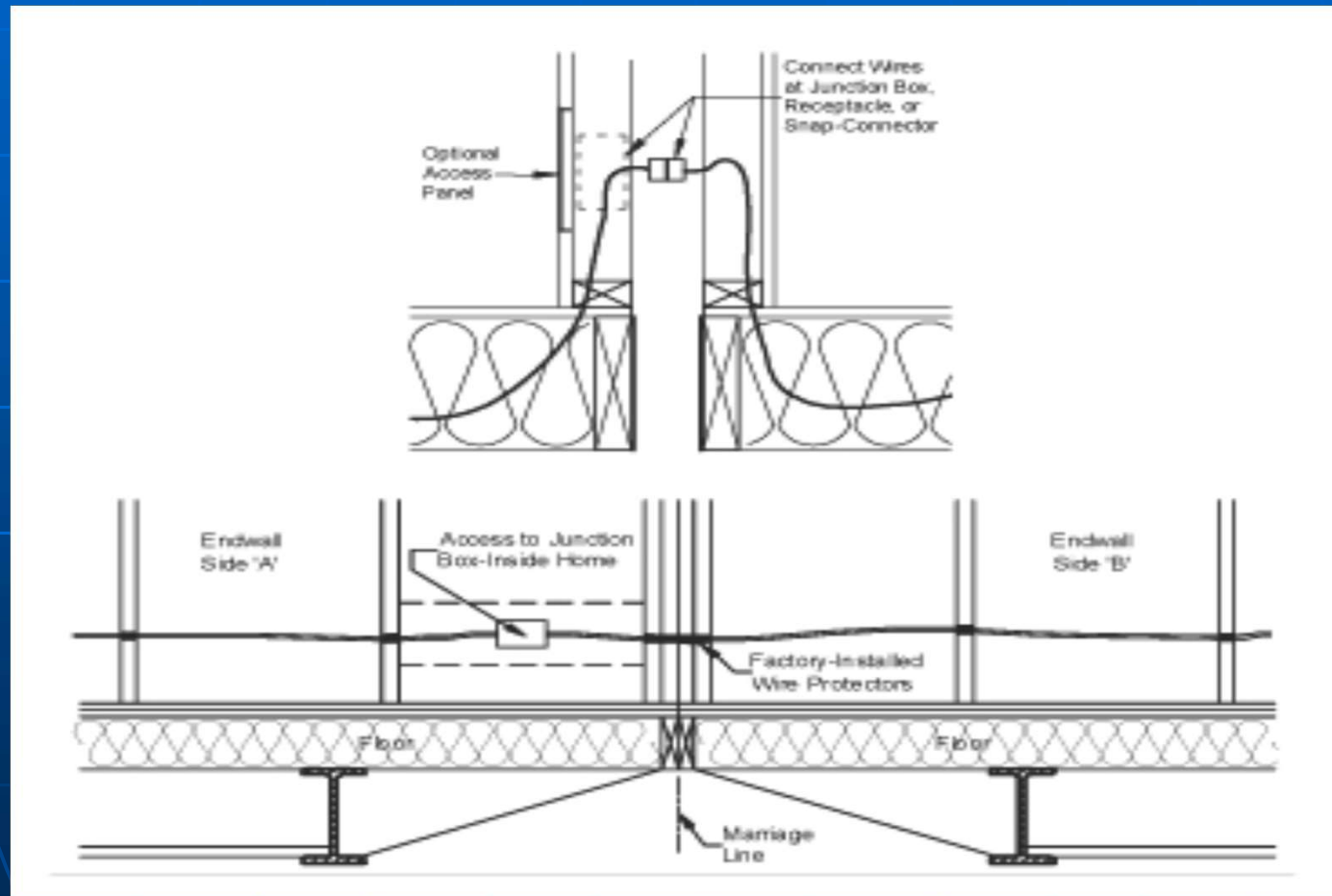


JUNCTION BOX WITH CONDUIT

- ACCESS BOXES
- CONNECT WIRES
- COVER BOXES
- SEAL FLOOR

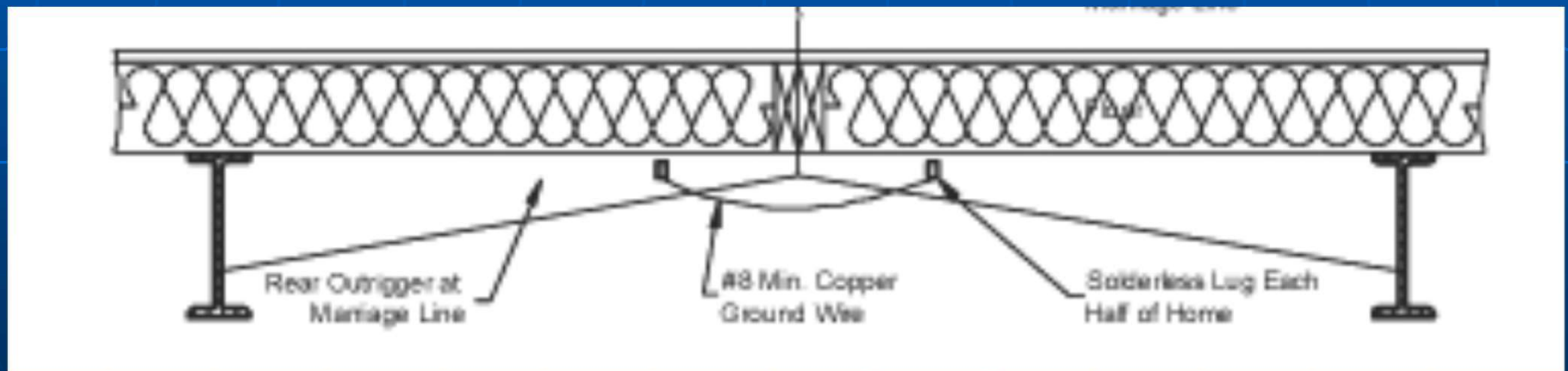


WALL CROSSOVERS



INSTALL ELECTRICAL BONDING

- FIND LUGS
- ATTACH WIRE
- ATTACH STRAP

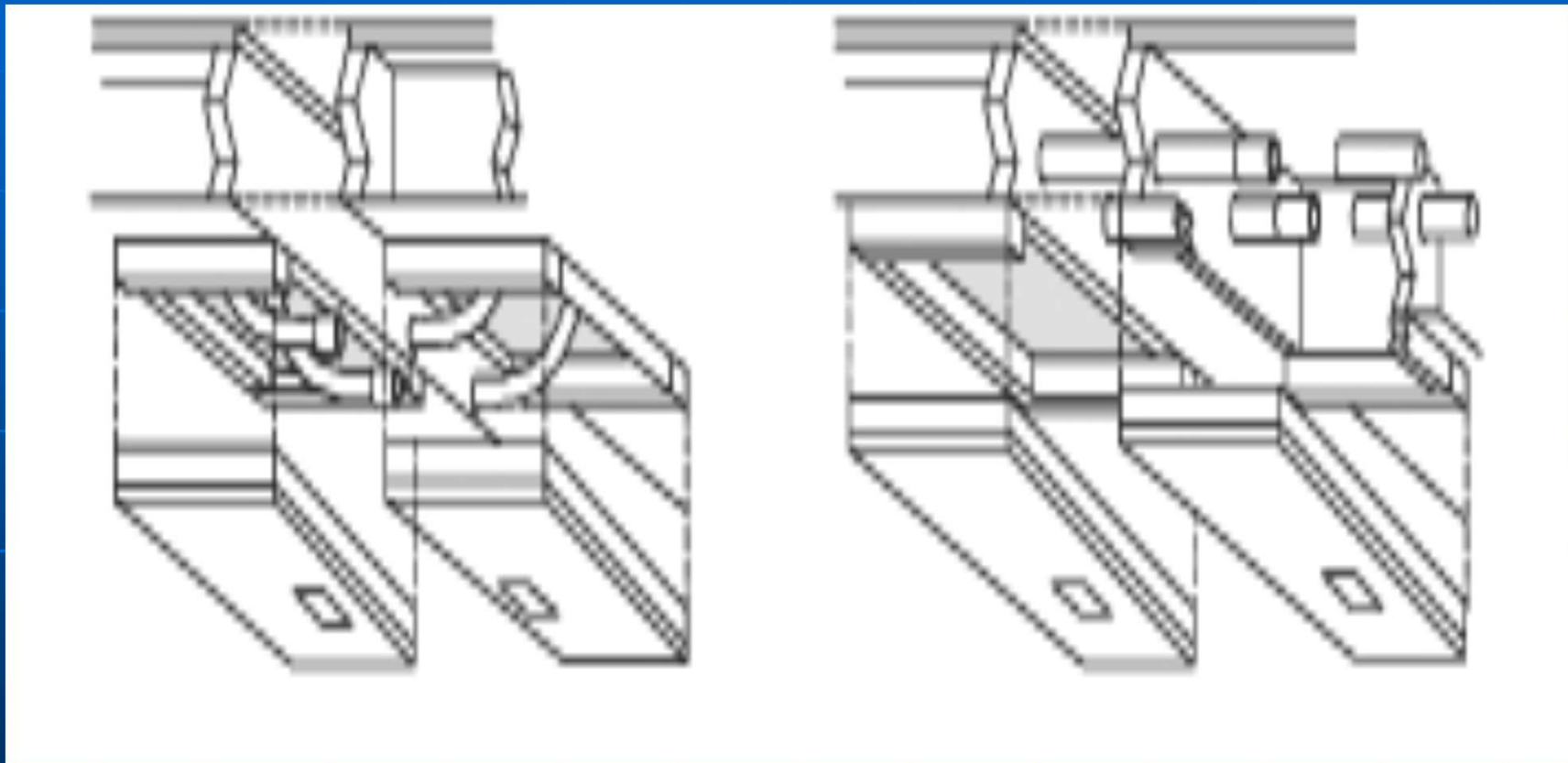


CONNECT WATER LINES

WATER LINES ACCESSED THROUGH PANELS

- REMOVE PANELS
- REMOVE CAPS
- PULL LINES
- CONNECT PIPES
- TEST
- SEAL FLOOR

WATER LINE CROSSOVER WITH ACCESS PANELS



TEST FOR LEAKS

- **CONDUCT A TWO-PART LEAKAGE TEST ON THE COMPLETED DRAINAGE SYSTEM AS FOLLOWS:**
 - PART 1. WITH ALL FIXTURES CONNECTED, AND ALL TUB AND SHOWER DRAINS PLUGGED, FILL THE SYSTEM WITH WATER TO THE RIM OF THE TOILET BOWL THROUGH A HIGHER FIXTURE. RELEASE ALL TRAPPED AIR, REPLACE TUB AND SHOWER PLUGS, BACKFILL FIXTURES, AND ALLOW THE SYSTEM TO STAND AT LEAST 15 MINUTES. CHECK FOR LEAKS. DRAIN THE SYSTEM. IF LEAKS ARE FOUND, REPAIR AND RETEST.
 - PART 2: PLUG ALL FIXTURES, SINKS, SHOWERS, AND TUBS AND FILL WITH WATER. RELEASE THE WATER IN ALL FIXTURES SIMULTANEOUSLY TO OBTAIN THE MAXIMUM POSSIBLE DRAIN PIPING FLOW. AS WATER IS DRAINING, CHECK FOR LEAKS. IF ANY ARE FOUND, REPAIR AND RETEST

PROTECT AND INSULATE PIPES

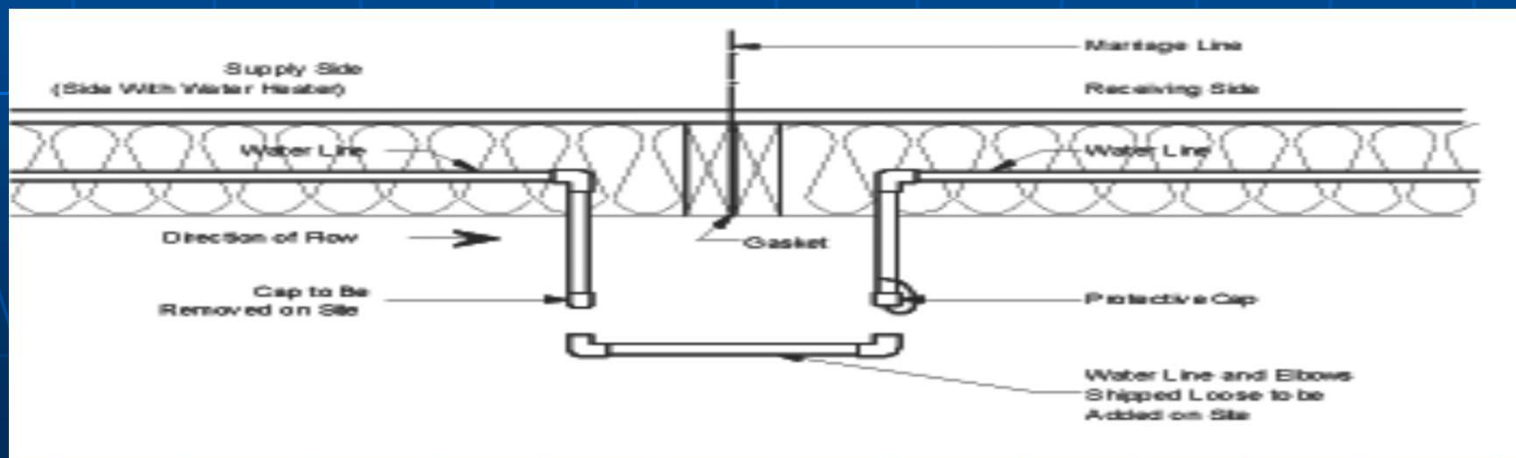
- REPLACE ALL INSULATION AND MAKE SURE ALL POTENTIALLY EXPOSED PORTIONS OF THE DWV SYSTEM ARE WELL INSULTED TO PROTECT AGAINST FREEZING
- IF HEAT TAPE IS USED IT MUST BE LISTED FOR MANUFACTURED HOME USE AND BE INSTALLED IN COMPLIANCE WITH MANUFACTURERS INSTRUCTIONS



**WHAT'S
WRONG
WITH
THIS
PICTURE?**

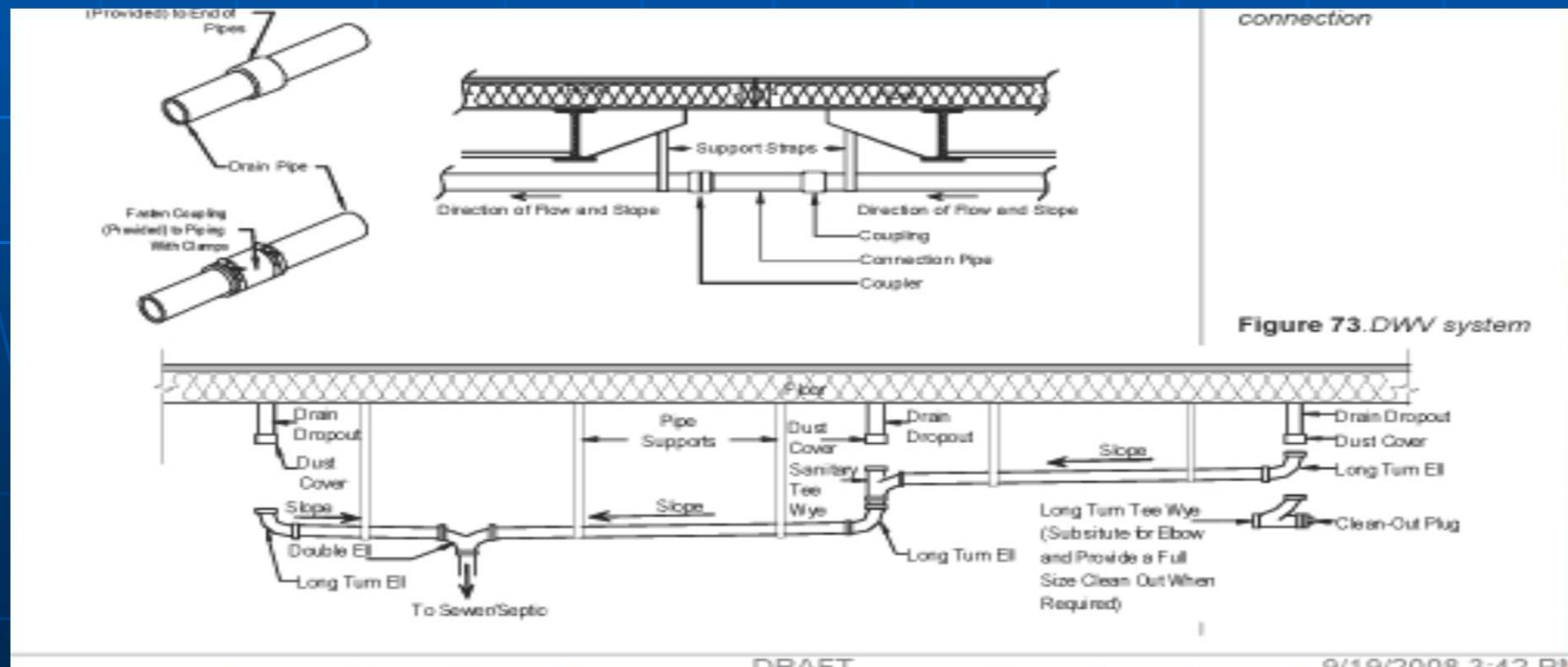
WATER LINES DROPPED BELOW THE BOTTOM BOARD

- REMOVE CAPS
- CONNECT PIPES
- TEST
- PROTECT PIPES



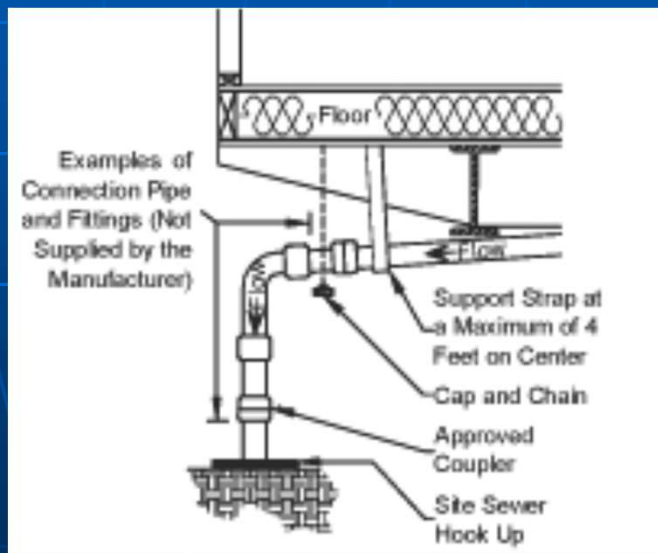
CONNECT DRAIN, WASTE AND VENT LINES

- REMOVE CAPS
- ASSEMBLE PIPES
- TEST

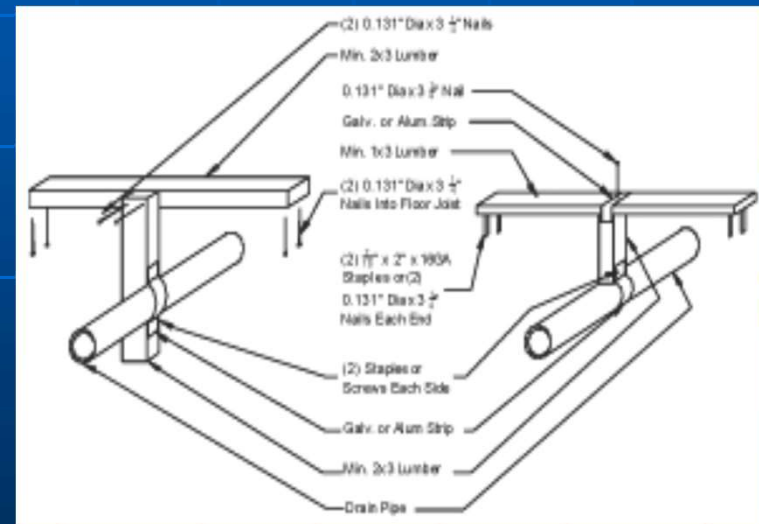


CONNECT DRAIN, WASTE AND VENT LINES (CON'T)

➤ CONNECT TO OUTLET

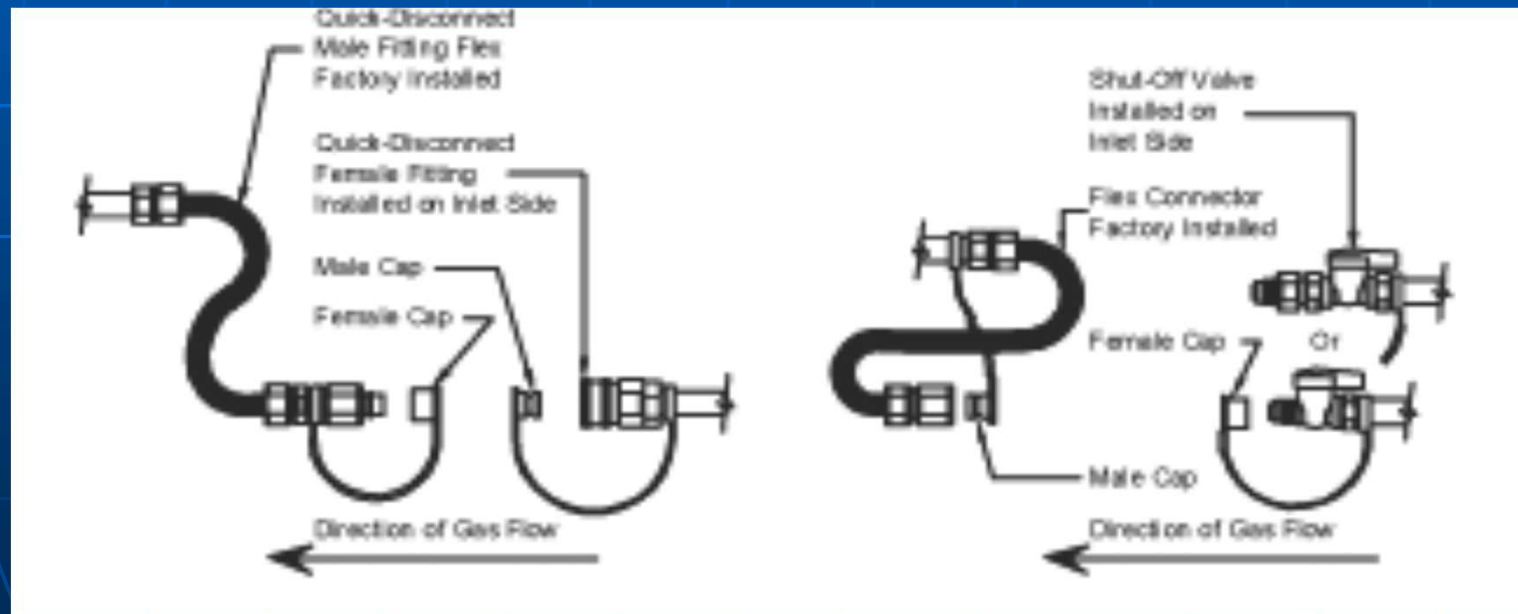


➤ INSTALL SUPPORTS



CONNECT GAS LINES

THE GAS CROSSOVER CONNECTION MAY USE QUICK DISCONNECT FITTINGS OR THREADED CONNECTORS.



CONNECT TELEPHONE AND CABLE TV WIRING

- INSTALL TELEPHONE AND CABLE WIRING IN ACCORDANCE WITH THE REQUIREMENTS OF THE LAHJ, THE NEC, AND NFPA NO. 70-205.
- WHEN MAKING CROSSOVER CONNECTIONS OR INSTALLING TELEPHONE OR CABLE TELEVISION WIRES, DO NOT RUN THEM IN THE SAME RACEWAY AS, OR IN CLOSE PROMIMITY TO, HIGH VOLTAGE ELECTRICAL CONDUCTORS OR CABLES

COMPLETE THE INTERIOR

 **Page 65 in workbook**

ALIGN MARRIAGE WALLS

- ALIGN WALLS
- FASTEN WALLS
- FILL GAPS

FINISH GYPSUM BOARD

- INSTALL PANELS
- MUD SEAMS
- PAINT

FASTENING GYPSUM

- **WHEN ATTACHING GYPSUM BOARD, DEPRESS, BUT DO NOT BREAK THE PAPER FACE WITH THE FASTENER.**
BREAKING THE PAPER WILL WEAKEN THE CONNECTION!

COMPLETE WALL AND CEILING FINISHES

- INSTALL INTERIOR SHIP LOOSE WALL AND/OR CEILING PANELS USING A ¼ INCH DIAMETER BEAD OF POLYVINYL ACETATE (PVA) ADHESIVE ON ALL FRAMING MEMBERS AND FASTEN WITH MINIMUM 1 ½ INCH LONG STAPLES OR NAILS AT 6 INCHES O.C. ALONG PANEL EDGES AND 12 INCHES O.C. IN THE FIELD INTO FRAMING MEMBERS

COMPLETE CARPET

- PREPARE FLOOR
- LAY PAD
- STRETCH CARPET
- BUTTER CARPET
- SEAM CARPET
- KEEP SCRAPS

COMPLETE TRIM

- USING FINE GAUGE WIRE STAPLES OR PIN NAILS, INSTALL SHIP LOOSE MOLDING AND WAINSCOT PANELING TO FINISH TRIMMING OUT CEILINGS, MARRIAGE LINE WALLS, FRONT AND REAR END WALLS, AND PASSAGEWAY DOORS WHERE NECESSARY

INSTALL SHIP LOOSE ITEMS

- REMOVE ALL STRAPPING, BLOCKING, AND PACKAGING FROM APPLIANCES, WINDOWS, AND DOORS. INSTALL ANY DRAPES, MINI-BLINDS, MIRRORS, DOOR STOPS, CLOSET SHELVES, AND HARDWARE PER THE PRODUCT MANUFACTURER'S INSTALLATION INSTRUCTIONS

INSTALL STABILIZING SYSTEMS

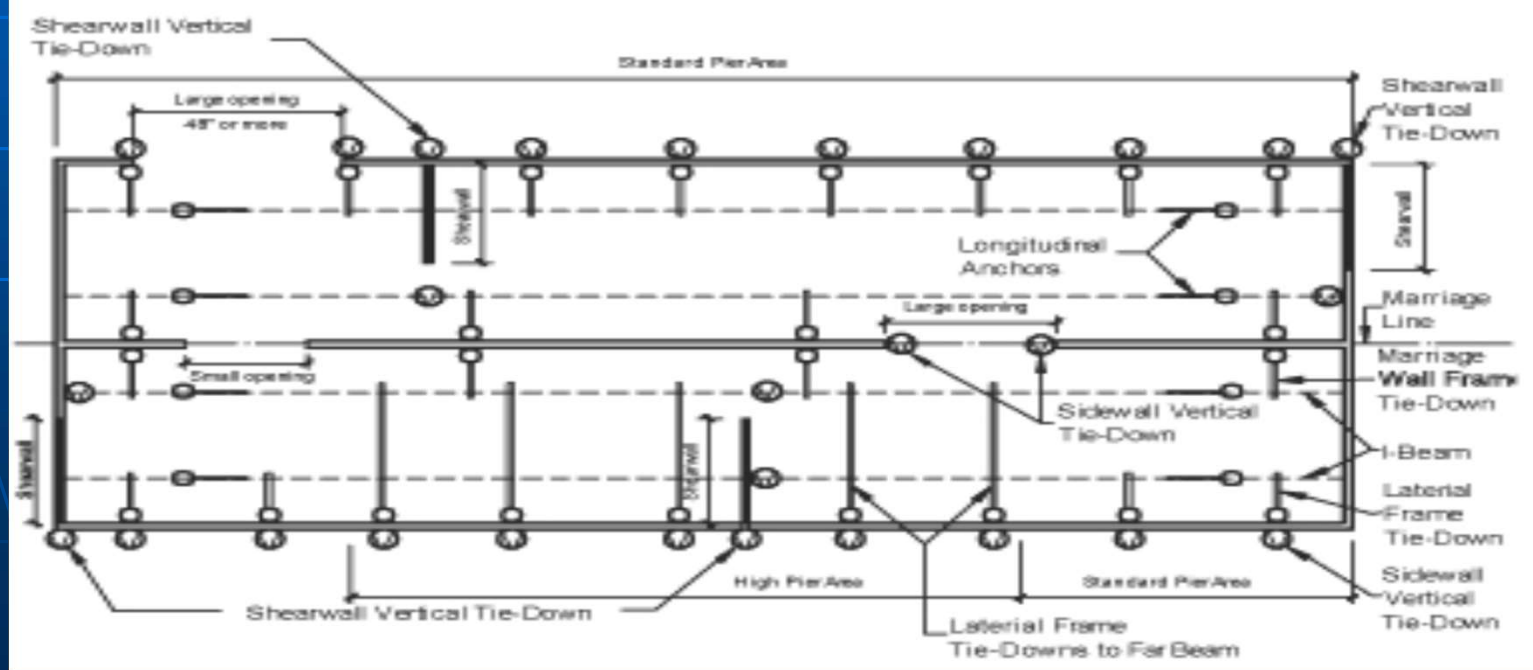
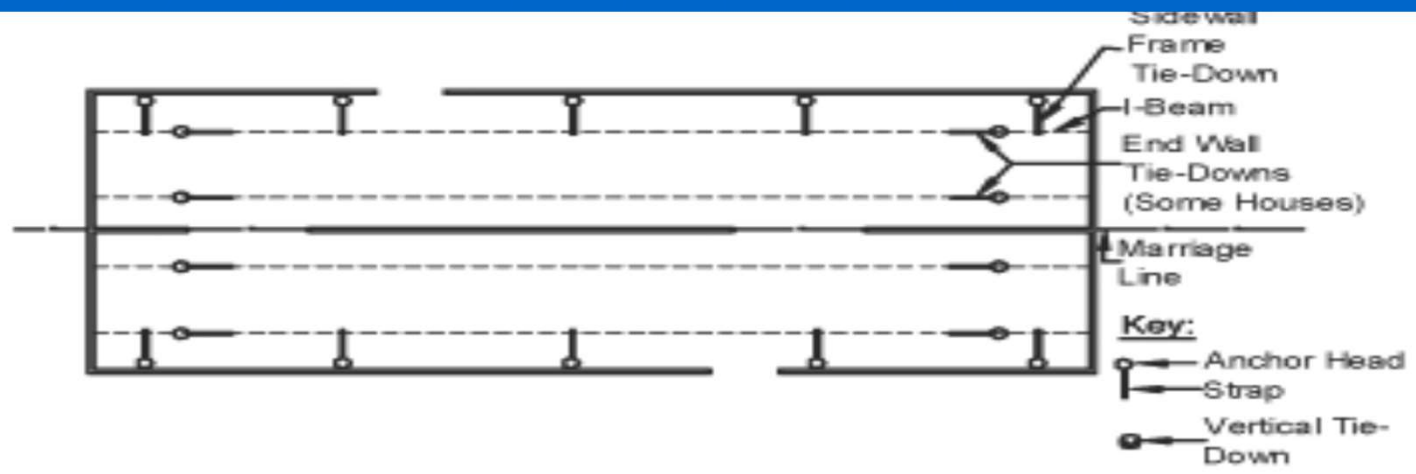
- THIS CHAPTER COVERS THE DESIGN AND INSTALLATION OF THE STABILIZING SYSTEM WHICH SECURES THE HOME AGAINST LATERAL AND UPWARD FORCES CAUSED BY WIND!

DETERMINE ANCHOR LOCATIONS

TABLE 24. ANCHOR LOCATION TYPES

Location	Type	Wind Zone I	Wind Zones II and III	See page
Sidewall	Frame	Yes	Yes	68
	Vertical	No ¹	Yes	72
End wall	Frame	Sometimes	Yes	72
	Vertical	No	Yes	72
Shear wall ²	Vertical	No	Yes	72
Marriage line	Vertical	No	Yes	72
Tag Unit	Frame	Yes	Yes	72
	Vertical	No	Yes	72
Porch Post	Vertical		Yes	73
Offset Unit		Yes	Yes	73

Connect any factory-installed sidewall tie-down straps to a ground anchor regardless of the wind



MAXIMUM SPACING REQUIREMENTS FOR ANCHORS

- **THE LAHJ MAY HAVE ANCHOR SPACING REQUIREMENTS THAT SUPERCEDE THE VALUES PROVIDED IN THE MANUFACTURERS MANUAL!**
- **IT IS IMPORTANT TO KNOW WHICH WIND ZONE THE MANUFACTURED HOME WILL BE PLACE IN!**

SIDEWALL FRAME ANCHORS

- SPACING REQUIREMENTS WILL VARY DEPENDING ON THE TYPE OF HOME, THE SLOPE OF THE ROOF, THE WIDTH OF THE FLOOR FOR EACH SECTION, THE SIDEWALL HEIGHT, I-BEAM SPACING AND THE HEIGHT FROM THE GROUND TO THE STRAP ATTACHMENT POINT
- KEEP IN MIND THAT **SIDEWALL FRAME TIE-DOWNS MUST BE LOCATED NO MORE THAN TWO FEET FROM EACH END!**

TABLE 25. WIND ZONE I SIDEWALL FRAME ANCHOR MAXIMUM SPACING

Floor width	Sidewall height	I-beam spacing	Height from ground to strap attachment	Roof slope maximum 4.35/12 (20 degrees)		Roof slope maximum 6/12 (26.5 degrees)	
				Single section	Double section	Single section	Double section
Less than 13'	Up to 7'-6"	Less than 85'	Up to 25'				
			25" to 45"				
		45" to 67"					
		Up to 25'					
	85' and above	25" to 45"					
		45" to 67"					
		Up to 25'					
		25" to 45"					
More than 7'-6" to 9'-0"	Less than 85'	Up to 25'					
		25" to 45"					
	45" to 67"						
	Up to 25'						
85' and above	25" to 45"						
	45" to 67"						
	Up to 25'						
	25" to 45"						
More than 13' to 15'	Up to 7'-6"	Less than 85'	Up to 25'				
			25" to 45"				
		45" to 67"					
		Up to 25'					
	85' and above	25" to 45"					
		45" to 67"					
		Up to 25'					
		25" to 45"					
More than 7'-6" to 9'-0"	Less than 85'	Up to 25'					
		25" to 45"					
	45" to 67"						
	Up to 25'						
85' and above	25" to 45"						
	45" to 67"						
	Up to 25'						
	25" to 45"						
More than 15' to 17'	Up to 7'-6"	Less than 85'	Up to 25'				
			25" to 45"				
		45" to 67"					
		Up to 25'					
	85' and above	25" to 45"					
		45" to 67"					
		Up to 25'					
		25" to 45"					
More than 7'-6" to 9'-0"	Less than 85'	Up to 25'					
		25" to 45"					
	45" to 67"						
	Up to 25'						
85' and above	25" to 45"						
	45" to 67"						
	Up to 25'						
	25" to 45"						
More than 17'	Up to 7'-6"	Less than 85'	Up to 25'				
			25" to 45"				
		45" to 67"					
		Up to 25'					
	85' and above	25" to 45"					
		45" to 67"					
		Up to 25'					
		25" to 45"					
More than 7'-6" to 9'-0"	Less than 85'	Up to 25'					
		25" to 45"					
	45" to 67"						
	Up to 25'						
85' and above	25" to 45"						
	45" to 67"						
	Up to 25'						
	25" to 45"						

* Indicates a configuration that will require an additional strap connected to the far beam (see Figure 80).

TABLE 26. WIND ZONE II SIDEWALL FRAME ANCHOR MAXIMUM SPACING

Floor width	Sidewall height	I-beam spacing	Height from ground to strap attachment	Roof slope maximum 4.35/12 (20 degrees)		Roof slope maximum 6/12 (26.5 degrees)	
				Single section	Double section	Single section	Double section
Less than 13'	Up to 7'-6"	Less than 88"	Up to 25"				
			25" to 48"				
		48" to 67"					
		Up to 25"					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25"					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	25" to 48"					
		48" to 67"					
	88" and above	Up to 25"					
		25" to 48"					
More than 13' to 15'	Up to 7'-6"	Less than 88"	Up to 25"				
			25" to 48"				
		48" to 67"					
		Up to 25"					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25"					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	48" to 67"					
		Up to 25"					
	88" and above	Up to 25"					
		25" to 48"					
More than 15' to 17'	Up to 7'-6"	Less than 88"	Up to 25"				
			25" to 48"				
		48" to 67"					
		Up to 25"					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25"					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	48" to 67"					
		Up to 25"					
	88" and above	Up to 25"					
		25" to 48"					
More than 17'	Up to 7'-6"	Less than 88"	Up to 25"				
			25" to 48"				
		48" to 67"					
		Up to 25"					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25"					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	48" to 67"					
		Up to 25"					
	88" and above	Up to 25"					
		25" to 48"					

* Indicates a configuration that will require an additional strap connected to the far beam (see Figure 80).

TABLE 27. WIND ZONE III SIDEWALL FRAME ANCHOR MAXIMUM SPACING

Floor width	Sidewall height	I-beam spacing	Height from ground to strap attachment	Roof slope maximum 4.35/12 (20 degrees)		Roof slope maximum 6/12 (26.5 degrees)	
				Single section	Double section	Single section	Double section
Less than 13'	Up to 7'-6"	Less than 88"	Up to 25*				
			25" to 48"				
		48" to 67"					
		Up to 25*					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25*					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	Up to 25*					
		25" to 48"					
	48" to 67"						
	Up to 25*						
88" and above	25" to 48"						
	48" to 67"						
	Up to 25*						
	25" to 48"						
More than 13' to 15'	Up to 7'-6"	Less than 88"	Up to 25*				
			25" to 48"				
		48" to 67"					
		Up to 25*					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25*					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	Up to 25*					
		25" to 48"					
	48" to 67"						
	Up to 25*						
88" and above	25" to 48"						
	48" to 67"						
	Up to 25*						
	25" to 48"						
More than 15' to 17'	Up to 7'-6"	Less than 88"	Up to 25*				
			25" to 48"				
		48" to 67"					
		Up to 25*					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25*					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	Up to 25*					
		25" to 48"					
	48" to 67"						
	Up to 25*						
88" and above	25" to 48"						
	48" to 67"						
	Up to 25*						
	25" to 48"						
More than 17'	Up to 7'-6"	Less than 88"	Up to 25*				
			25" to 48"				
		48" to 67"					
		Up to 25*					
	88" and above	25" to 48"					
		48" to 67"					
		Up to 25*					
		25" to 48"					
More than 7'-6" to 9'-0"	Less than 88"	Up to 25*					
		25" to 48"					
	48" to 67"						
	Up to 25*						
88" and above	25" to 48"						
	48" to 67"						
	Up to 25*						
	25" to 48"						

* Indicates a configuration that will require an additional strap connected to the far beam (see Figure 80).

SIDEWALL VERTICAL ANCHORS

- HOMES DESIGNED FOR WIND ZONE II AND III ALSO REQUIRE VERTICAL TIE-DOWNS ALONG THE SIDEWALL
- ANY FACTORY-INSTALLED SIDEWALL TIE-DOWN STRAPS MUST BE CONNECTED TO A GROUND ANCHOR REGARDLESS OF THE WIND ZONE IN WHICH THE HOME IS PLACED!

SHEARWALL ANCHORS

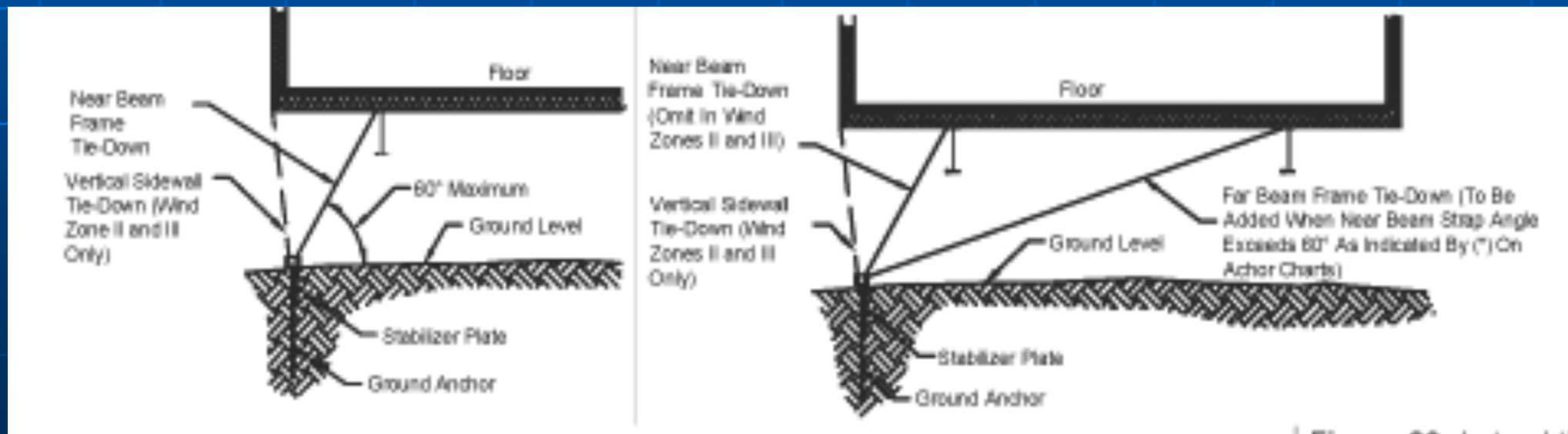
- SHEARWALLS ARE SECTIONS OF INTERIOR OR EXTERIOR WALL ENGINEERED TO WITHSTAND RACKING FORCES. IN WIND ZONE II AND III, THERE MUST BE TWO TIE DOWNS AND ANCHORS PER SHEARWALL - ONE AT EACH END OF THE WALL
- EACH SHEARWALL TIE-DOWN REQUIRES A DEDICATED ANCHOR. DO NOT CONNECT SHEARWALL TIE-DOWNS TO THE SAME ANCHOR AS FRAME OR OTHER TIE-DOWNS

MARRIAGE LINE VERTICAL ANCHORS

- IN WIND ZONES II AND III, MARRIAGE LINE ANCHORS ARE REQUIRED AT EACH COLUMN ALONG THE MARRIAGE WALL
- IF NECESSARY TO AVOID INTERFERENCE WITH PIERS, THE TIE-DOWN LOCATION MAY BE OFFSET HORIZONTALLY FROM THE COLUMN BY A MAXIMUM OF 12 INCHES

DETERMINE TIE-DOWN CONFIGURATION

- NEAR BEAM METHOD
- FAR BEAM METHOD



SELECT ANCHORS

TABLE 29. ANCHOR SYSTEM MATERIALS SPECIFICATIONS

Component	Specification
Anchors	Anchors must be tested and listed to resist a minimum ultimate load of 4,725 lbs and a minimum allowable working load of 3,150 lbs or ultimate and corresponding working load limited by soil conditions and anchor length. The working load is the maximum load the designer can use. Ground anchors must be provided with protection against weather deterioration and corrosion at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated.
Straps	Straps must be minimum 1-1/4" x 0.035" zinc-coated (0.30 oz per sq ft) steel strapping conforming to ASTM D3953-97, Type 1, Grade 1, Finish B with a minimum allowable working load capacity of 3,150 lbs and a minimum ultimate load of 4,725 lbs. Slit or cut edges of zinc-coated strapping do not need to be zinc coated.
Stabilizer plates	The size and type of stabilizer plate, if required by the ground anchor manufacturer, will be specified in the anchor manufacturer's instructions. Stabilizer plates must be provided with protection against weather deterioration and corrosion at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated. Alternatively, ABS stabilizer plates may be used when listed and certified for such use.

ANCHORS

- ANCHORS MUST BE TESTED AND LISTED TO RESIST A MINIMUM ULTIMATE LOAD OF 4,725 LBS AND A MINIMUM ALLOWABLE WORKING LOAD OF 3,150 LBS OR ULTIMATE AND CORRESPONDING WORKING LOAD LIMITED BY SOIL CONDITIONS AND ANCHOR LENGTH
- THE WORKING LOAD IS THE MAXIMUM LOAD THE DESIGNER CAN USE.

ANCHORS

- GROUND ANCHORS MUST BE PROVED WITH PROTECTION AGAINST WEATHER DETERIORATION AND CORROSION AT LEAST EQUIVALENT TO THAT PROVIDED BY A COATING OF ZINC ON STEEL OF NOT LESS THAN .30 OZ. PER SQ. FT OF SURFACE COATING – THIS MEANS GALVANIZATION OF ANCHORS! – ***January 2009 - HUD HAS TEMPORARILY WAIVED THIS RULE***

**ALL ANCHORS, STRAPS AND
STABLIZER PLATES MUST BE
GALVANIZED!**

GRADING AREA AROUND ANCHORS

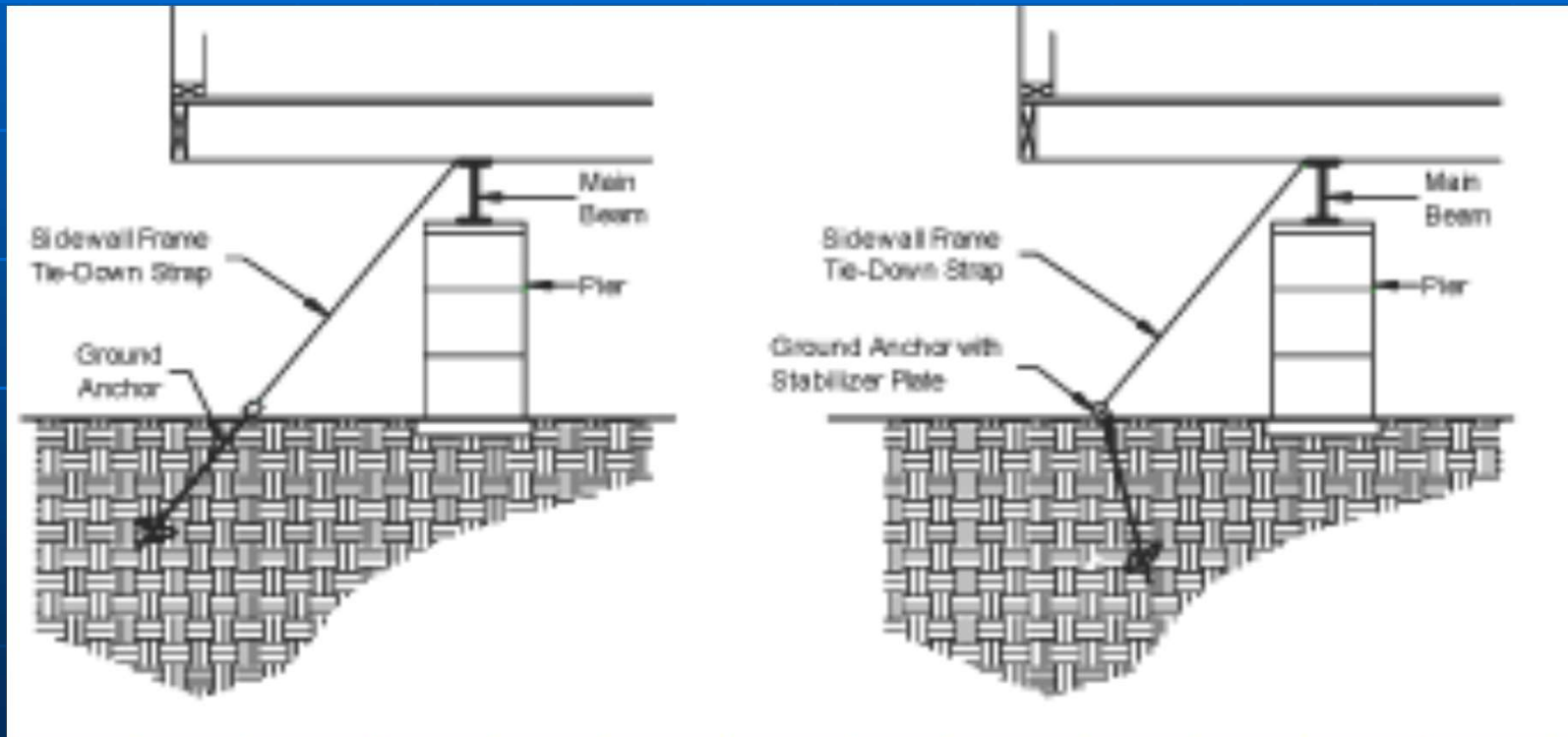
- ANCHOR HEADS SHOULD NOT REST IN SUNKEN SPOTS.
- GRADE THE GROUND SO THAT **WATER DOES NOT COLLECT AROUND ANCHOR HEADS**, BUT RUNS AWAY FROM THE ANCHOR AND OUT FROM UNDER THE HOUSE.
- DO NOT BURY ANCHOR HEADS!





FRAME ANCHORS

➤ IN-LINE CONFIGURATION



IN-LINE CONFIGURATION

- **THE IN-LINE CONFIGURATION FOR HOMES CAN BE USED IN WIND ZONE 1 ONLY!**
- TYPICALLY, IN-LINE ANCHORS ARE USED UNDER HIGH HOMES WHERE THE ANCHORS CAN BE INSTALLED FROM UNDER THE HOME AFTER THE HOME IS SET

STABILIZER PLATE CONFIGURATION

- STABILIZER PLATE CONFIGURATIONS ARE SUITABLE FOR HOMES IN ALL WIND ZONES
- A STABILIZER DEVICE IS **USED TO PREVENT THE TOP OF THE ANCHOR FROM SLICING THROUGH THE SOIL WHEN THE LOAD IS APPLIED**

STABILIZER PLATES

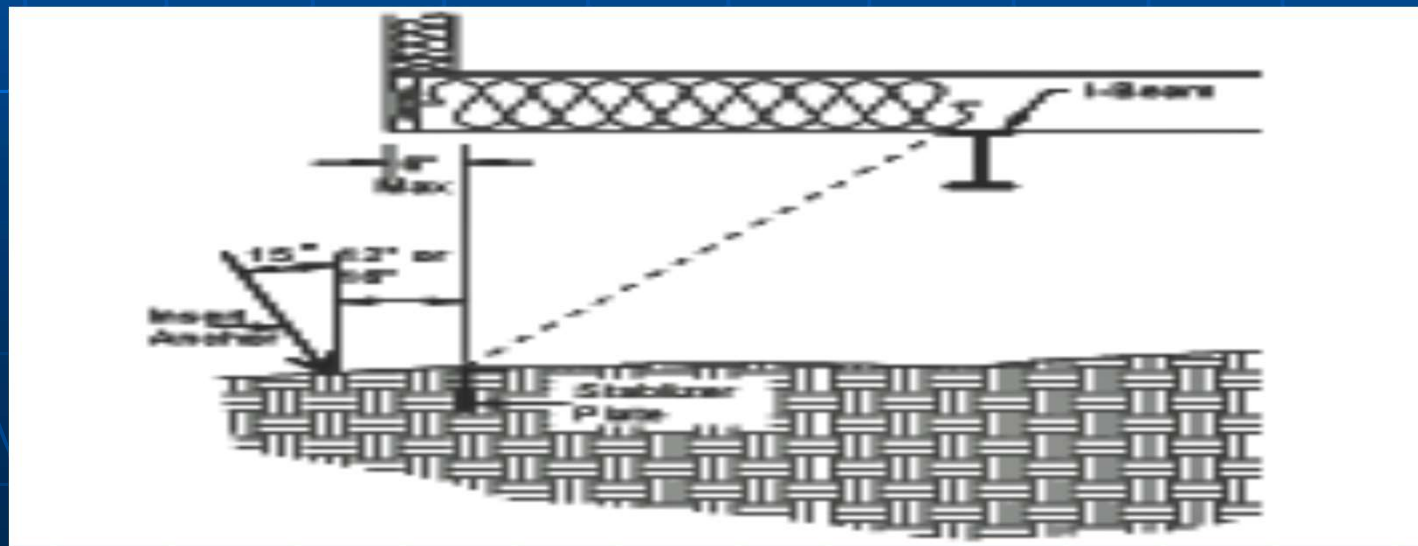
- STABILIZER PLATES ARE AVAILABLE IN A VARIETY OF WIDTHS
- **CHOOSE THE WIDEST PLATE THAT CAN BE DRIVEN INTO THE SOIL TO MAXIMIZE RESISTANCE TO MOVEMENT**



BAD ANCHOR JOB!

STABILIZER PLATE CONFIGURATION

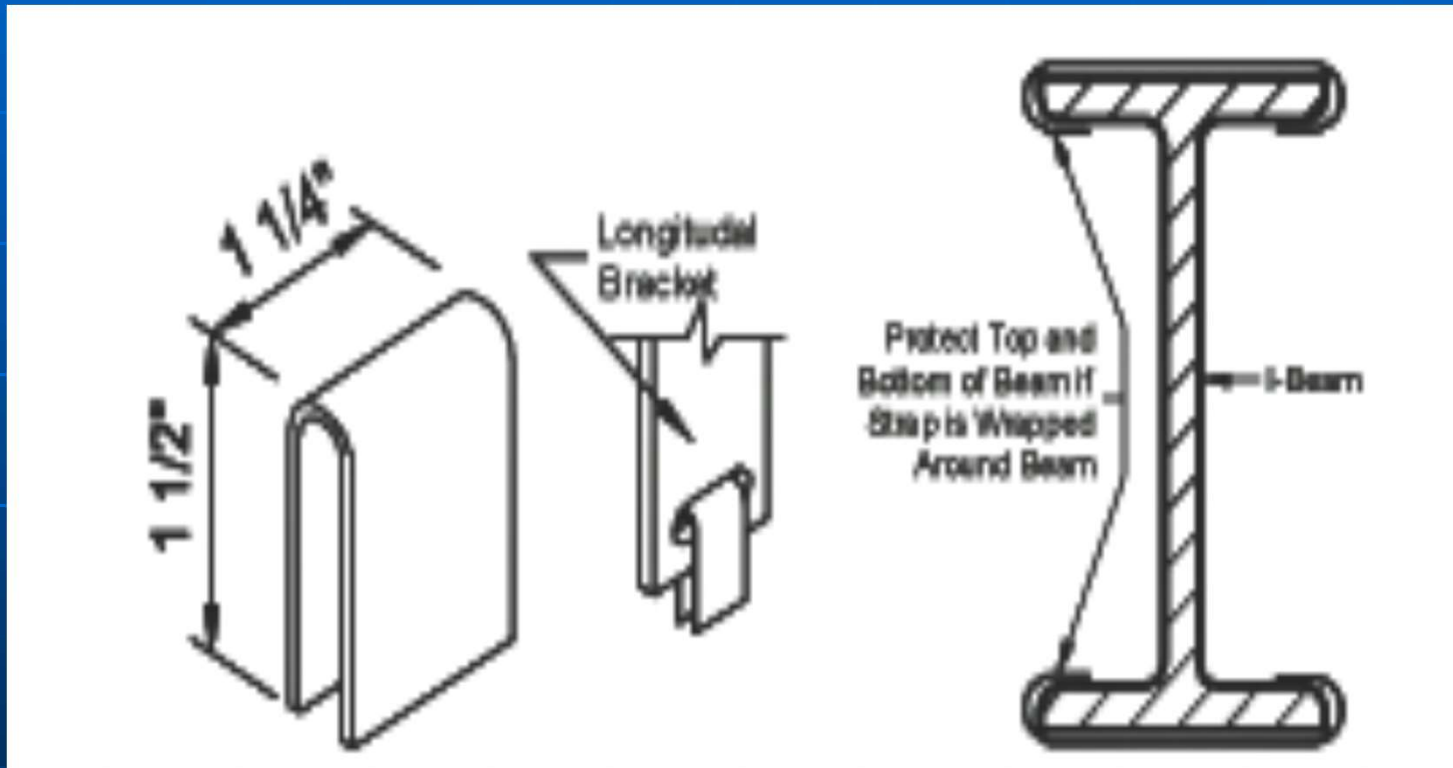
- Locate anchor
- Install anchor
- Drive stabilizer plate
- Complete Anchor installation



VERTICAL ANCHORS

- TO INSTALL VERTICAL ANCHORS, SCREW THE ANCHOR INTO THE GROUND DIRECTLY UNDER THE STRAP ATTACHMENT POINT ON THE HOME UNTIL THE BOTTOM OF THE ANCHOR HEAD IS FLUSH WITH THE GROUND OR NO MORE THAN 1 INCH ABOUT GRADE

INSTALL STRAPS



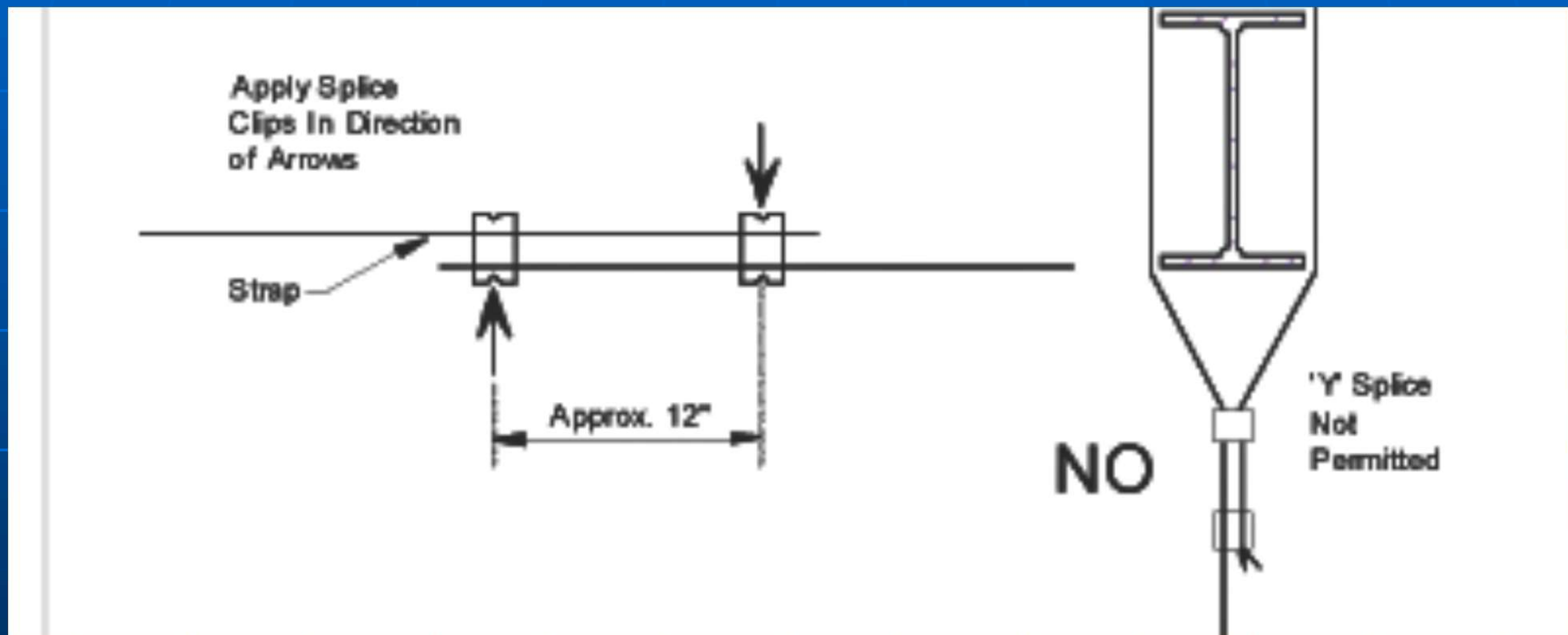
STRAPS

- **ALWAYS PROTECT STRAPS AT SHARP CORNERS INCLUDING AROUND I-BEAMS WITH RADIUS CLIPS OR OTHER METHODS.**

CONNECT STRAP TO ANCHOR

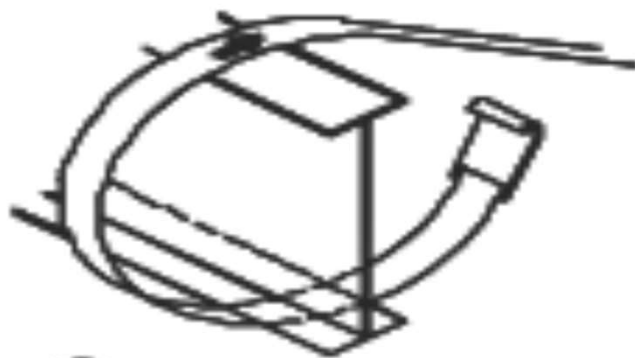
- CONNECT THE OTHER END OF THE STRAP TO THE SPLIT BOLT IN THE ANCHOR
- LEAVE ENOUGH STRAP LENGTH TO BE ABLE TO MAKE AT LEAST THREE, BUT NO MORE THAN FIVE COMPLETE TURNS AROUND THE BOLT BEFORE IT BECOMES TIGHT.

SPLICING STRAPS

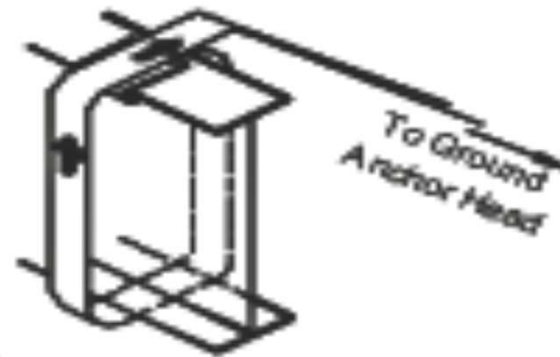


SIDEWALL FRAME ANCHORS

- CONNECT STRAP TO HOME
- CONNECT STRAP TO ANCHOR



① Wrap strap around main beam



② Connect hook to top of main beam and connect other end of strap to anchor head.

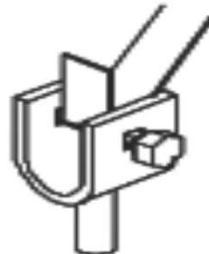
Connect strap to anchor. Connect the other end of the strap to the or

SIDEWALL FRAME ANCHORS

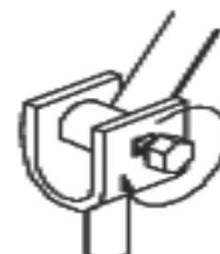
➤ PRETENSION ANCHOR



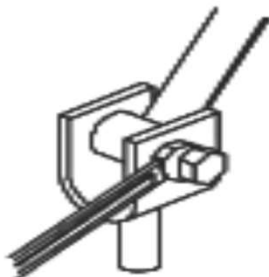
- 3 Insert the tension bolt into the anchor head and loosely attach the hex nut.



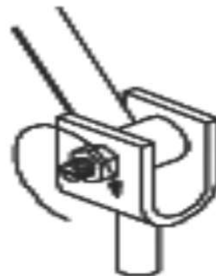
- 4 Place the strap through the slotted shank of the tension bolt and bend up to 90°.



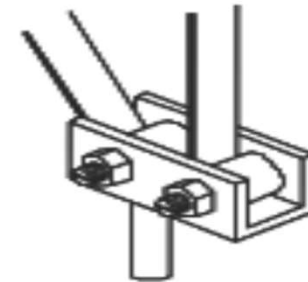
- 5 Using a 15/16" socket or open end wrench, rotate clockwise, wrapping the strap around the tension bolt.



- 6 Once tensioned to the point that counter-clockwise resistance appears, use a 5/8" open end wrench to hold the square neck while repositioning the 15/16" tensioning wrench to continue tensioning. Repeat as required.

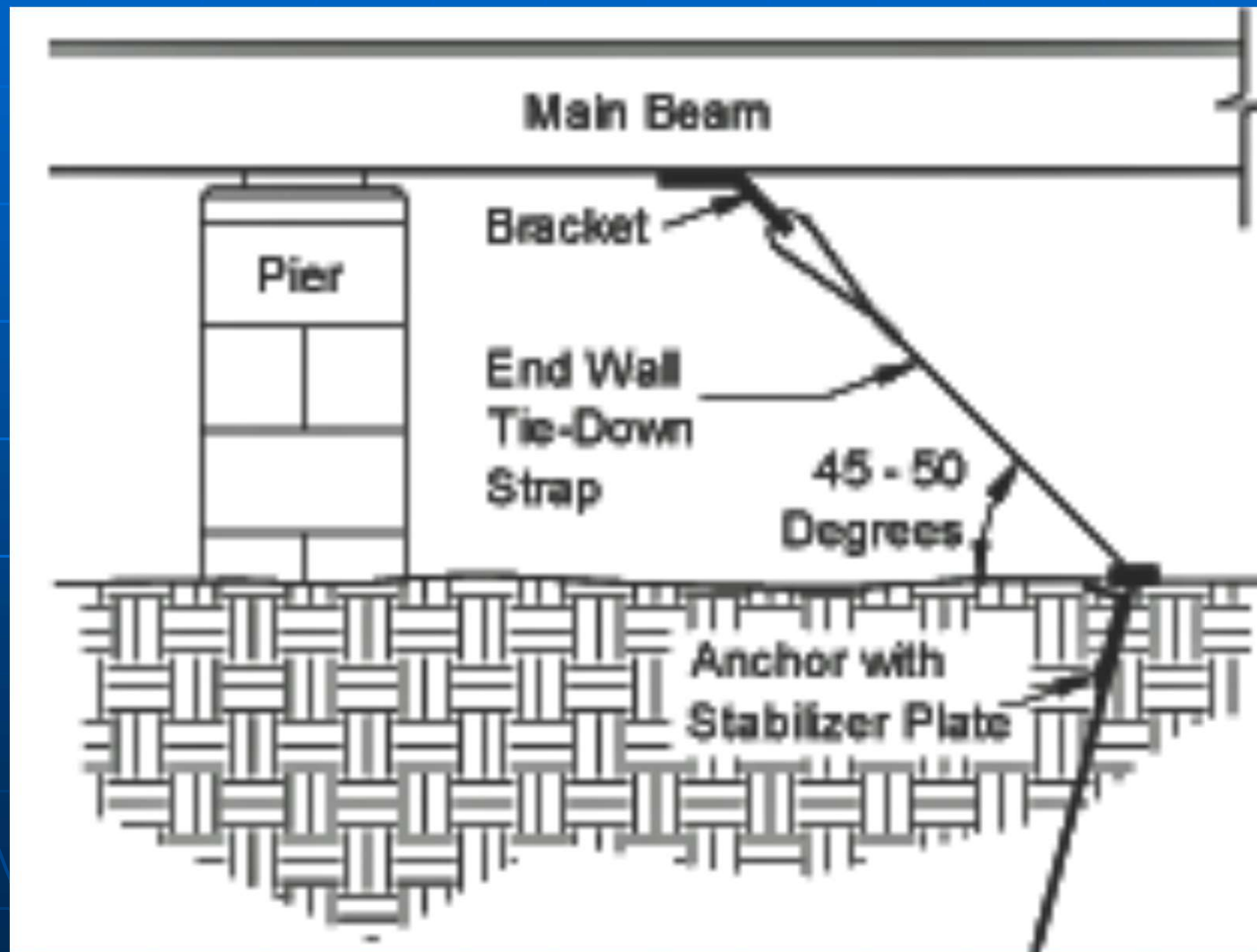


- 7 Once fully tensioned, align the square neck of the bolt with the square recess in the anchor head and tighten the hex nut. This will draw the two together and lock the system into final position.

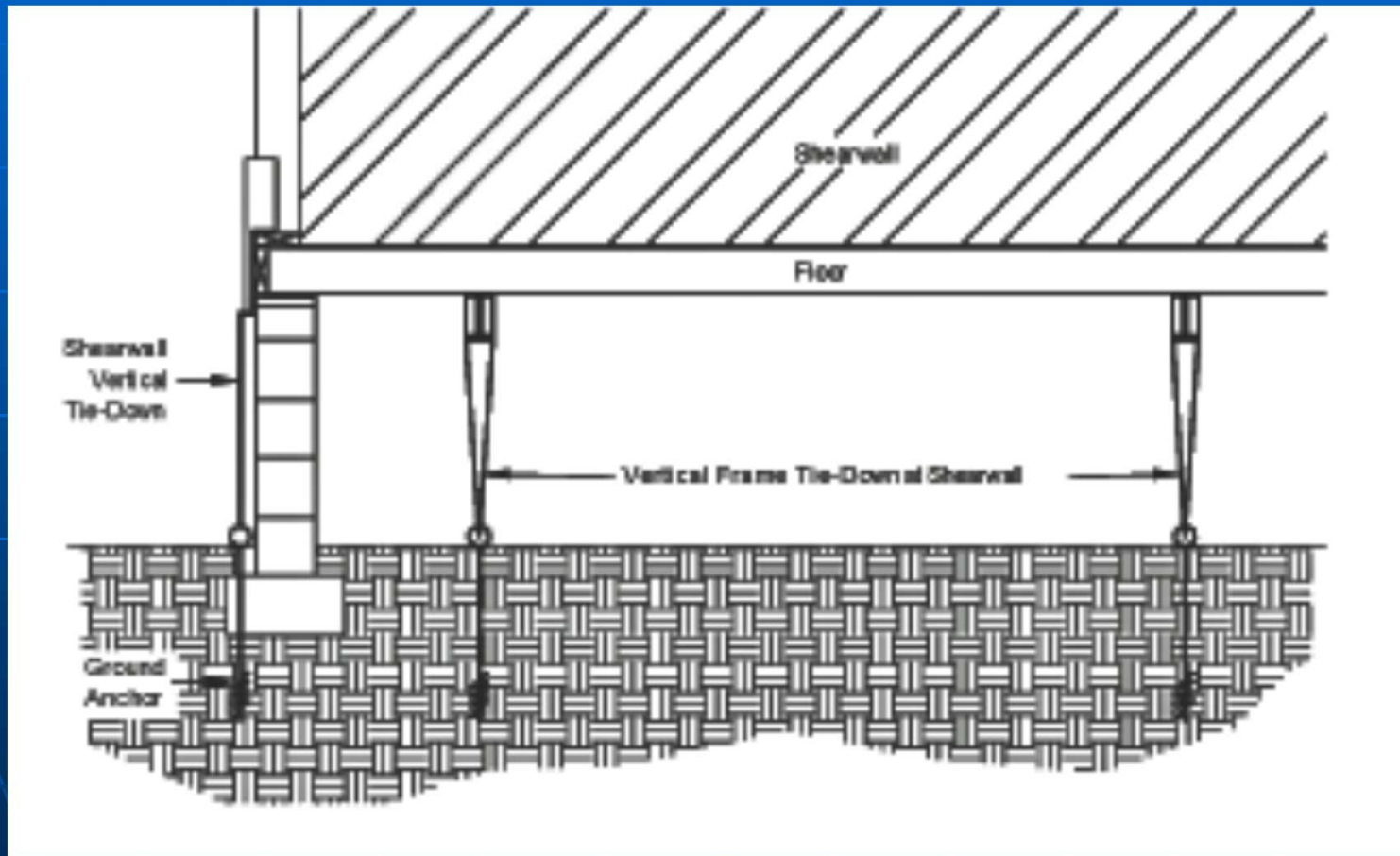


- If approved by the manufacturer, double head anchors may be used for both diagonal and vertical tie-down strap tensioning. Tension the diagonal tie-down strap first. Follow Steps 3 through 7 to install straps to anchorhead.

END WALL FRAME ANCHORS



VERTICAL ANCHORS



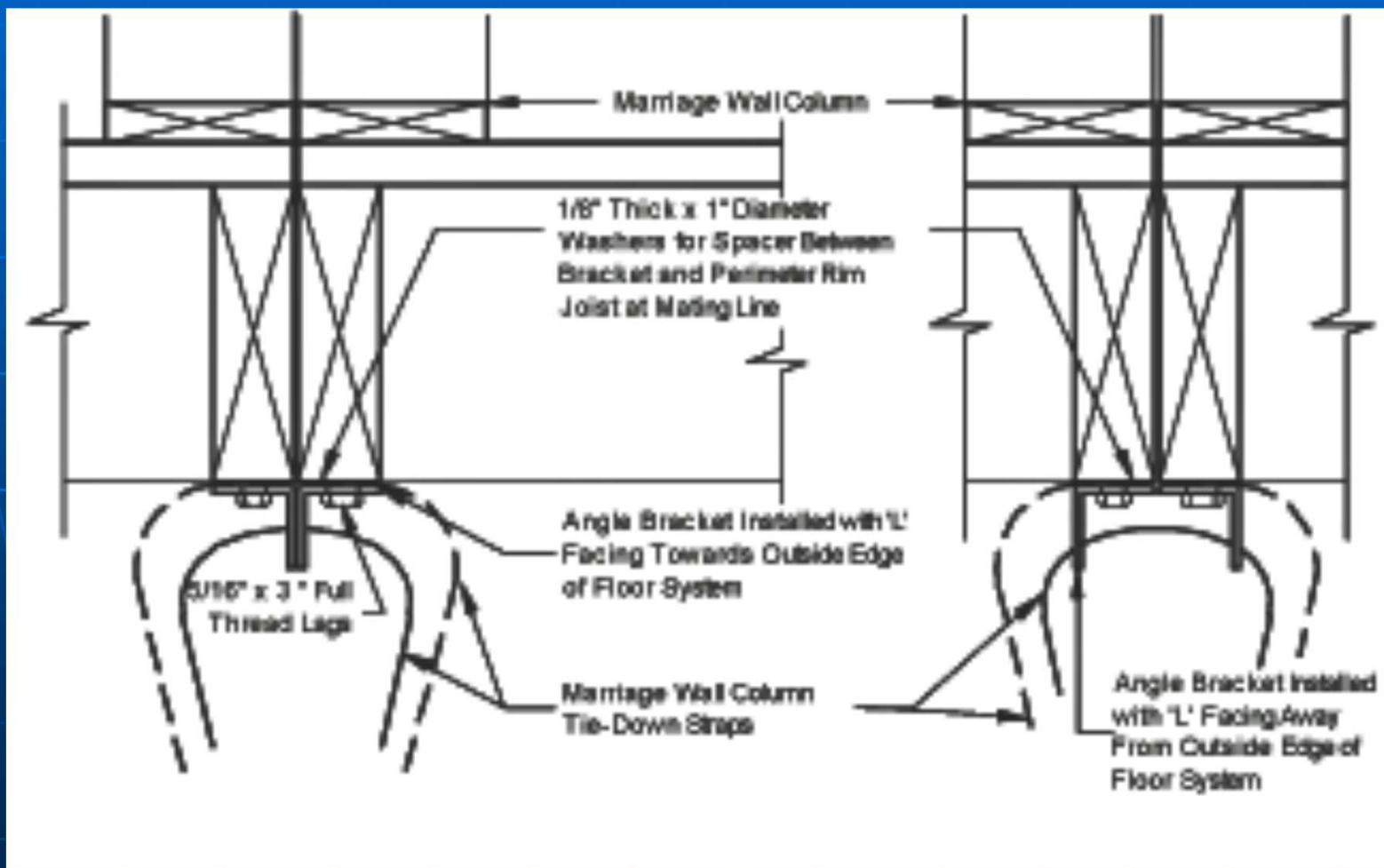
WHAT'S WRONG WITH THIS PICTURE?



VERTICAL ANCHORS

- IF VERTICAL STRAPS HAVE BEEN ATTACHED TO THE HOME BY THE MANUFACTURER, CONNECT THE OTHER END OF THE STRAP TO THE ANCHOR HEADS
- IF NOT, INSTALL STRAP FROM ONE HEAD OF A DOUBLE-HEADED ANCHOR, UP THROUGH THE BRACKETS (IF PROVIDED) OR AROUND THE I-BEAM AND DOWN TO THE OTHER ANCHOR BOLT IN A CONTINUOUS LOOP.

MARRIAGE LINE VERTICAL TIE-DOWNS



CONNECT UTILITIES

IT'S OKLAHOMA LAW
ONLY LICENSED PLUMBERS,
ELECTRICIANS, GAS AND
MECHANICAL PERSONNEL CAN
CONNECT UTILITIES OUTSIDE
THE FOOTPRINT OF THE HOME

CONNECTING WATER SERVICE FOR LICENSED PLUMBERS

- FLUSH PIPE
- CLEAN THREADS
- INSTALL PRESSURE-REDUCING VALVE –
MAXIMUM INLET PRESSURE OF 80 PSI
- CONNECT VALVE – YOUR PLUMBER NEEDS
TO **INSTALL A MAIN SHUT-OFF VALVE
BETWEEN THE WATER SUPPLY AND
THE INLET ON THE HOME!**

PREPARE APPLIANCES AND EQUIPMENT

SOME OF THE ITEMS IN THIS
CHAPTER “MUST” BE DONE BY
A LICENSED ELECTRICIAN OR
HVAC HEATING AND AIR
PROFESSIONAL

AIR CONDITIONER OR HEAT PUMP

- PROPERLY SIZING EQUIPMENT
 - **OVERSIZED COOLING EQUIPMENT CAN LOWER ENERGY EFFICIENCY, REDUCE COMFORT, SHORTEN EQUIPMENT LIFE, AND MAY CAUSE MOISTURE PROBLEMS IN THE HOME (INCLUDING POTENTIALLY DAMAGING THE HOME'S STRUCTURE).**



**WHAT IS
WRONG
WITH THIS
PICTURE?**

VENTING EXHAUST SYSTEMS

- EXHAUST VENTS MUST BE EXTENDED TO THE HOME'S EXTERIOR THROUGH SKIRTING!
- TERMINATION OF THE DRYER EXHAUST UNDERNEATH THE HOME CAN CAUSE CONDENSATION AND MOISTURE DAMAGE TO THE HOME
- LINT AND DUST ACCUMULATION CAN IGNITE, CAUSING A FIRE
- THE EXHAUST SYSTEM MUST NOT CONTAIN REVERSE SLOPE



**SOMETHING IS
GROWING UNDER
THIS HOME!**

PREPARE SMOKE ALARMS

**THE HOME HAS SEVERAL FACTORY
INSTALLED SMOKE ALARMS THAT ARE
WIRED TO A 120-VOLT CIRCUIT.**

TEST ALL ALARMS AS FOLLOWS:

- CHECK CIRCUIT
- REMOVE BATTERIES
- TEST ALARMS
- REPLACE BATTERIES

COMPLETE EXTERIOR WORK

REPAIR AND SEAL BOTTOM BOARD

- INSULATE
- REPAIR LARGE OPENINGS
- REPAIR SMALL OPENINGS

INSTALL GROUND MOISTURE RETARDER

- IF THE SPACE UNDER THE HOME IS TO BE ENCLOSED WITH SKIRTING OR OTHER MATERIAL, A GROUND MOISTURE RETARDER OF A MINIMUM 6 MIL THICK POLYETHYLENE SHEETING OR EQUIVALENT MUST BE INSTALLED COVERING THE GROUND UNDER THE HOME

VAPOR RETARDER

- IF ON-GRADE (SURFACE) FOOTINGS ARE USED, INSTALL THE GROUND MOISTURE RETARDER PRIOR TO PLACING THE FOOTINGS, OR INSTALL IT AROUND THE FOOTINGS AFTER ALL OTHER WORK UNDER THE HOME IS COMPLETE

INSTALL GROUND MOISTURE RETARDER

- **APPLY SHEETING** – Unroll the ground moisture overlapping joints in the sheeting a minimum of 12 inches and covering the entire area under the home except for areas under recessed entries, decks and porches
- **SEAL JOINTS** – Seal joints in the retarder with mastic
- **WEIGH DOWN** – To keep the retarder in place, weight it down with stones, concrete blocks, or other heavy durable materials
- **REPAIR TEARS** – Repair any voids or tears in the retarder by patching with like material, maintaining a minimum 12-inch overlap and sealing joints with mastic

COMPLETE SITE-BUILT STRUCTURES

- DO NOT OBSTRUCT ANY OF THE TWO REQUIRED EXIT DOORS FROM THE HOME
- CONSTRUCT SITE-BUILT STRUCTURES TO BE STRUCTURALLY INDEPENDENT UNLESS PROVIDED FOR IN THE DESIGN OF THE HOME
- DO NOT DAMAGE THE INTEGRITY OF THE HOME'S STRUCTURAL OR WEATHERPROOFING SYSTEM.
- UTILIZE ONLY GFCI OUTLETS FOR SITE-BUILT STRUCTURES

DESIGNING SITE-BUILT STRUCTURES

- ALL SITE-BUILT STRUCTURES MUST SUPPORT THEIR OWN DEAD, LIVE, AND WIND LOADS AND MUST NOT TRANSMIT ANY LOADS TO THE HOME'S STRUCTURE. ALL CARPORTS SHOULD BE FREESTANDING.

FASTENING VINYL SIDING

- **DO NOT INSTALL FASTENERS DIRECTLY INTO VINYL SIDING!**
- ALLOW FOR SIDING THERMAL EXPANSION BY PRE-DRILLING MINIMUM ½ INCH DIAMETER FASTENER HOLES OR FASTENING SKIRTING TO A LEDGER UNDER THE HOME

ATTACHING VINYL SIDING

- TO INSTALL SKIRTING ON VINYL-SIDED HOMES, SCREW A TREATED 2X4 ON EDGE TO THE UNDERSIDE OF THE FLOOR JOISTS TWO INCHES BACK FROM THE EDGE OF THE HOME. SCREW SKIRTING TIGHT TO THE 2X4

INSTALL SKIRTING

TABLE 31. ANCHOR SYSTEM MATERIALS SPECIFICATIONS

Component	Specification
Skirting	Skirting must be of weather-resistant materials or provided with protection against weather deterioration at least equivalent to that provided by a coating of zinc on steel of not less than 0.30 oz per sq ft of surface coated. Skirting made from wood or wood products and used within six inches of the ground needs to be made of materials naturally resistant to decay and termite infestation or pressure treated.
Vents	Ventilation openings must be covered for their full height and width with a perforated (1/4 inch maximum opening in any dimension) corrosion and weather-resistant covering that is designed to prevent the entry of rodents. In areas subject to freezing, the coverings for the ventilation openings must have an operable damper, permitting them to be in the open or closed position depending on the weather.

➤ SKIRTING MUST BE OF WEATHER-RESISTANCE OR PROVIDED WITH PROTECTION AGAINST WEATHER DETERIORATION AT LEAST EQUIVALENT TO THAT PROVIDED BY A COATING OF ZINC ON STEEL OF NOT LESS THAN .30 OZ PER SQ.FT. OF SURFACE COATED.

➤ **SKIRTING MADE FROM WOOD OR WOOD PRODUCTS AND USED WITHIN SIX INCHES OF THE GROUND NEEDS TO BE MADE OF MATERIALS NATURALLY RESISTANT TO DECAY AND TERMITE INFESTATION OR PRESSURE TREATED.**

PREPARE HOME FOR OCCUPANCY

- DOES THE HOME NEED “ALTERNATIVE CONSTRUCTION” (A/C) INSPECTION?
- ✓ IF SO...THIS IS NORMALLY THE RESPONSIBILITY OF THE RETAILER AND THE MANUFACTURER....THE INSTALLATION IS NOT COMPLETE UNTIL THE A/C INSPECTION HAS BEEN PASSED AND DOCUMENTED BY THE MANUFACTURERS DESIGNATED REPRESENTATIVE

COMPLETE INSPECTION CHECKLIST

- AFTER ALL PREVIOUS STEPS HAVE BEEN ACCOMPLISHED, INSPECT THE HOME TO VERIFY THAT IT HAS BEEN COMPLETELY AND PROPERLY INSTALLED USING A CHECKLIST
- CORRECT ANY DEFICIENCIES FOUND, IF POSSIBLE, OR IF NOT POSSIBLE, **INFORM THE RETAILER OR MANUFACTURER IMMEDIATELY**

ENERGY STAR HOMES

- FOR ENERGY STAR QUALIFIED HOMES (CHECK WITH THE RETAILER OR MANUFACTURER), THIS STEP IS TO BE COMPLETED BY THE MANUFACTURER'S DESIGNATED REPRESENTATIVE. ASK THE RETAILER OR THE MANUFACTURER WHO THIS IS
- THE MANUFACTURER'S REPRESENTATIVE MUST COMPLETE THE ENERGY STAR SITE INSTALLATION CHECKLIST, OBTAIN SIGNATURES ON THE ENERGY STAR LABEL, AND RETURN THE COMPLETED ENERGY STAR SITE INSTALLATION CHECKLIST TO THE MANUFACTURING PLANT

CLEAN THE HOME

- REMOVE AND PROPERLY DISPOSE OF ALL INSTALLATION-GENERATED DUST, DEBRIS, AND PACKAGING MATERIALS FROM THE HOME AND THE SURROUNDING PROPERTY.
- ENSURE THAT THE HOME IS IN "MOVE-IN" CONDITION

INSTALLATION IS COMPLETE