R-Anell Homes®

Modular Home Installation Manual

A copy of this manual must remain with the home for reference by the homeowner.

APPROVED BY
NTA
9/19/2024

Approval of this document does not authorize or approve any deviation or deviations from the requirements of applicable State Laws.

Kip Whitehead

Seal of Approval

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Thank you for purchasing one of our modular homes. Today the modular home takes many forms and with varying degrees of completion as it leaves the factory. Each style of home requires differing amounts of site work. Your home was designed and approved to conform to state codes in effect on the date of manufacture. These codes set forth the requirements for structural design, fire safety, plumbing, heating, and electrical systems for factory built housing designed to be used as dwellings. This Installation Manual contains instructions that must be followed for the proper installation of your home. Please familiarize yourself with all the requirements contained in this manual. Please be aware that designs and specifications are subject to change without notice. The illustrations and procedures in this manual are representative of the home at the time of the printing of this manual. The following is a brief explanation of the specific styles of homes that we manufacture:

Ranch:

A ranch style home arrives in two or more modules with a roof pitch that typically ranges from 3 in 12 up to 7 in 12, which is hinged down in order to comply with shipping restrictions.

Cape Cod:

Cape Cod homes have a modular main floor with a roof pitch that is typically 9 in 12 to 12 in 12 which is hinged down to accommodate shipment. The upper level of such homes is framed, insulated, and finished by the builder with respect to all local codes which apply.

Two Story

Two stories are generally manufactured and shipped as four or more modules. In addition to the same type of site work as required to finish a ranch home, connections between the first and second floors must be made. In some cases, installation of components between the floors may be necessary prior to setting the second floor on top of the first floor. NOTE: Not all manufacturing facilities produce two story home systems.

Regarding On-Frame Floor Systems:

Any reference in this manual to on-frame floor system design are not applicable for states which prohibit such design. Check state and local code requirements if an on-frame floor system is being considered.

INSTALLATION OF YOUR HOME REQUIRES SKILLS, AND SHOULD BE PERFORMED BY A PROFESSIONAL CONTRACTOR WHO HAS BEEN TRAINED IN SETUP AND INSTALLATION IN ACCORDANCE WITH ALL LOCAL CODES SUBJECT TO THE APPROVAL OF THE LOCAL JURISDICTION HAVING AUTHORITY. PLEASE READ ALL INSTRUCTIONS PRIOR TO SETUP. NOTE: FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN INJURY AND/OR DAMAGE TO THE HOME AND MAY ALSO VOID THE WARRANTY ON YOUR HOME.

Chapter 1 - Introduction

1.1. Builder / Installer Considerations

The following guidelines have been prepared to assist the Builder / Installer in setting up your home. Proper setup will assure the homeowner of a home that is safe and secure for the lifetime of the structure. This Installation Manual along with the provided design package for your home will define the minimum acceptable practices for field installation. Prior to locating your home, contact the local authority having jurisdiction regarding installation to determine if permits for such procedures as excavation and foundation construction, or utility connections are required. Inspections may be required during the various stages of installation. On private property, zoning rules and regulations and/or development covenants may apply and should be taken into consideration as well.

(NOTE: Preparations of the site, when completed by someone other than the installer, may not be in accordance with these instructions.) Under no circumstances will the manufacturer be responsible for performing any of the functions listed herein. The Builder / Installer have the responsibility to assure that all functions described in this manual are performed adequately and in conformance with all building codes.

In any state that requires a licensed Builder / Installer, or contractor to erect units or to be present during the erection of units, the builder / retailer is responsible for meeting those requirements. The builder / retailer is also responsible for complying with all insulation requirements of the local building code. The insulation data provided as part of each home design package indicates the areas and minimum amounts of insulation required according to the specified design parameters. The builder / retailer is responsible for insuring that the proper insulating materials are provided and installed correctly in floors, crawlspaces, basements, and other site finished areas of the home in order to complete the thermal envelope in accordance with local codes.

1.2. How To Use This Manual

Effort has been made to write this manual in an objective and easy to understand manner so that the instructions may be accurately followed. This manual is designed to provide information about the setup of your home from delivery of your home through final inspection. **(This manual MUST be used in combination with the design package[1] for your home which provides: Floor plan, foundation plans, tie-down specifications, plumbing, electrical, and other model-specific information for the set up of your home . Where specifications in the home design package differ from the general requirements found in this installation manual, the specifications in the home design package, which control the home-specific design, must be observed.)**

[1] Where ever the term "design package" occurs in this manual, it is referring to the specific set of plans for your particular home. This set of plans is often also referred to as "permit set", "home package", or "floor plan package".

Illustrations in this manual are typical and may not depict actual: roof lines, exterior treatments, and other specific features of any given home. Careful adherence by the homeowner and installation personnel, as well as, consultation with a registered professional structural engineer in those unusual circumstances not covered by this manual, will assure you of a safe and low maintenance home for many years to come.

1.2.1 Important Wind Speed Information

WHERE EVER WIND SPEED VALUES ARE REFERENCED IN THIS MANUAL, THE VALUES ARE EXPRESSED AS "ULTIMATE (Ult)" WIND SPEEDS IN ACCORDANCE WITH THE PROVISIONS OF THE 2015 AND LATER EDITIONS OF THE IRC. WHERE LOCAL AUTHORITY USES NOMINAL WIND SPEED VALUES ASSOCIATED WITH EARLIER IRC CODE EDITIONS, THE FOLLOWING MAY BE USED TO DETERMINE EQUIVALENT NOMINAL WIND SPEED VALUES WHICH WOULD APPLY:

Ultimate wind speed specified in this manual	Nominal wind speed equivalent
115 mph Ult maximum	90 mph maximum
130 mph Ult maximum	100 mph maximum
140 mph Ult maximum	110 mph maximum
155 mph Ult maximum	120 mph maximum
167 mph Ult maximum	130 mph maximum

1.3. Safety

ONLY TRAINED CREWS SHOULD INSTALL THE HOME. INSTALLERS SHOULD FOLLOW THE SAFETY INSTRUCTIONS PROVIDED IN THIS MANUAL.

THIS HOME WEIGHS SEVERAL TONS. ADEQUATE SAFETY PRECAUTIONS SHOULD BE TAKEN TO SUPPORT THE HOME AT EVERY STEP OF THE INSTALLATION PROCESS. NO PERSONNEL SHOULD BE ALLOWED TO WORK UNDER THE HOME UNLESS IT IS SECURELY SUPPORTED AND STABILIZED IN PLACE.

Chapter 2 - Site Preparation

2.1. Location and Layout

Your home is designated for a certain ground snow load, wind load, seismic load, thermal zone, and other weather conditions. (Refer to data sheet near home main electrical panel or under kitchen sink.) Do not place your home in a geographical area requiring greater wind, ground snow, seismic, or heating/cooling capabilities than those for which your home was designed. However, it is safe to locate your home in an area requiring lower loading and thermal requirements. For example: A home designed for a 40 psf ground snow load may be sited in 30 psf or less ground snow zones. To insure correct home design, your Builder / Retailer must obtain the proper loading conditions from your local building authority for the projected home site in advance of ordering your home from the factory. A design package will be developed which is tailored for your specific home based upon the geographical location of your home according to the data provided for it's design. **Should there ever be a question regarding the design conditions required for your home as built, consult your local building department and/or refer to the design maps in the applicable building code.**

2.1.1. Flood Prone Areas

We do not recommend locating your home close to river or in other flood prone areas. Special local regulations or flood insurance provisions usually apply for such areas. Special elevation and anchoring techniques are required when locating in flood susceptible areas. Consult a registered professional or local structural engineer to insure that the home and foundation design and construction conform to applicable federal, state, and local code regulations.

2.1..2. Severe Wind Areas

Modular homes are designed and constructed to meet the structural design wind loads for the areas in which they are sited. The manufacturer is not responsible for damage incurred by wind driven rain or debris. Protection of glazed openings, (including garage windows), during extreme wind conditions must be provided by others on site according to IRC Section 301 (Ref. Pg. 3-4). Protective measures against wind driven rain for vulnerable building elements such as vented soffits must also be considered for homes sited in these regions.

2.2. Soil Conditions

Soil type is based on the Unified Classification System allowable pressure (Pounds Per Square Foot).

Soil Bearing Capacity (psf) *	Soil Classification Type
4,000 and up	Rock or Hard Pan
2,000	Sandy Gravel and Gravel
1,500	Sand, Silty Sand, Clay Sand, Silty Gravel, or Clay Gravel
1,000 or less	Uncommitted fill (Types of soil not listed). Peat or Organic Clay Foundation must be designed by a registered professioal engineer and approved by local authority.
* No allowances made for overburden pressure, embedment depth, water table height, or settlement problems. Foundation designs for soil bearing capacities, other than the noted capacity on your model-specific print, must be approved by local authority having jurisdiction.	

Table 2.1 - Soil Classification

NOTE: Use the soil values on the preceding (Table 2-1) only when none of the following are available:

A. Soil testing investigation and analysis of the site.
B. Compliance with the local building code.
C. Competent opinion by a local engineer or building official.

2.2.1. Requirements

To help prevent settling of your home, site it only on firm, undisturbed soil or fill compacted at least 90% of it's maximum relative density. Installation on loose, non-compacted may invalidate home's limited warranty.

2.2.2. Bearing Capacity

Test the bearing capacity of the soil at the depth of the footings after completing any grading and filling. In the presence of unusual circumstances, or if the soil appears to be peat or non-compacted fill, consult a local geologist or professional engineer.

2.2.3. Soil Bearing Testing Methods

A pocket penetrometer (available from engineering supply houses) or other methods acceptable to local jurisdictions may be used.

2.2.4. Removal of Organic Material

Remove all biodegradable material such as: grass, roots, and wood scraps from beneath the home, (especially in areas where footings are to be placed), in order to minimize settling of footings and insect damage. Remove shrubs and overhanging branches from the immediate vicinity of the home site to prevent wind storm damage.

2.3. Drainage

Drainage prevents water build-up under the home which may cause settling of the foundation, dampness in the home, damage siding, buckling of walls and floors , problems with the operation of doors and windows. **Failure to provide adequate drainage will void your warranty.**

2.3.1. Elimination of Depressions

Grade the home site to permit water to drain from under and away from the home. Figure 2.1 at right illustrates guidelines to observe for drainage about the home.

2.3.2. Drainage Structures

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

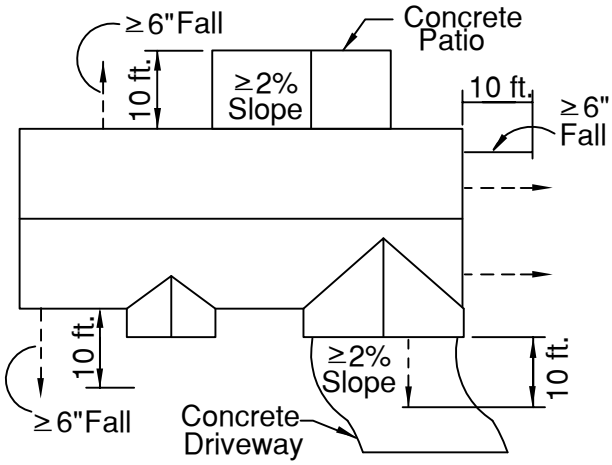


Fig. 2.1 - Typical Drainage Points

2.3.3. Ground Moisture Control

In conjunction with proper drainage measures, mention is made here of required moisture control beneath the home. A vapor barrier that keeps ground moisture out of the home must be used on the ground beneath the home. Refer to Chapter 3 for expanded information regarding required ground moisture control measures that must be implemented.

Chapter 3 - Foundation and Structural Site- Work Requirements

3.1. Builder / Installer Information and Responsibility

3.1.1. Alternative Foundations

Typical foundation details in this section are designed to provide general information. When there are design deviations from the home plan package or special conditions and requirements, consult a licensed professional engineer locally. When the foundation plans are designed by others, the designer of the building plans shall not be held liable for the foundation design or any related structural damage or component systems failure related to a foundation issue. Alternative foundation systems, such as Foundation Works and Superior Walls, may be approved as alternative foundations for your home provided that the foundation plans for such systems are reviewed and approved by a professional engineer.

3.1.2. Foundation Construction

The builder/contractor is responsible for the design and construction of the foundation. This includes temporary bracing and shoring of the structure as required during all phases of the construction process. It is also the contractor's responsibility to properly determine the size and location or spacing of piers, and to install the correct footings. Refer to applicable sections of the IRC for requirements to protect exposed wood sheathing, siding, and other wood based products from decay. Fasteners which contact pressure treated lumber must have proper corrosion resistance properties as required by lumber manufacturer. Failure to install a proper foundation may lead to sagging floors, walls, and roofs among numerous other issues. (Foundation shown in home design package is intended for dimensional information and must be designed by others to satisfy the specific site conditions.)

3.1.3. Codes and Standards

The builder/contractor is responsible to construct the project in full compliance with currently adopted edition of all applicable codes and standards, and to the requirements of the local jurisdiction having authority.
When a modular home has been designated for stock or retail display, such homes may be subject to changes in codes relative to when they were originally ordered and built. It is critically important to verify current code compliance of these homes before they are sold to retail customers. Before such homes are sold, the retailer is responsible for obtaining a current design package developed specifically for the established site address and customer. If the home is subject to code updates, the design package will indicate the proper compliance. Any alterations that are necessary to bring the home into compliance is the responsibility of the builder working in concert with the local authority having jurisdiction where the home is to be sited. Depending on State & local requirements, the home may need third party inspection and re-labeling as well. Arrangements and costs for all mandated procedures are the responsibility of the retailer, builder, or customer.

3.1.4. Building Plan Review

The builder/contractor is responsible to refer to the specific design plan package to determine locations for dropped or extended floor areas, floor drains, or any other features that affect the work.

3.1.5. Support Footings

Concrete is to be installed as required. If additional reinforcement is required, it shall be the responsibility of the builder/contractor to provide support in the footings.

3.1.6. Perimeter Foundations

Perimeter foundation walls and piers may be poured in place with concrete (28-day compressive strength of at least 2500 psi) or may be constructed with concrete blocks (CMU's) mortared in place per local codes. Mortar to be type "M" or "S" per ASTM C-90. Piers must be capped and shimmed with wedges and located as specified in foundation plans.

3.1.7. Rebar and Reinforcement

The builder/contractor will be responsible to see that all rebar members are properly assigned and secured in place prior to pouring the concrete. All reinforcement must be held in place during the pouring of the concrete.

3.1.8. Weather Conditions

The builder/contractor shall exercise all precautions when concrete is being placed and cured in very cold or hot weather conditions. Installer shall follow the procedures established by the ACI for hot and cold weather conditions.

3.1.9. Structural Steel

The structural steel installer shall provide web reinforcement at each point where the steel beam is supported at open spans. This would apply where ever the building point loads are being transferred through studs, floor joists or girders above the beam to the footing at a post or pier location.

3.2. Types of Footings

3.2.1. Concrete

Footings may consist of precast or poured-in-place concrete, with a 28-day compressive strength of at least 2500 psi. All concrete and reinforcing shall be installed to comply with the standards set forth in the latest edition of ACI-318.

3.2.2. Other Materials

Other materials may also be used only when they are approved for this use by the local authorities and that they provide equal load-bearing capacity and resistance to decay.

3.2.3. Placement in Freezing Climates

1) Conventional Footings: To help prevent the effects of ground frost heave, footings are to be located below the frost line. Consult local authorities to determine the local frost penetration.

2) Insulated Foundations: Footings may be placed above the frost line when the home is provided with a perimeter foundation having insulation properties sufficient to prevent freezing of the soil beneath or adjacent to every load-bearing component of the foundation. The installation of such foundations for this purpose are subject to the acceptance of the local building authority having jurisdiction. Note: This foundation application requires that the perimeter foundation walls be insulated. Refer to the IRC for provisions to create "conditioned" air, in the area surrounded by the perimeter foundation walls, by eliminating crawlspace vents. For additional information regarding general crawlspace requirements, refer to the Crawlspace section of this chapter.

3.2.4. Proper Sizing of Footings

Refer to the specific design package provided with your home for the foundation footing size (based on standard soil capacities). Proper sizing of the footings depends upon the load carrying capacity of both the piers and the soil, (as previously discussed under Soil Conditions in Chapter 2). The foundation design in your home package has been prepared in the absence of a specific soil report applicable to the home site. Soil conditions should be evaluated prior to starting the foundation work. If footings were installed prior to obtaining a design package, and foundation loads exceed installed footings, provided footing sizes must be designed and verified by a local engineer and must meet the approval of the local authority having jurisdiction (LAHJ).

3.3. Other Important Considerations

3.3.1. Design

The foundation must be designed and built to local codes and ordinances and must be approved and inspected by local building officials.

3.3.2. Ground Moisture Control

All foundation applications require a ground moisture barrier regardless of basement or crawlspace. Use a polyethylene sheeting or equivalent at least 6 mils thick. A Class-I vapor barrier is to be used. Such material will provide a permeance rating of 0.1 or less. (Refer to typical illustrations later in this chapter).
Cover the entire area under the home with sheeting and overlap it at least 6" at all joints. Where soil and frost conditions permit placement of footings at grade level, place the sheeting directly beneath them.

NOTE: All crawlspace areas require crawlspace access in accordance with Section 408 of IRC.

3.3.3. Conventional Ventilated Crawlspace

1) Conventional crawlspace areas require ventilation. Use minimum vents as enforced by all local codes that apply. Number, size, location, and required construction of the ventilator shall conform to IRC Section 408. Note: Ventilators with dampers should not be used since there is no ventilation possible when the damper is in the closed position. Only fixed open vents should be utilized.

2) Floor insulation requirement is per the provided thermal report in the design package for the home. Where floor cavity is insulated, the insulation must extend to the rim joist to prevent thermal short. (See also Sec. 9.7)

3.3.4. Conditioned Crawlspace Method

Conditioned crawlspace construction is a practical choice to consider (Fig. 3-1). Where homes are built to comply with 2018 and earlier editions of the IECC, conditioned crawlspaces do not require on-site duct testing. ***Duct testing became a requirement regardless, for homes built for compliance as per the 2021 IECC.***

Where floor above the crawl space is un-insulated, insulation is required to be installed on the crawl space walls. The following is a summary of the required steps to provide proper thermal protection:

1. Eliminate all ventilation openings in the perimeter foundation stem walls.
2. The exposed earth in all crawl space foundations shall be covered with a continuous vapor barrier having a maximum rating of 0.1 perm. (Refer to 3.3.2 for requirements)
3. Insulate the rim joist around the perimeter of the home with fiberglass batt insulation or other approved insulating materials to achieve the required perimeter joist insulation value per the home thermal report.
4. Insulate the perimeter foundation walls. The minimum required insulation will vary according to the site location. Refer to the Rescheck analysis included with the approved plan package provided with the home or to local code requirements to determine the minimum required perimeter wall insulation. See Fig. 3.1 for minimum insulation coverage below grade.
5. Install heating register(s) and return air grille to condition the crawlspace area. Generally, (1) 4x10 register for supply air and (1) 4x10 grille for return air is adequate to accommodate conditioning of the air in the crawl space, unless home is located in areas with extreme temperatures. Locate the supply and return air openings as remote from each other as possible to allow circulation of air across the entire crawl space area. Consult your local official for requirements and/or other acceptable methods to condition the space when floor is not insulated.
6. For homes with other than forced air heating, use min. 80 cfm continuously operating fan along with RA grille.
7. Inspect and protect water lines that could be subject to freezing.
8. Provide proper drainage for crawl space and foundation system as applicable per local codes.

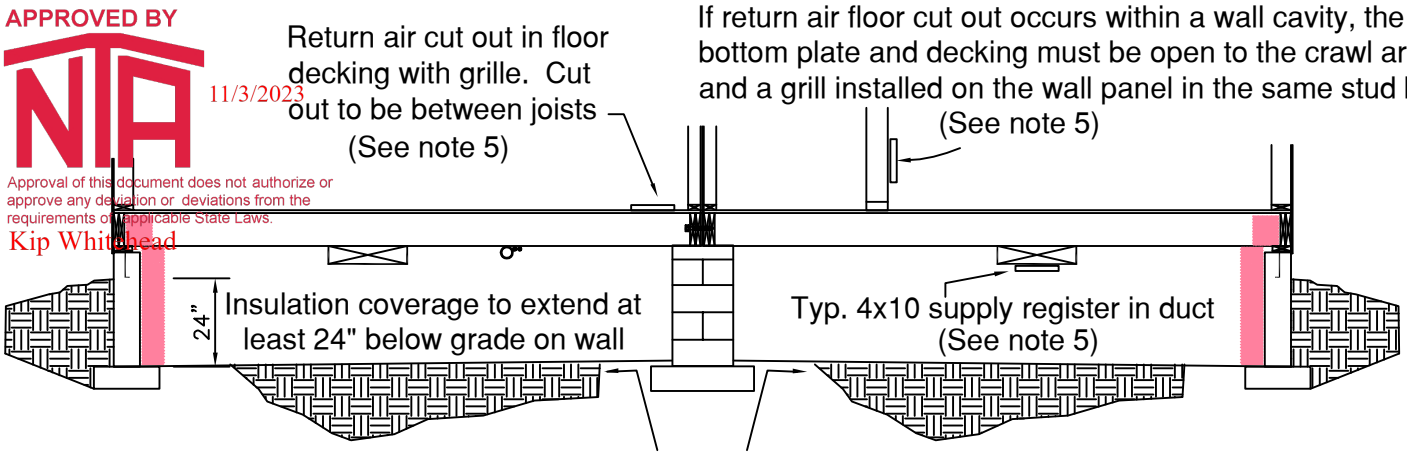


Fig. 3.1 - Un-Insulated Floor / Conditioned Crawlspace

3.3.5. Support Posts

Support posts, where required, shall be per local codes and provided on site by others. Support post to be secured to concrete floor or footing with a minimum of (2) 5/8 diameter lag screws or equivalent which are of sufficient length to achieve at least 1-1/2" penetration.

Support posts and bearing plates for posts must be rated for applied loads and footing support used. Where non-prefabricated columns are used, a minimum 3/8" x 5" x 5" steel bearing plate is recommended at the top and the bottom of the column. All columns and bearing plates must meet all local codes and the acceptance of the authority having jurisdiction.

3.3.6. Severe Wind and Flood Prone Areas

Special foundation and anchoring techniques are required when locating the home in a severe wind or flood prone area. Where this is unavoidable, consult a registered professional or structural engineer. Never place the home in a wind zone which exceeds the one indicated on the home data plate. (Refer also to Chapter 2 for additional considerations for severe wind and flood prone areas).

3.3.7. Special Snow Load Conditions

Homes designed to be located in heavy snowfall areas or which are subject to other extreme loading conditions may require special piers or footings. Refer to tables and/or other manufacturer's specifications provided in the design package with your home. Any required steel connections shall be welded with a fillet weld all around unless otherwise noted. Weld size shall be the maximum allowed by the latest edition of the "Manual of Steel Construction" based on the thickness of the material. Field cutting and burning is not permitted without the approval of an engineer.

3.3.8 Foundation Backfill

Foundation should not be backfilled until after home is fastened to the foundation. If backfill is required prior to home installation, foundation walls must be adequately braced to resist the backfill pressure. Use adequate temporary support blocking to safeguard workers.

3.4. Typical Illustrations and Information

The following pages in this chapter present illustrations, charts, and information which are relevant to general foundation design. Although the information presented conforms to generally accepted codes and engineering practice and represents valid guidelines, it is typical in nature. It is important to note that, when special site conditions exist, or where a local professional has prepared designs, or where the design package for your home specifies other than the information herein, such specific designs will supercede and take precedence over the typical depictions in this manual.

3.5. Important Reference Documents

3.5.1 Wood Frame Construction Manual (WFCM) - Latest Edition

3.5.2 Applicable version of International Residential Code (IRC) - with applicable state amendments.

3.5.3 Standard For Residential Construction in High Wind Regions: ICC-600

3.5.4 ASCE 7-05 "Minimum Design Loads For Buildings And Other Structures" - Applicable to structures designed in accordance with the 2009 IRC and earlier versions. For structures designed in accordance with the 2012 IRC and 2015 IRC - ASCE 7-10 is applicable, and for 2018 IRC and subsequent editions - ASCE 7-16 must be followed. Ref: (www. ASCE.org) 1801 Alexander Bell Drive, Reston, VA 20191

SIZE AND CAPACITY FOR UNREINFORCED CAST-IN-PLACE FOOTINGS

Soil Capacity (PSF)	Min. Square Footing Size (in.)	Min. Round Footing Dia.	8" x 16" Pier		16" x 16" Pier		Steel Column With 3/8" x 5" x 5" Min. Steel Bearing Plate	
			Maximum Footing Capacity (lbs)	Min. Footing Thickness (in.)	Maximum Footing Capacity (lbs)	Min. Footing Thickness (in.)	Max. Footing Capacity (lbs)	Min. Footing Thickness (in.)
1,000	16 x 16	19	1,600	6	1,600	6	1,600	6
	20 x 20	23	2,600	6	2,600	6	2,600	6
	24 x 24	28	3,700	6	3,700	6	3,700	8
	30 x 30	34	5,600	8	5,800	6	5,600	8
	36 x 36	41	7,900	10	8,100	8	7,900	10
	42 x 42	48	10,700	10	10,700	10	10,700	10
	48 x 48	55	13,100	12	14,000	10	13,100	12
1,500	16 x 16	19	2,500	6	2,500	6	2,500	6
	20 x 20	23	4,000	6	4,000	6	4,000	8
	24 x 24	28	5,600	8	5,600	6	5,600	8
	30 x 30	34	8,500	10	8,500	8	8,500	10
	36 x 36	41	12,400	10	12,400	8	12,400	12
	42 x 42	48	16,500	12	16,500	10	16,500	14
	48 x 48	55	21,200	14	21,200	12	21,200	16
2,000	16 x 16	19	3,400	6	3,400	6	3,400	6
	20 x 20	23	5,300	6	5,300	6	5,300	8
	24 x 24	28	7,600	8	7,700	6	7,600	10
	30 x 30	34	11,700	10	11,900	8	11,700	12
	36 x 36	41	16,700	12	16,900	10	16,700	14
	42 x 42	48	22,400	14	22,700	12	22,400	16
2,500	16 x 16	19	4,300	6	4,300	6	4,300	8
	20 x 20	23	6,700	6	6,700	6	6,700	8
	24 x 24	28	9,600	8	9,700	6	9,600	10
	30 x 30	34	14,800	10	15,000	8	14,800	12
	36 x 36	41	20,700	12	21,400	10	20,700	14
3,000	16 x 16	19	5,200	6	5,200	6	5,200	8
	20 x 20	23	8,100	8	8,100	6	8,100	10
	24 x 24	28	11,500	10	11,700	6	11,500	12
	30 x 30	34	17,800	12	18,100	8	17,800	14
	36 x 36	41	25,400	14	25,900	10	25,400	16
4,000	16 x 16	19	7,000	6	7,000	6	7,000	8
	20 x20	23	10,800	8	10,900	6	10,800	10
	24 x 24	28	15,500	10	15,600	8	15,500	12
	30 x 30	34	23,300	12	24,200	10	23,300	16

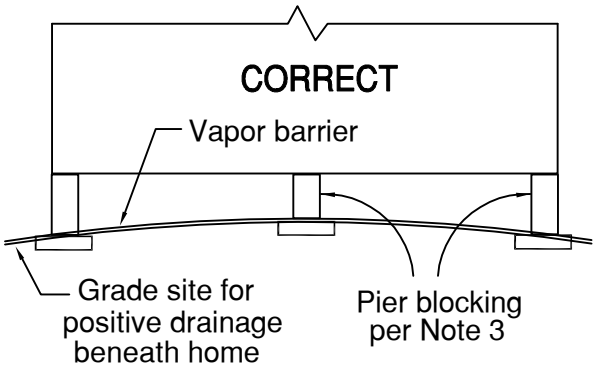
1. Footing sizes shown provide for square or round pads and are based on sq. in. area, shear, and bending required for the loads shown. Other configurations can be used provided the area and depth is equal to or greater than the area and depth of the square footing shown in the table. The distance from the edge of the pier to the edge of the footing shall not be less than 2" nor greater than 8".
2. The 6" cast-in-place values can be used for 4 inch un-reinforced precast concrete footings.
3. The capacity values listed have been reduced by the dead load of the concrete footing. The applied load shall not exceed the listed capacity of the footing used.
4. Steel columns shall be appropriately rated for the loads applied and shall have bearing plate as indicated.

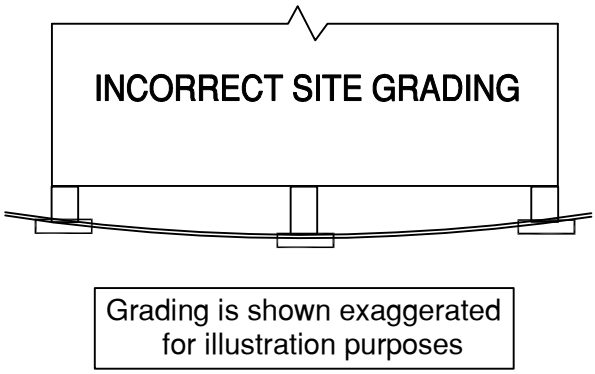
Table 3.1 - Footing Capacity Chart

3.6 Temporary Support For Retailer Stock or Display Homes

Proper grading of the site is always of key importance for the permanent siting process, and is equally important during times of storage and temporary display. The following guidelines are critical to insure the integrity of the structure during such times:

1) Site must be graded in a manner that does not allow for water to collect beneath the home while it is in display or storage. If water is allowed to settle beneath the home, for even short periods of time, the evaporation of moisture will cause warping and serious damage to decking and framing members. This will severely jeopardize the warranty for the home and cause expensive repairs.





2) A minimum 6 mil thick polyethylene sheeting or equivalent must be installed over the entire area of the ground beneath the home to prevent any ground moisture from penetrating the home structure. Refer also to Ground Moisture Control discussed earlier in this chapter.

3) The home must be properly supported while in display or storage. Use dry stacked 8" x 16" concrete block piers at 8'-0" on center around perimeter and beneath marriage line of home. Support under large mating wall spans and at sidewall "bump-out" bay windows and other projecting elements must also be provided. Where home is situated on the ground or asphalt, use minimum ABS pad footings beneath each pier. (ABS pads are not required where home is situated on a concrete area).

4) In addition, if home is to be enclosed about the perimeter with skirting or any other crawlspace enclosure, cross-ventilation to the crawlspace must be provided. Use at least a 96 sq. in. ventilator at each corner of the crawlspace area.

NOTE: For homes that are displayed or stored on-frame, the same site preparations apply as indicated in all of the notes above . For home attached to carrier, locate support piers at no more than 12'-0" on center beneath all of the frame main rails as well 12'-0" on center maximum beneath the perimeter of the home. Support the marriage line of the home beneath each end of interior spans that exceed 4'-0", plus install supports so that there is no more than 10'-0" without support beneath marriage line of home.

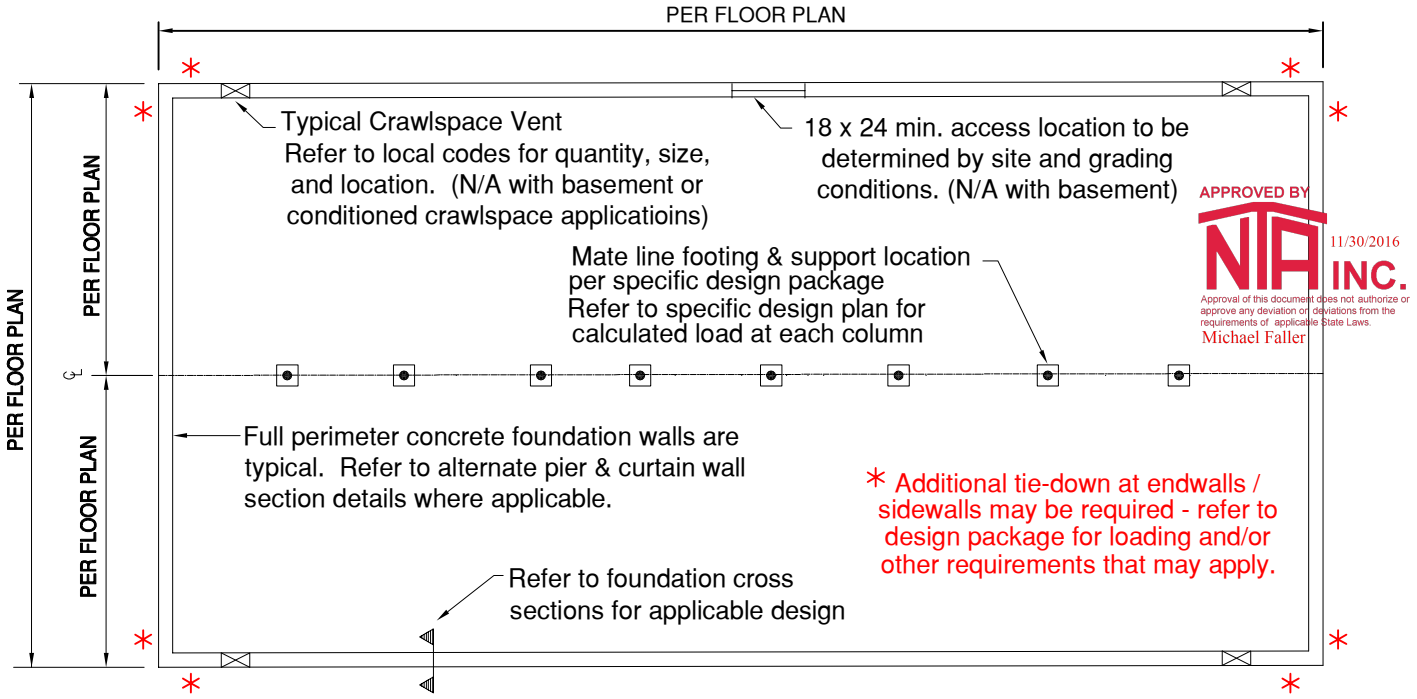
IMPORTANT

THIS APPLICATION IS INTENDED PRIMARILY FOR RETAILERS AND APPLIES ONLY FOR TEMPORARY STORAGE OR DISPLAY OF THE HOME. NEVER ATTEMPT TO PERMANENTLY SITE A HOME USING THE METHODS DESCRIBED ON THIS PAGE. FOR PERMANENT SET, ALWAYS REFER TO THE DESIGN PACKAGE FOR YOUR HOME IN CONJUNCTION WITH THE PERMANENT FOUNDATION GUIDELINES IN THIS MANUAL AND/OR THE REQUIREMENTS PREPARED BY A PROFESSIONAL ENGINEER AND THE ACCEPTANCE OF THE LOCAL BUILDING AUTHORITY.

Chapter 3 - Foundation & Structural Site-Work Requirements

The foundation details which follow in this chapter are for general illustration. Since some localities have specific foundation design requirements, always refer to the design package for your home and all local code requirements.

3.7 Typical Foundation



1. Footing size to be based on site determined soil bearing capacity.
2. Columns and footings must be rated to meet the required loads applied per design plan.
3. Foundation shown in home package indicates minimal loading information and shows critical tie-down points on home perimeter when applicable. This plan is primarily intended for dimensional information. The foundation must be designed by others to satisfy specific site conditions such as seismic, lateral, longitudinal, shear, uplift, and downward forces which are unique to the site. Such design and home attachment must be per local codes and meet the approval of the local authority having jurisdiction.

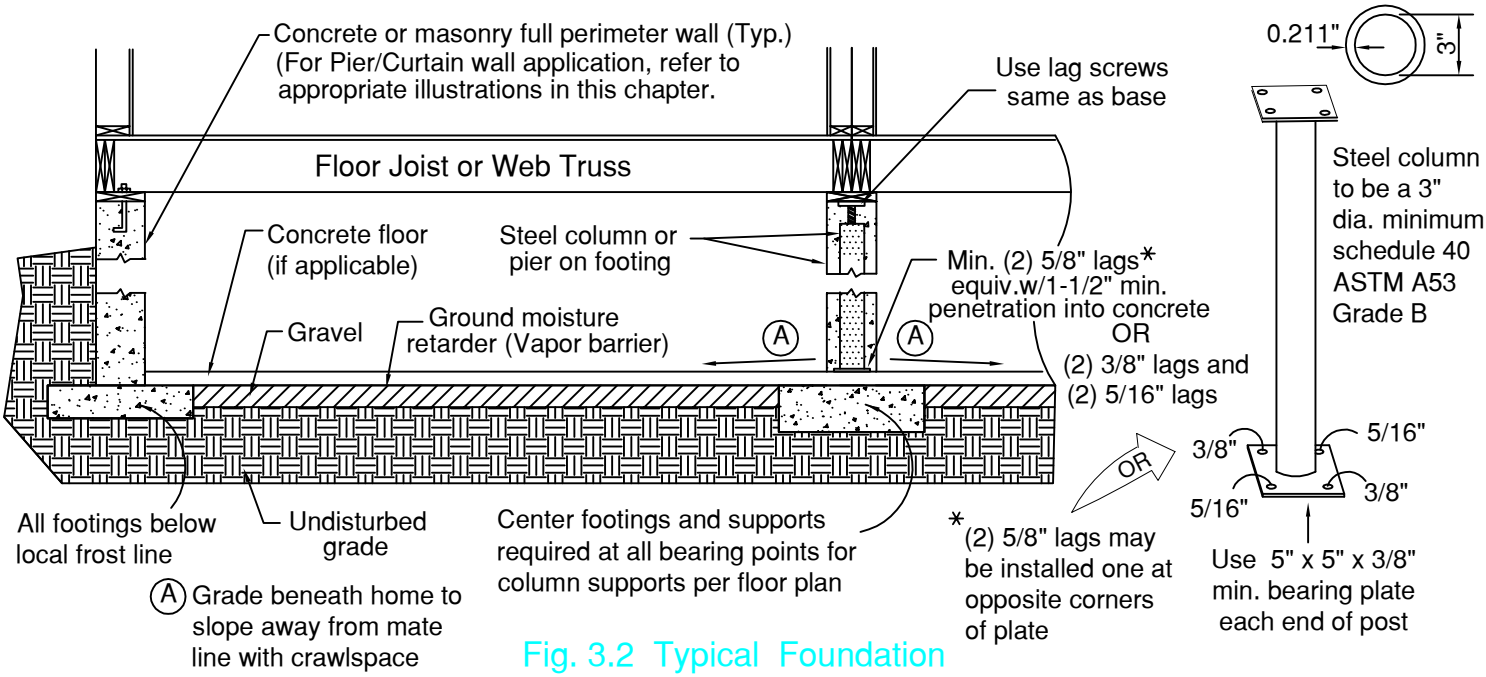
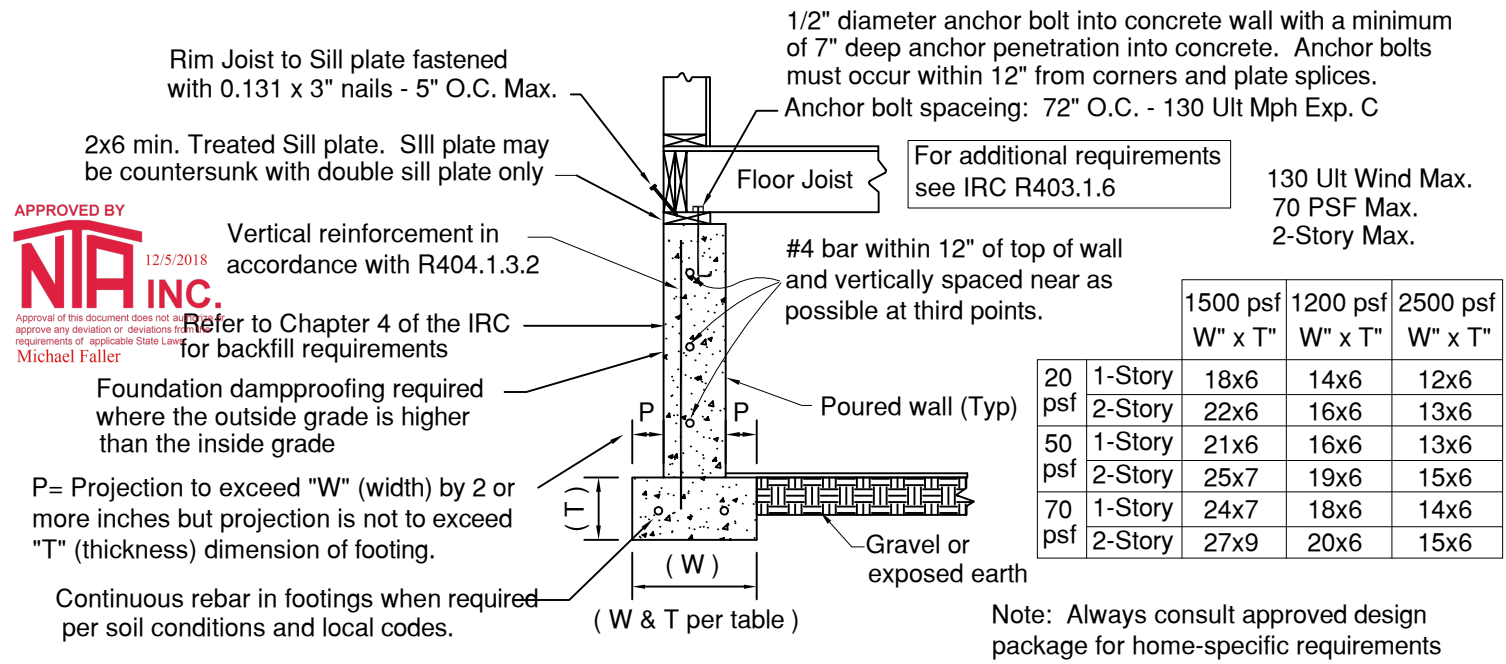


Fig. 3.2 Typical Foundation

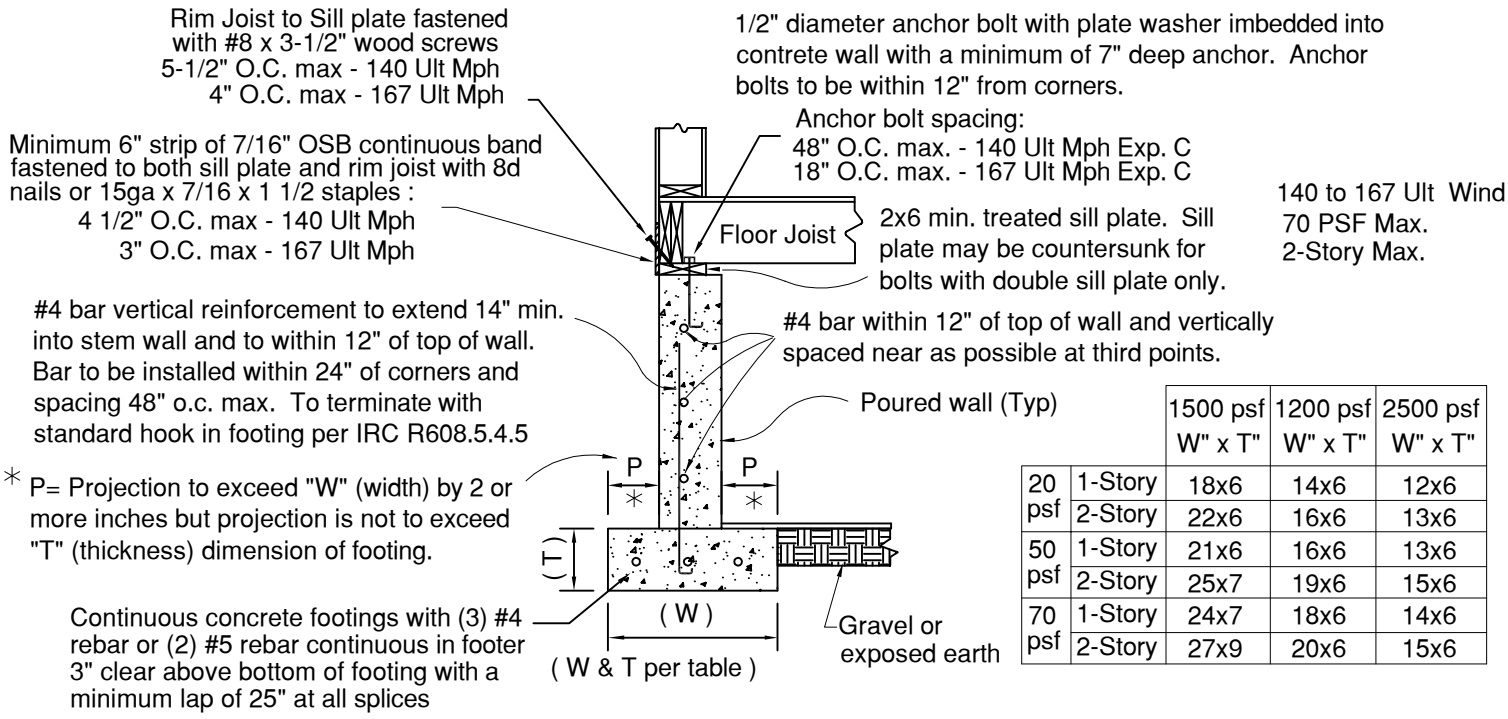


		1500 psf W" x T"	1200 psf W" x T"	2500 psf W" x T"
20 psf	1-Story	18x6	14x6	12x6
	2-Story	22x6	16x6	13x6
50 psf	1-Story	21x6	16x6	13x6
	2-Story	25x7	19x6	15x6
70 psf	1-Story	24x7	18x6	14x6
	2-Story	27x9	20x6	15x6

Note: Always consult approved design package for home-specific requirements

Applicable to Seismic Zone C with minimum soil bearing capacity of 1500 psf and 2500 psi Concrete. Wind speed up to 130 Ult Mph Exp. C. Refer to Chapter 4 of the IRC for specific foundation applications and additional requirements or CMU construction. Refer to wind bracing design plan for additional tie down and braced wall requirements where prescriptive wall bracing is not met.

Fig. 3.3 Typical Foundation Wall Section (130 Ult mph max. wind speed)



		1500 psf W" x T"	1200 psf W" x T"	2500 psf W" x T"
20 psf	1-Story	18x6	14x6	12x6
	2-Story	22x6	16x6	13x6
50 psf	1-Story	21x6	16x6	13x6
	2-Story	25x7	19x6	15x6
70 psf	1-Story	24x7	18x6	14x6
	2-Story	27x9	20x6	15x6

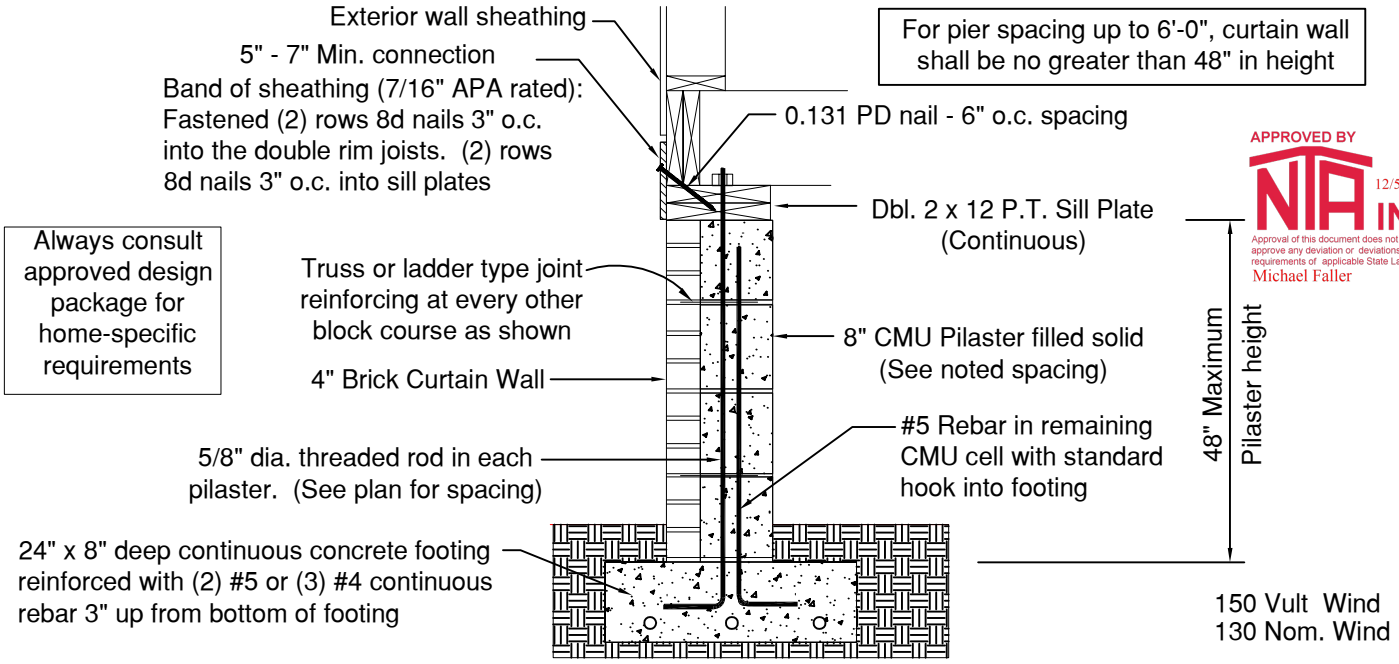
Foundation dampproofing required where the outside grade is higher than the inside grade

Refer to Chapter 4 of the IRC for backfill requirements

Note: Always consult approved design package for home-specific requirements

Applicable to Seismic Zone C, D0, D1 with minimum soil bearing capacity of 2500 psf and 2500 psi concrete and wind speed up to 167 Mph Ult max. Refer to the wind speed bracing design for specific home, for additional tie down and braced wall requirements where prescriptive wall bracing is not met.

Fig. 3.4 Typical High Wind Foundation Wall Section (140 to 167 Ult mph max. wind speed)

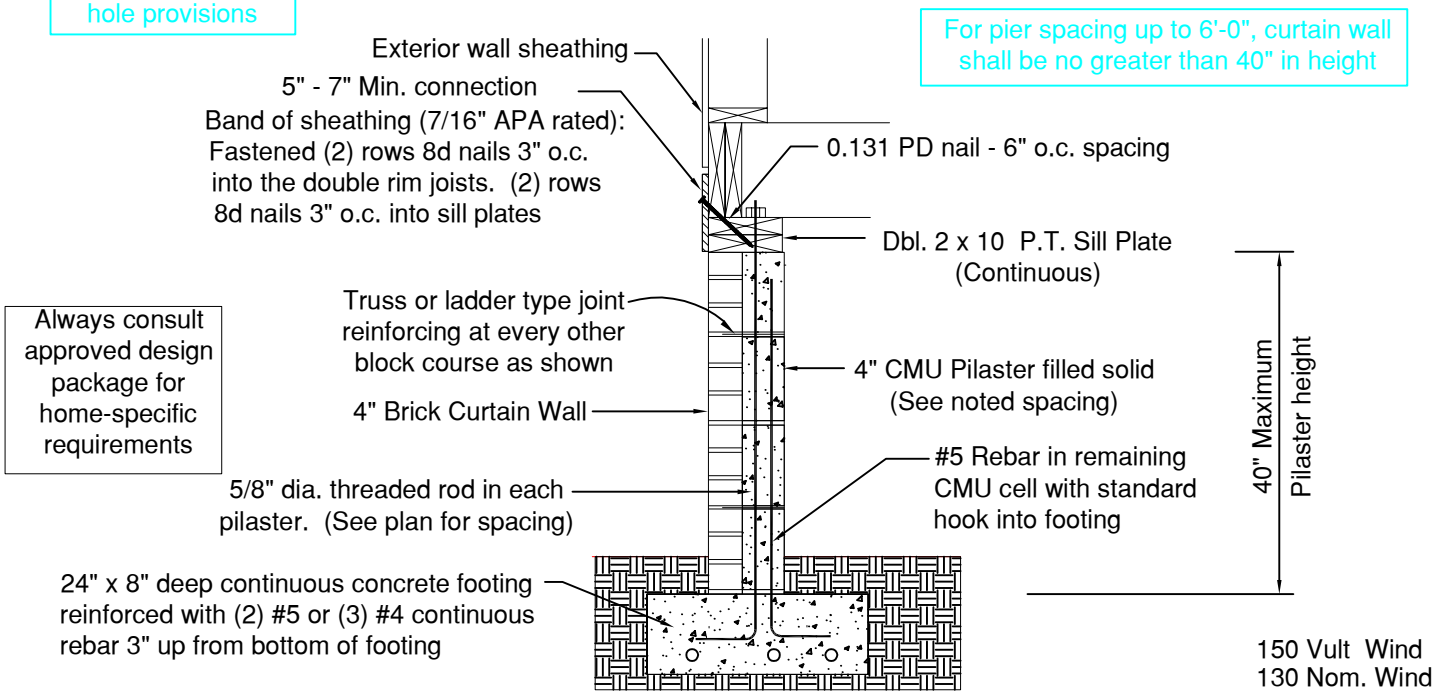


Applicable to 167 Ult mph maximum wind speed, Exposure C, Footings 12" min below grade or 12" min. below local frost line whichever is greater.

(Refer to wind bracing design plan for additional tie down and braced wall requirements where prescriptive wall bracing is not met

Fig. 3.5 Typical 8" CMU Foundation Curtain Wall Application

Consult local requirements regarding flashing, air space, and weep hole provisions



Applicable to 167 Ult mph maximum wind speed, Exposure C, Footings 12" min below grade or 12" min. below local frost line whichever is greater.

(Refer to wind bracing design plan for additional tie down and braced wall requirements where prescriptive wall bracing is not met

Fig. 3.6 Typical 4" CMU Foundation Curtain Wall Application

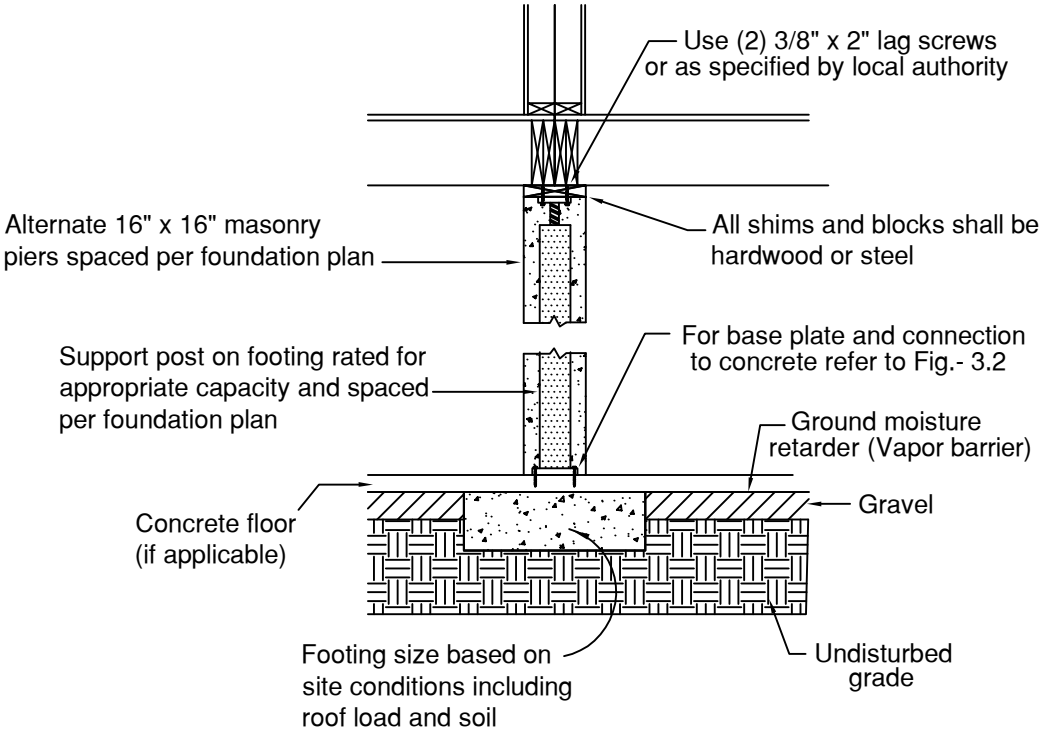


Fig. 3.7 Typical Off-Frame Section At Mate Line

Ends of the stair Header must be supported by the columns for longitudinal stairs (parallel to length of home.) It is important that the support is beneath the Header ends and not necessarily the joist that it is attached to. For stairwells running transverse (perpendicular to the length) the support is not required beneath the stair header.

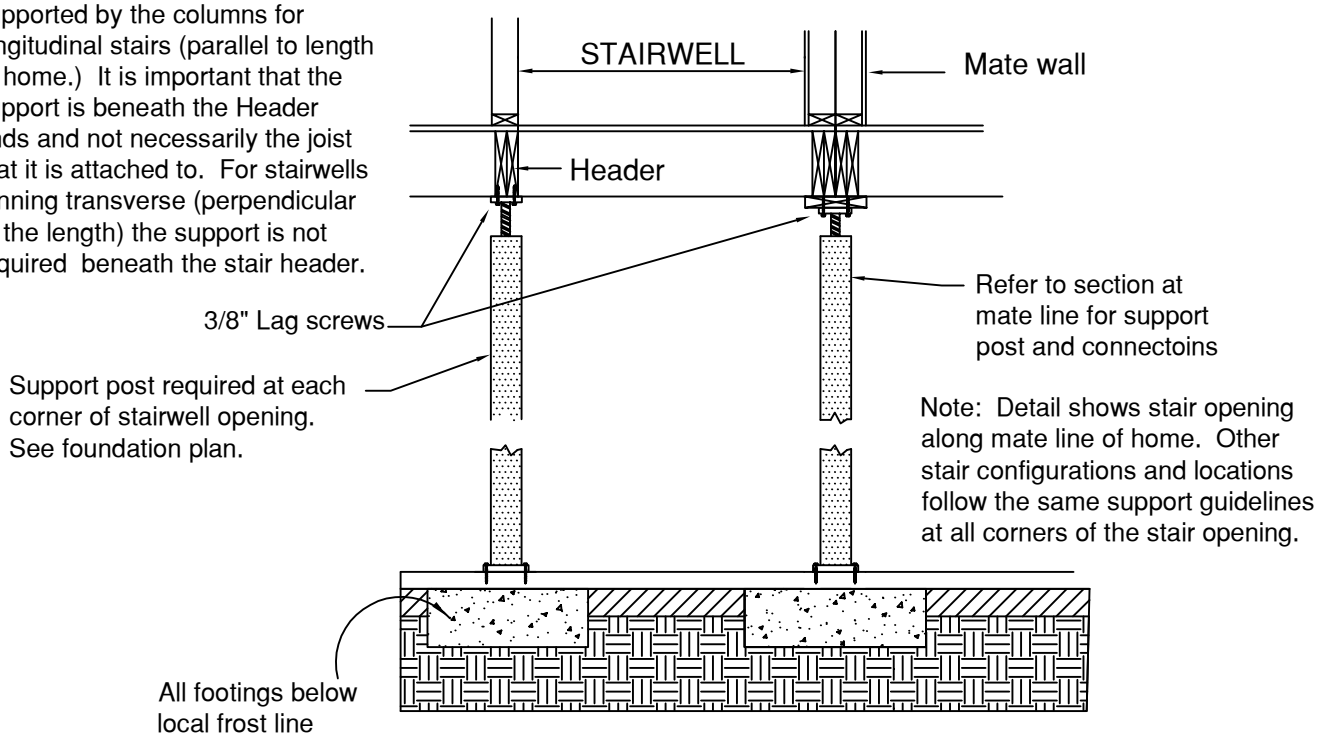
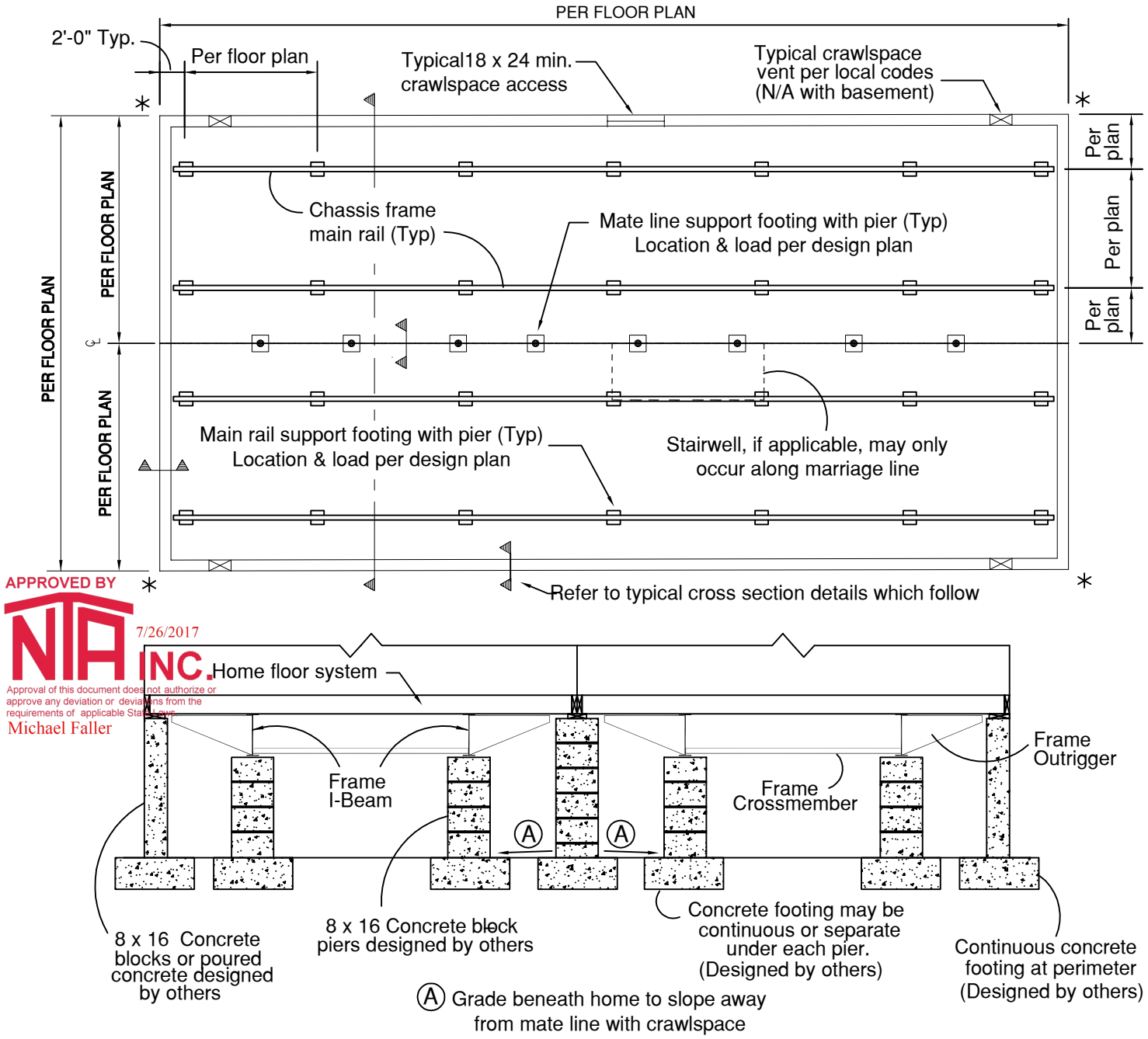


Fig. 3.8 Typical Off-Frame Section At Stairwell On Home Centerline

3.8 Typical On-Frame Foundation (On-Frame floor construction is not permitted for the states of NY, MA, NJ, and TN. Check with your State before ordering this type of floor system.)

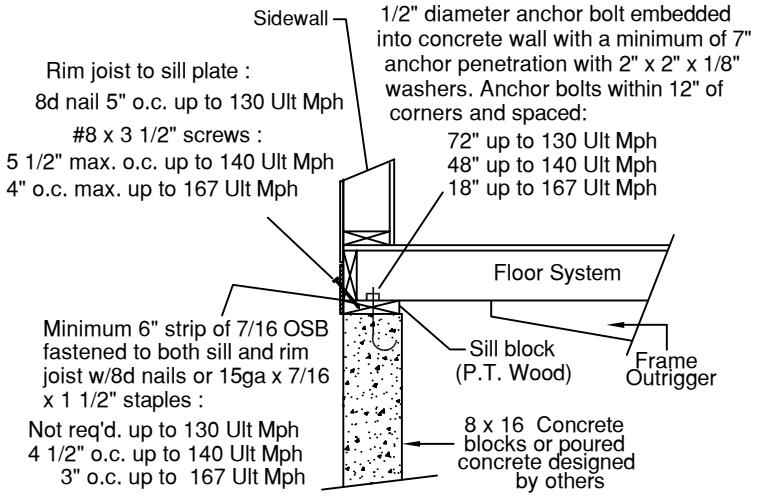
On-Frame homes differ from conventional modulars in that the transporter chassis system is integral with it's structure and remains permanently attached to the home. This requires an alternate foundation support system as well. The perimeter foundation wall has the same basic construction, ventilation, and access requirements as the typical foundation system addressed in the preceding pages. The longitudinal I-beam frame system beneath the home floor must be supported by other methods as described in the following details.



FULL WIDTH CROSS SECTION TYP.

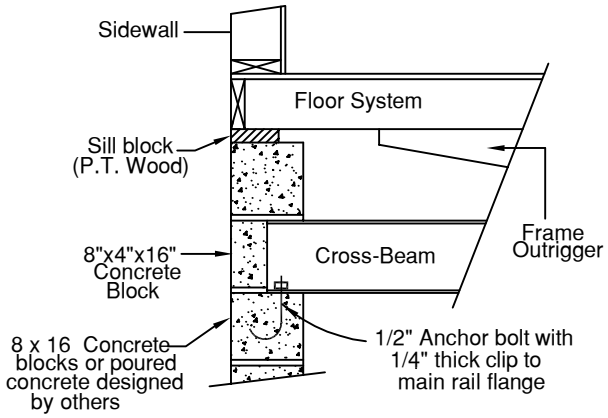
This typical foundation plan and cross section illustrate the crawlspace application. Refer to supplemental cross sections that follow for illustrations including crawlspace and basement applications.

Fig. 3.9 Typical On-Frame Foundation

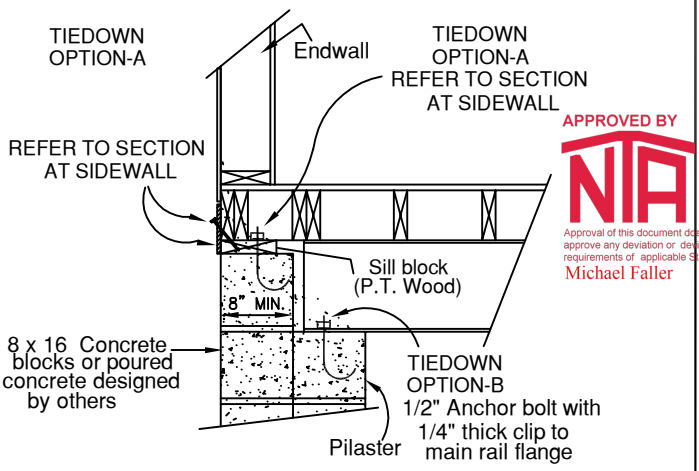


FOUNDATION DESIGN TO BE PERFORMED BASED ON INTERNATIONAL RESIDENTIAL CODE REQUIREMENTS FOR WIND, SEISMIC, SNOW AND FLOOR LOADS PER THE ACTUAL SITE CONDITIONS.

SECTION AT SIDEWALL

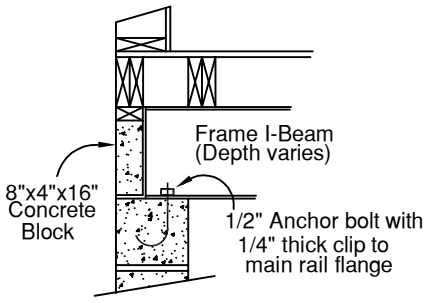


SECTION AT SIDEWALL W/CROSS-BEAM

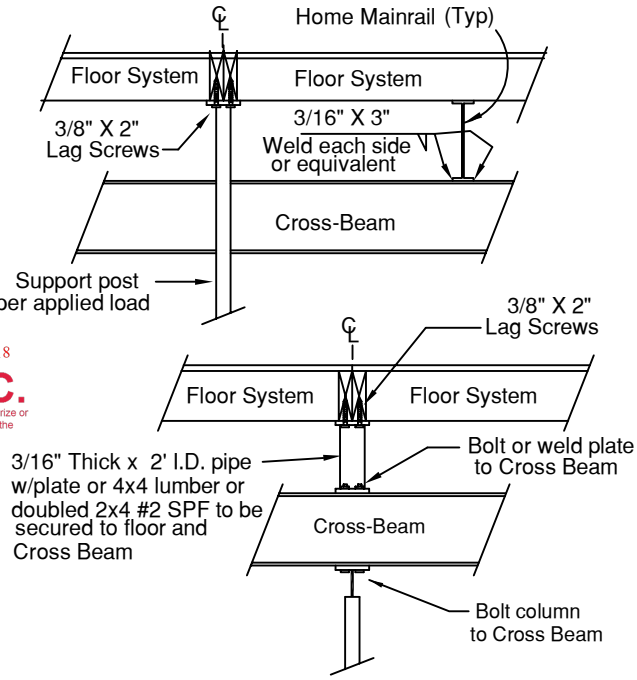


Either Anchor System (A or B) may be used

SECTION AT ENDWALL W/PILASTER



SECTION AT ENDWALL W/O PILASTER



SECTIONS AT MATE LINE W/CROSS-BEAM

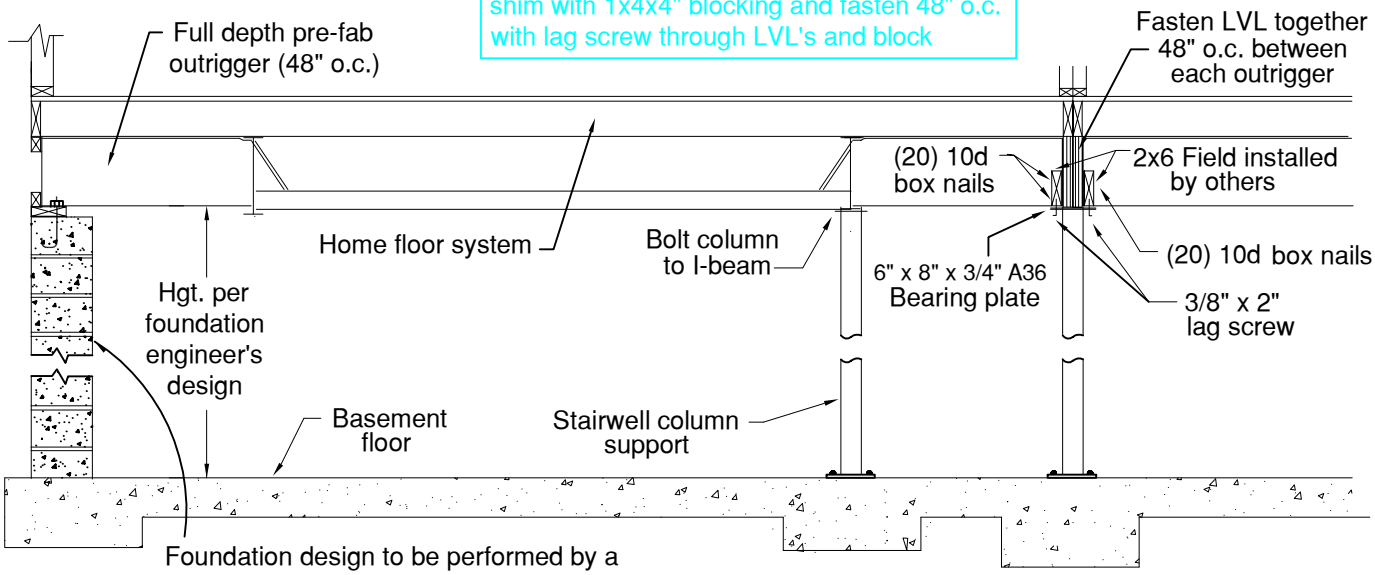
Support post, tie-down connection, and footing design by others

Fig. 3.10
Typ. On-Frame Foundation Cross Sections

1. The foundation must be designed and built to local codes and ordinances, and must be approved and inspected by local building officials.
2. Footings to be below local frost line.
3. Roof live load design as shown on foundation plan.
4. Basement stairs must meet all local code requirements.
5. Equivalent foundation sill strap may be substituted for anchor bolts where allowed by code, and when installed per strap mfgr. instructions.
6. Refer to typical foundation for ventilation and steel post specifications as well as all other general foundation notes.

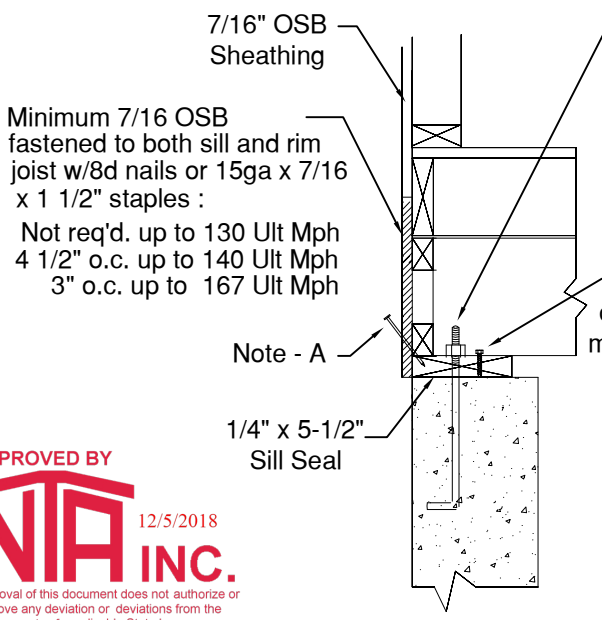
Typical Residential Frame
(on frame construction)

If max. 1" gap occurs between LVL members, shim with 1x4x4" blocking and fasten 48" o.c. with lag screw through LVL's and block



Foundation design to be performed by a local professional engineer familiar with local codes and site/soil conditions.

Any opening less than 5'-0" in the main floor above the 1-1/2" x 11-1/2" LVL beam does not require added column support

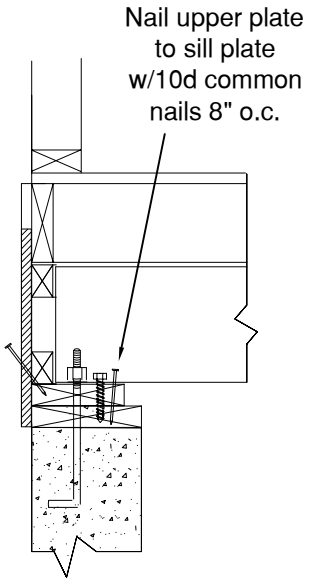


SECTION AT SIDEWALL

Note - A

Fasten Perimeter Rail to Sill Plate with 12d nails all sides of home as follows:

12" O.C. - 115 Ult MPH, EXP. C
9" O.C. - 140 Ult MPH, EXP. C
6" O.C. - 115 Ult MPH, EXP. C
4" O.C. - 167 Ult MPH, EXP. C



ALT. SECTION AT SIDEWALL

For all other details, refer to std. Side Wall Section

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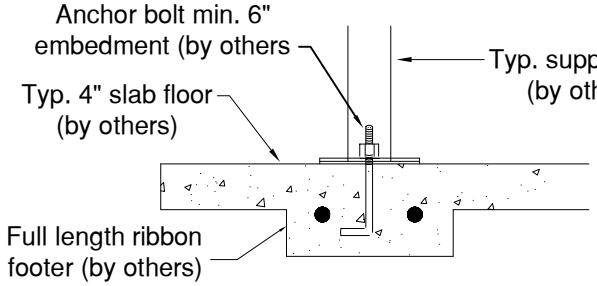
Check with local authority for acceptance of all on-frame designs Details on this page are site installation and the responsibility of other per local authority approval.



ALTERNATE RIBBON FOOTER

Fig. 3.11 Typ. Residentail Frame (on-frame) Cross Sections

3.9 Tie Down To Foundation

Wind and seismic forces must be transferred to the foundation. These forces are carried from the walls to the roof and floor diaphragms (sheathing). The floor diaphragm loads are transferred to the foundation by the standard tie down connections (anchor bolts, etc.) as described per the typical details in this installation manual. The loads carried by the roof diaphragm are transferred to the braced wall sections in the home. The typical connections are adequate to carry the loads provided the home meets the prescriptive IRC requirements when home is sited in regions with wind speeds of 130 Ult mph or less. However in regions with High Wind requirements (exceeding 130 Ult mph), or where other elements of the construction preclude the use of the IRC design, then a calculated method is used to design the braced walls and *additional:* sheathing, fastening, and foundation tie downs are required. These will appear in various locations on the Bracing Wall, Foundation Plan, and Floor Plan pages in the home's design package.

The sheathing and fastening requirements for the factory built portion is addressed during construction, but the additional foundation tie downs must be handled on site by the installer. It is our intent to provide a braced wall design for each home which can be implemented in the field without requiring a technical understanding of brace wall design. Load values are provided where the tie-downs are required and, in some cases, optional double studs are located near these locations (per floor plan) to facilitate certain types of tie-downs capable of carrying higher loads. All tie-downs should be chosen by a local engineer or knowledgeable installer. There are three typical tie-down styles that are described below, but there are many others on the market which may be used provided they meet loads required by the manufacturer. The following is an overview of examples of these three tie-down types and, as such, are not meant to restrict the installer's choice or advocate one connector manufacturer over another. They are:

1. Pre-deflected hold downs (Simpson Strong-Tie HDU), are used with pre-installed anchor bolts in the exterior wall stud cavities. Installation of these types would require removal of OSB at the noted load points. Concrete wall must be drilled with application of approved adhesive per hold down manufacturer instructions.

2. Strap ties (Simpson Strong-Tie MSTAM) are attached to the exterior wall of home and foundation. Follow strap manufacturer's fastening and installation method.

3. Strap tie hold downs (Simpson Strong-Tie STHD) are pre-installed into the foundation and are then attached to the exterior wall of the home.

Note: Factory can add studding for site strapping methods only if locations are specifically identified in advance and are ordered as options prior to production.

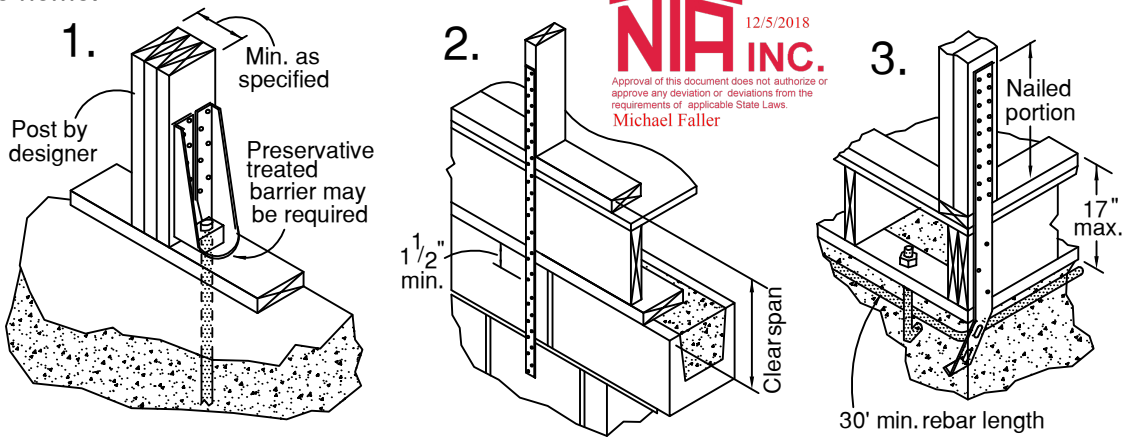
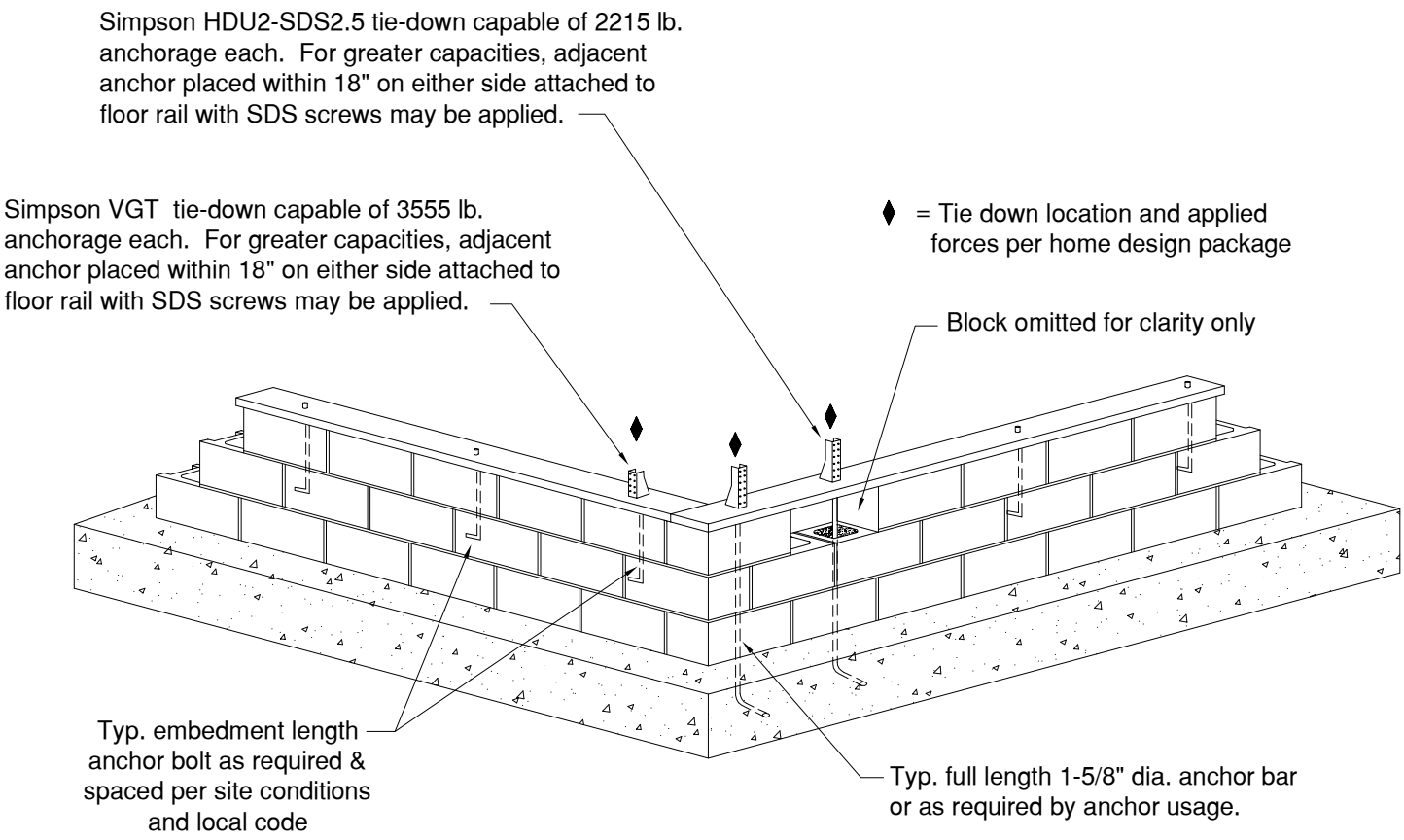
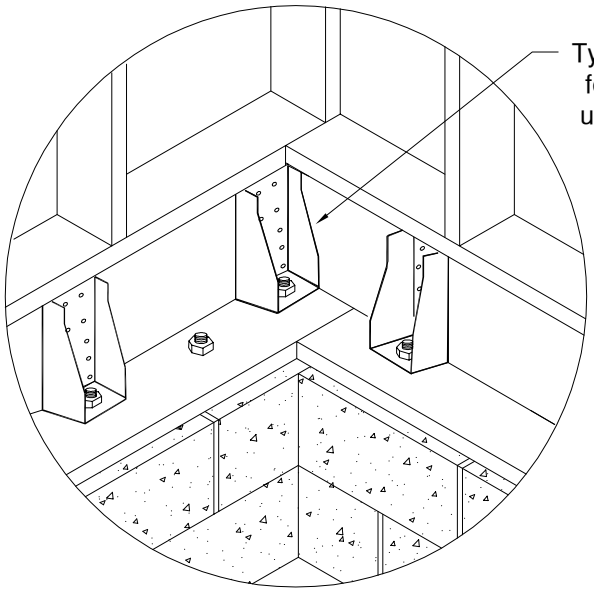


Fig. 3.12
Typical Tie Down Methods

Each of these types of tie-downs are designed by their manufacturer to meet the developed loads indicated. Please scrutinize them closely before installation. NOTE: The capacity of the selected fasteners must be in excess of the loads noted on the foundation or bracing wall design plan. Multiple fasteners may be used where allowed by fastener manufacturer to meet or exceed specified loads. Consult your local engineer/architect for alternate designs and options.

Modular homes designed for 140 -167 Ult mph wind zones may be installed in areas with lower wind speeds. IRC and local codes may be used as an alternate to provided foundation and attachment plans where home is located in wind speed areas of 130 Ult mph or less.





NOTE: Fasten wall studs to rim joists with straps rated for noted racking load.

Fig. 3.12A
Alternate Typical Tie-Down Methods

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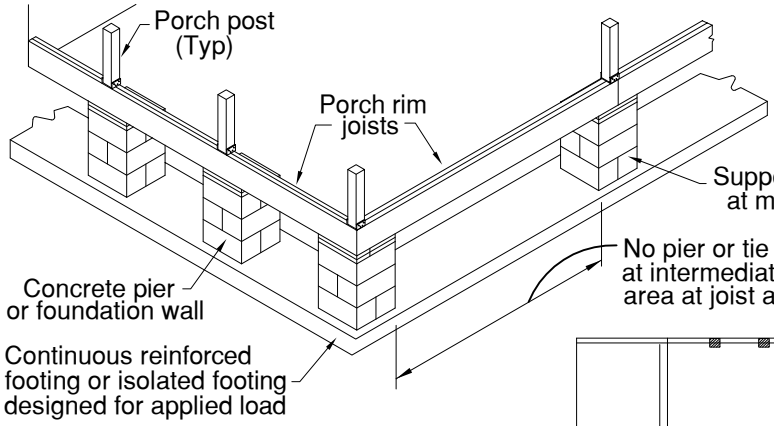
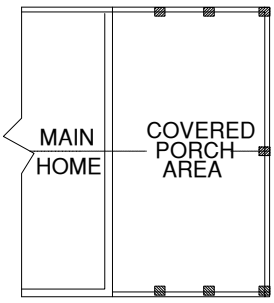
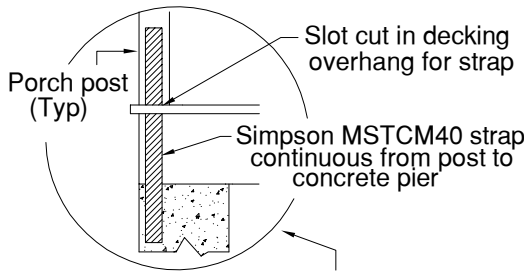


TYPICAL PORCH FOUNDATION
(Decking Omitted for Clarity)

All tie down connections must be used at proper applications for 115 to 167 Ult mph Exp. C wind zones



TIE DOWN METHODS OTHER THAN SHOWN MUST BE DESIGNED BY LOCAL ENGINEER AND APPROVED BY LOCAL BUILDING AUTHORITY



THIS TIE DOWN MUST BE USED IF PORCH POSTS WERE NOT CONNECTED WITH POST BASE CONNECTORS AT FACTORY

Fig. 3.13 Porch - Standard Standard Tie-Down Method

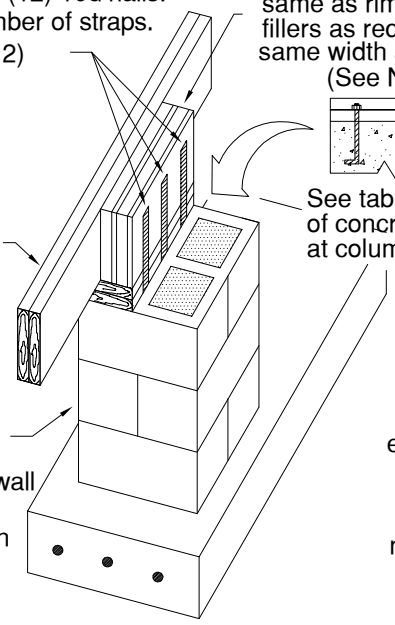
Straps supplied by others on site
Simpson LSTA15 straps beneath lower bottom plate and bent up for face fasten to blocking. Fasten each end of straps w/ (12) 10d nails. Refer to table for number of straps.
(See Note 2)

Add 12" min. length blocking same as rim joists plus OSB fillers as required to achieve same width as sill plate used. (See Note 1)

See table for number of concrete anchors at column locations

Porch rim joists

Concrete pier at each column location or continuous foundation wall (CMU's , if used, must have all cores filled with concrete at each post location)



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THIS TIE DOWN METHOD IS ONLY APPLICABLE WITH FACTORY INSTALLED PORCH BASE CONNECTOR

Table 3.2

Required number of Straps & Anchor Bolts per porch post (column) location.		
Ultimate (Ult) Wind Speed	5/12 Max. Roof Pitch	7/12 Min. Roof Pitch
115 mph max	2	*
140 mph max.	3	*
167 mph max.	3	1

* Use (2) #8 x 4" wood screws from rim joists to sill plates @ 115 Ult mph & (5) #8 x 4" screws up to 167 Ult mph

(1) 1/2"x7" min. Anchor Bolt is required at each column pier for up to 140 Ult mph 7/12 roof pitch.

Factory installed post base connector

(2) #8x4" wood screws each column location. See table for exception.

Double sill plate. Upper sill notched for anchor bolt & nut 2"x2"x1/8" washer required each bolt

1/2" dia. bolts each porch column w/ 7" min. conc. penetration. (See Table 3.2 for required anchor bolts)

Add 12" min. length blocking same as rim joists plus OSB fillers as required to achieve same width as sill plate used.

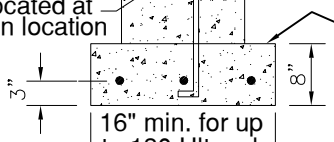
Install Simpson straps connected to bottom of lower sill plate.

3" Max.

Straps must be positioned to avoid the required sill to concrete anchors at each post location

Bend straps to vertical after blocking has been installed and face fasten straps to flush blocking.

One #5 rebar located at each post column location



16" min. for up to 130 Ult mph

24" min. for 140 to 167 Ult mph

Continuous concrete footing w/(3) #4 or (2) #5 bars continuous or lapped 25" min. at all splices

Based on 2500 psf min. soil bearing pressure

SITE ADDED COLUMN NOTES :

1. Fasten 1st block to rim joist with structural glue and (3) rows of 16d nails (5 nails each row) - 15 nails total. Subsequent blocks and fillers fastened together in the same manner as block to rim joist.
2. Straps are to be of sufficient length to cover 5" min. on bottom face of lower sill plate plus a minimum vertical length of 11". (Min. 16" total length)
3. All materials used: Lumber, straps, connectors, screws, nails, etc. must be treated and intended for exterior use.

Fig. 3.14 Porch - Alt. Tie-Down Method

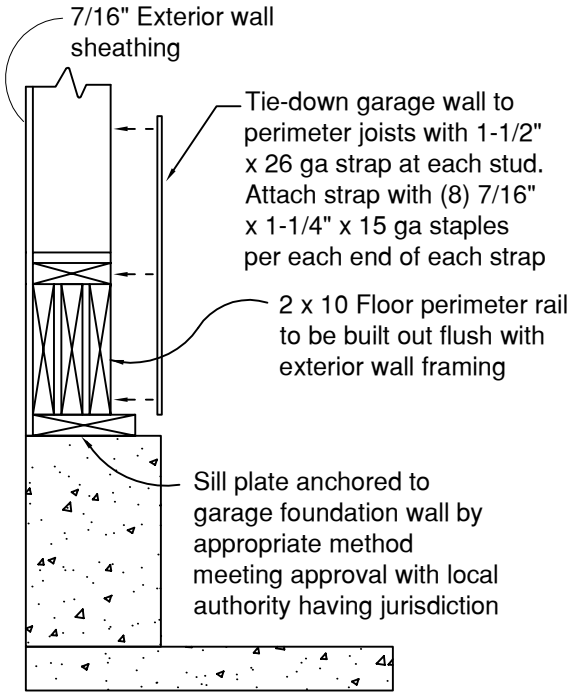


Fig. 3.15
Method For Garage Tie-Down

THIS DETAIL IS LIMITED TO
MAX WIND - 115 ULT MPH Exp. C

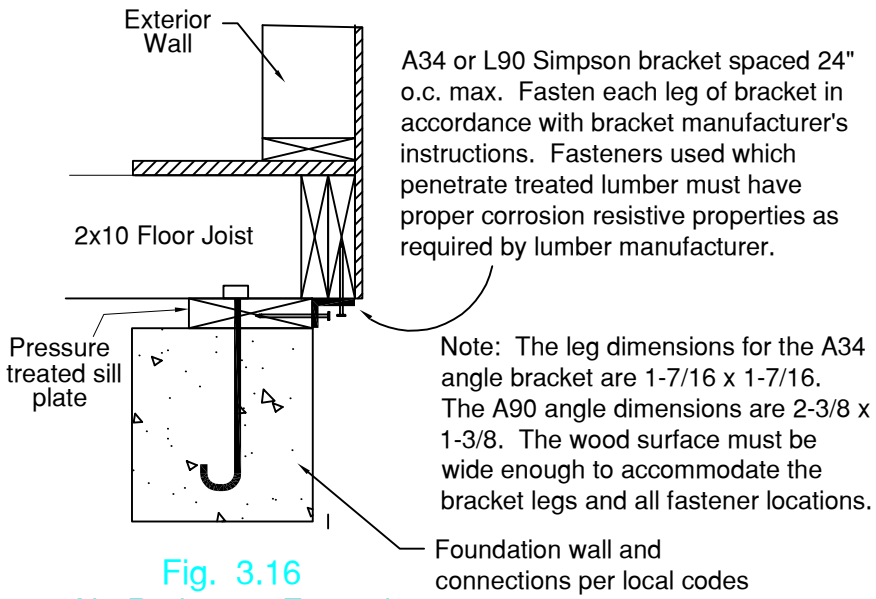


Fig. 3.16
Alt. Perimeter Fastening
W/ Minimal Floor Overhang

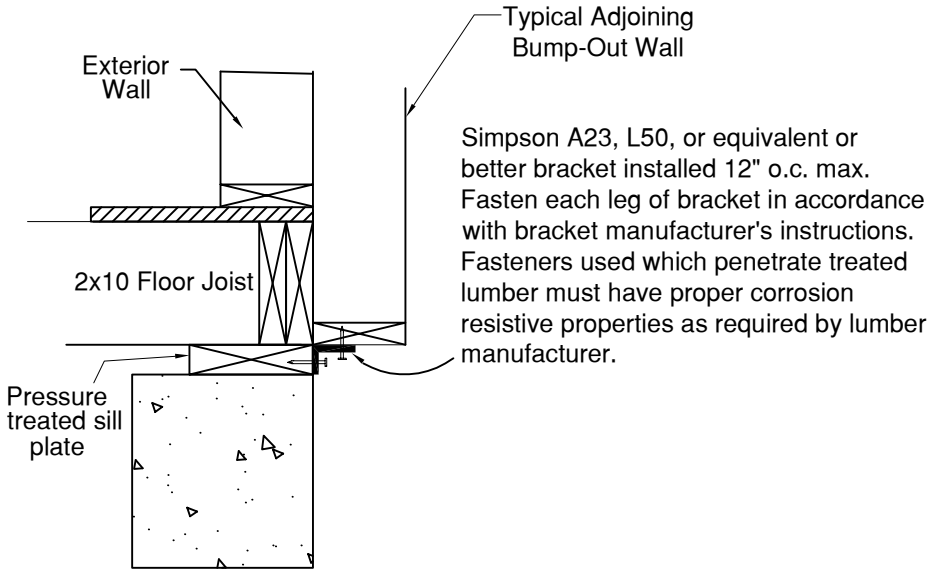


Fig. 3.17
Alt. Perimeter Fastening
When Add-On Wall Obstructs
Std. Rim To Sill Fastening

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Kip Whitehead

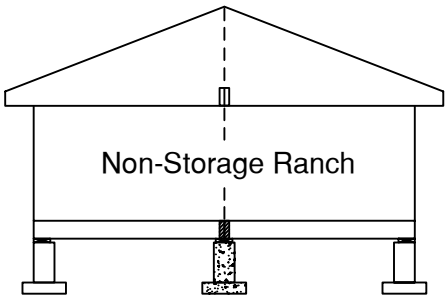


Chart Notes:

1. Values in parenthesis apply to units greater than 28' wide up to 32' wide. All other values on chart apply to units not exceeding 28' in width.
2. Specified spans are based on 3 effective members.

Floor girder at mate line	Floor LL + DL only	20 psf	30 psf	40 psf	60 psf	80 psf	100 psf
(4) 2x10 #2 spf	**11'-1"** (10'-7")	**8'-9"** (8'-6")	**8'-4"** (8'-1")	**8'-0"** (7'-9")	**7'-2"** (6'-11")	**6'-6"** (6'-3")	**5'-11"** (5'-9")
(4) 1.5 x 9.25 LVL	**13'-1"** (12'-9")	**11'-1"** (10'-10")	**10'-7"** (10'-5")	**10'-2"** (10'-0")	**9'-6"** (9'-5")	**9'-0"** (8'-11")	**8'-7"** (8'-6")
(4) 2x12 #2 spf	**12'-7"** (12'-0")	**10'-0"** (9'-8")	**9'-6"** (9'-3")	**9'-1"** (8'-10")	**8'-5"** (8'-2")	**7'-9"** (7'-6")	**7-1"** (6'-11")
(4) 1.5 x 11.25 LVL	**16'-0"** (15'-6")	**13'-6"** (13'-3")	**12'-11"** (12'-8")	**12'-5"** (12'-3")	**11'-7"** (11'-5")	**11'-0"** (10'-10")	**10'-5"** (10'-4")

Note: For perimeter PLF values, refer to foundation loads and locations as specified on foundation layout page of approved permit set for specific home.

Table 3.3 Ranch Non-Storage Floor Girder Spans

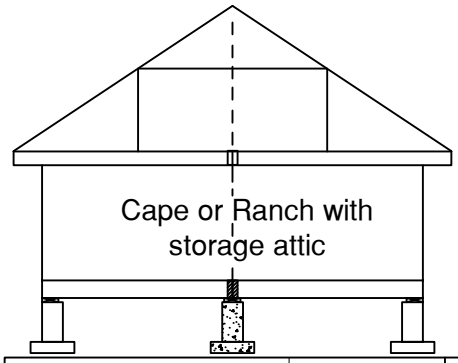


Chart Notes:

1. Values in parenthesis apply to units greater than 28' wide up to 32' wide. All other values on chart apply to units not exceeding 28' in width.
2. Specified spans are based on 3 effective members.

Floor girder at mate line	Floor LL + DL only	20, 30, & 40 psf	60, 80, & 100 psf
(4) 2x10 #2 spf	**11'-1"** (10'-7")	**8'-3"** (7'-11")	**8'-2"** (7'-10")
(4) 1.5 x 9.25 LVL	**13'-1"** (12'-9")	**10'-9"** (10'-7")	**10'-8"** (10'-6")
(4) 2x12 #2 spf	**12'-7"** (12'-0")	**9'-7"** (9'-3")	**9'-5"** (9'-2")
(4) 1.5 x 11.25 LVL	**16'-0"** (15'-6")	**13'-1"** (12'-11")	**13'-0"** (12'-9")

Note: For perimeter PLF values, refer to foundation loads and locations as specified on foundation layout page of approved permit set for specific home.

Table 3.4 Cape or Ranch With Storage Floor Girder Spans

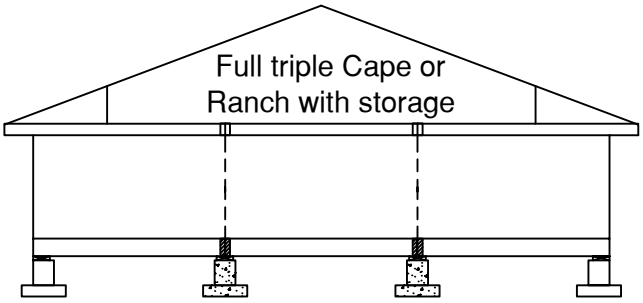


Chart Notes:

1. Values in parenthesis apply to units greater than 28' wide up to 32' wide. All other values on chart apply to units not exceeding 28' in width.
2. Specified spans are based on 3 effective members.

Floor girder at mate line	Floor LL + DL only	20 psf	40 psf	60 psf	80 psf
(4) 2x10 #2 spf	**11'-1"** (10'-7")	**8'-0"** (7'-8")	**7'-6"** (7'-2")	**6'-3"** (6'-0")	**5'-3"** (5'-1")
(4) 1.5 x 9.25 LVL	**13'-1"** (12'-9")	**10'-7"** (10'-5")	**10'-4"** (10'-2")	**9'-8"** (9'-7")	**9'-2"** (9'-1")
(4) 2x12 #2 spf	**12'-7"** (12'-0")	**9'-3"** (9'-1")	**9'-0"** (8'-9")	**7'-7"** (7'-4")	**6'-5"** (6'-2")
(4) 1.5 x 11.25 LVL	**16'-0"** (15'-6")	**12'-10"** (12'-8")	**12'-7"** (12'-5")	**11'10"** (11'-8")	**11'-2"** (11'-0")

Note: For perimeter PLF values, refer to foundation loads and locations as specified on foundation layout page of approved permit set for specific home.

Table 3.5 Full Triple Cape or Ranch With Storage Floor Girder Spans

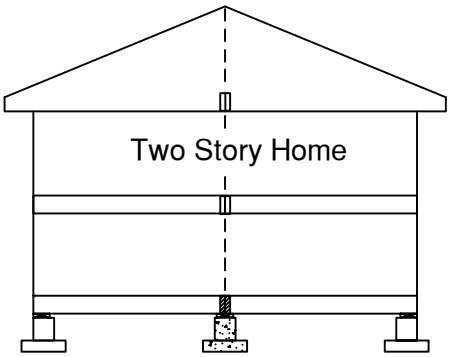


Chart Notes:

1. Values in parenthesis apply to units greater than 28' wide up to 32' wide. All other values on chart apply to units not exceeding 28' in width.
2. Specified spans are based on 3 effective members.

Floor girder at mate line	Floor LL + DL only	20 psf	30 psf	40 psf	60 psf	80 psf	100 psf
(4) 2x10 #2 spf	**11'-1"** (10'-7")	**7'-6"** (7'-1")	**7'-1"** (6'-9")	**6'-9"** (6'-5")	**6'-1"** (5'-11")	**5'-8"** (5'-5")	**5'-3"** (5'-1")
(4) 1.5 x 9.25 LVL	**13'-1"** (12'-9")	**10'-4"** (10'-1")	**10'-0"** (9'-9")	**9'-8"** (9'-6")	**9'-1"** (9'-0")	**8'-8"** (8'-7")	**8'-4"** (8'-0")
(4) 2x12 #2 spf	**12'-7"** (12'-0")	**8'-7"** (8'-4")	**8'-4"** (8'-1")	**8'-0"** (7'-8")	**7'-4"** (7'-1")	**6'-9"** (6'-6")	**6-4"** (6'-1")
(4) 1.5 x 11.25 LVL	**16'-0"** (15'-6")	**12'-7"** (12'-3")	**12'-2"** (11'-11")	**11'-9"** (11'-6")	**11'-1"** (10'-11")	**10'-7"** (10'-5")	**10'-1"** (9'-9")

Note: For perimeter PLF values, refer to foundation loads and locations as specified on foundation layout page of approved permit set for specific home.

Table 3.6 Two Story Homes Floor Girder Spans

Chapter 4 - Home Set Procedures

4.1. Preparation for Home Arrival

Make sure that the following items are completed before placing the home

1. Issuance of Permits. Confirm that all necessary local permits have been obtained and all required fees paid.
2. Survey the property and prepare a site plan conforming to local code requirements.
3. Insure that the foundation has been properly constructed. Refer to the home design package and/or local engineer design specifications to insure that piers are properly placed for the basement or crawlspace. Support columns are to be installed while structure is being set. Check the length, width, and diagonal dimensions of the foundation prior to set and insure that sill plate is installed and all concrete work necessary to setting the home is finished.
4. Install required utility connections. (Water, Gas, Electric, etc.)
5. Install items that could be difficult to install after the home is sited such as ground vapor barrier or other elements and insure that they are in the proper locations.
6. When home does not have insulation in the floor space between floor joists, the perimeter rail and foundation walls must be insulated per the thermal report in your design package. Failure to provide adequate drainage could affect your home and void it's warranty.
7. Foundation should not be backfilled until after the home is fastened to the foundation. If backfilling is required prior to installation, foundation walls must be adequately braced from the inside to resist the backfill pressure.

CAUTION: THE HOME WEIGHS SEVERAL TONS. USE ADEQUATE TEMPORARY SUPPORT BLOCKING TO SAFEGUARD WORKERS.

4.1.1 Access for Transporter

Before attempting to move your home to the installation site, be sure the transportation equipment can get through. Remove any overhanging branches and raise any overhead wires. Special transportation permits may be required from the state, county, or city officials. If a crane is to be used to set the home, insure that there is adequate clearance and room for the crane to operate. Confer with crane company for requirements.

4.1.2 Encroachments and Setback Distances

Obey local laws regarding encroachments in streets, yards, and courts, and permissible setback distances from property lines and public roads. Consider future additions such as porches, awnings, and screened rooms.

4.1.3 Fire Separation Distance

The distance that your home must be sited from other structures depends on it's fire resistive rating in conformance with local requirements. Contact the plant of manufacture or the inspection agency identified on the data plate for additional fire resistance information.

4.1.4 Preparing Muli-Section Home Units

Often there are exterior materials loaded into the home at the factory that are necessary to complete home. It is wise to remove these from the mating side of the home prior to setting the structures. These ship loose materials should be appropriately stored until they are installed. The home units should be placed near each other allowing enough room to unload the materials and to remove all shipping items that were factory attached to the mating side of the home. Any shipping items that are attached to the wall studs, truss ends, floor joists, or any other mating surface of the units must be removed prior to setting the home. DO NOT REMOVE THE FOAM-LIKE OR PLIABLE GASKET MATERIAL THAT HAS BEEN INSTALLED ALONG THE PERIMETER OF THE LIVING AREA OF THE HOME. THIS IS A NECESSARY SEAL THAT WILL COMPRESS WHEN THE SECTIONS ARE PULLED TOGETHER.

4.2 Set Using a "Roll-On" System

When setting a modular home which has conventional off-frame floor construction, a distribution bar must be utilized beneath the floor joists. The bar must make contact with a minimum of 5 floor joists at each roll point. Homes less than 60 feet in length require balanced spacing of at least two distribution bar locations per side of home section (4 bars total per home section). Homes greater than 60 feet will require a minimum of three bar locations per side (6 total per home section). Note: Distributioin bar would not be required for an on-frame home since the home floor joists would be bearing on the steel I-beam frame members of the attached frame which, in turn, bear on the roll rails.

Homes with floor constructed of web truss joists require reinforcements and extreme care at the contact points. In such systems, the roll-on cross beams must be located at the floor truss location with an additional 2x10 member that is at least 24" in length attached to the truss for reinforcement.

While jacking up the home, insure that the home stays level. Refer to design package foundation layout for attachments and other requirements.

4.2.1 Site Preparations

The following items apply to roll-on or crane set site preparation. See Fig. 4.1 for corresponding illustration.

1. Provide adequate support for the home to be rolled onto the foundation. Utilize enough support beams to insure that the home does not sag between these beams.
2. Where backfilling is necessary prior to home installation, all foundation walls must be adequately braced before backfilling in order to resist backfill pressure.
3. Basement area must be graded level and free of water and obstacles.
4. A flat compacted work area for equipment is recommended. The pad should be equal to the length of the foundation plus allowance for length of dozer and/or other moving equipment. Level ground on work side is recommended.
5. Balance of foundation can be backfilled (after properly reinforced) or graded level to allow a work area for set crew. Area to be free of obstacles such as dirt piles, holes, etc.
6. Assure that properly sized footings for support of centerline columns (support posts) are in place before setting the home. Support columns of adequate size and weight rating should be on site for installation as home is being set. For maximum spacing of footings and support columns refer to building design package for home.
7. Mark the center of each end wall on the sill plate. Placement of the first home section to these alignment marks will insure that the home section is square on the foundation.
8. Clear debris in and around foundation.
9. Check foundation before set to insure that it is square and level.

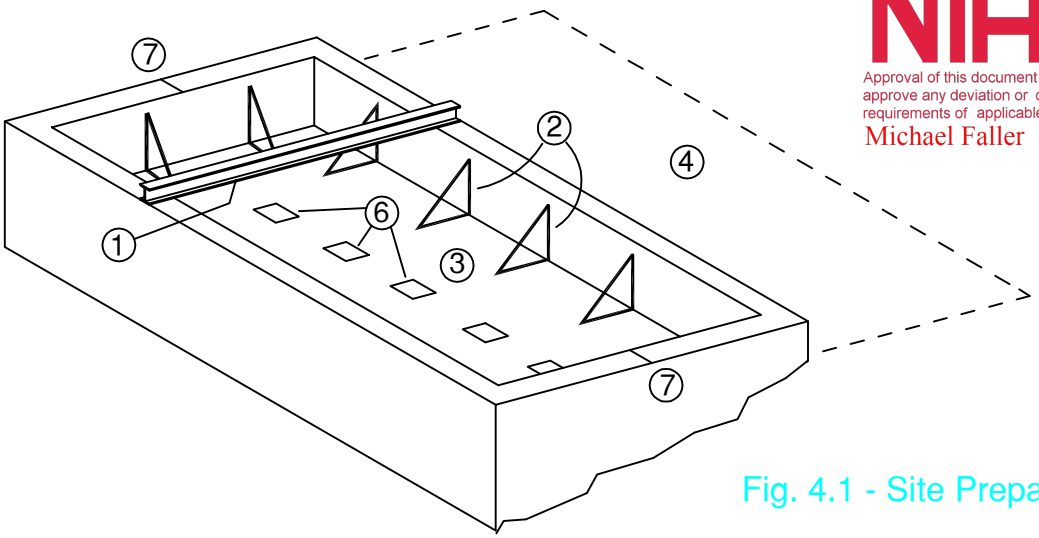


Fig. 4.1 - Site Preparation

NOTE: THE RESPONSIBILITY FOR THE SET IS ASSUMED BY THE RETAILER / INSTALLER. ANY DEVIATION FROM RECOMMENDATIONS IN THIS MANUAL ARE AT THE INSTALLERS OWN RISK.

4.3 Moving Units to Foundation

1. Prepare your support system to roll the home across the foundation. Make sure the structure is properly supported from the carrier all the way across the foundation and that the system is level with or above the sill plate on the foundation.

2. Reinforce the center of each track from the basement area.

3. Position, next to the foundation, the first home section to be set. Remove all transit wrap (plastic), strap, staples, etc. To insure close fit between mating walls, all debris must be removed from mating side of home sections. Remove any transit angle braces. If the home has a hinged roof, it is recommended that the roof be raised on each home section prior to setting the home. Refer to hinged roof raising methods in this manual for general instructions.

4. Level the steel transporter frame (carrier) with the home section on it. After leveled, block the carrier main rails on both sides approximately 10 feet on center.

5. Remove all bolts which connect the home modules to the carrier. Lift module using an appropriate jacking system or other lifting apparatus. Raise the module high enough off the carrier to allow clearance for support and dollies.

6. Use an appropriate transfer system to move the module from the carrier into position over the foundation. Use proper equipment as recommended and/or supplied by roll system manufacturer to move home section across foundation. If the home has factory installed duct work, or drain lines beneath floor joists, spacer must be used to prevent crushing during roll-on procedure.

7. To set the home exactly square onto the foundation, place the first module to the previously marked center alignment marks. (See Fig. 4.2)

8. After unit is in final position, remove dollies by raising home with jacks. Remove the dollies, then lower the home to the sill plate at the exterior wall. Bearing points above mate line columns, piers, or center beams must be wide enough to support all mate line perimeter joists both sides of home. Wider plates over these points may be necessary.

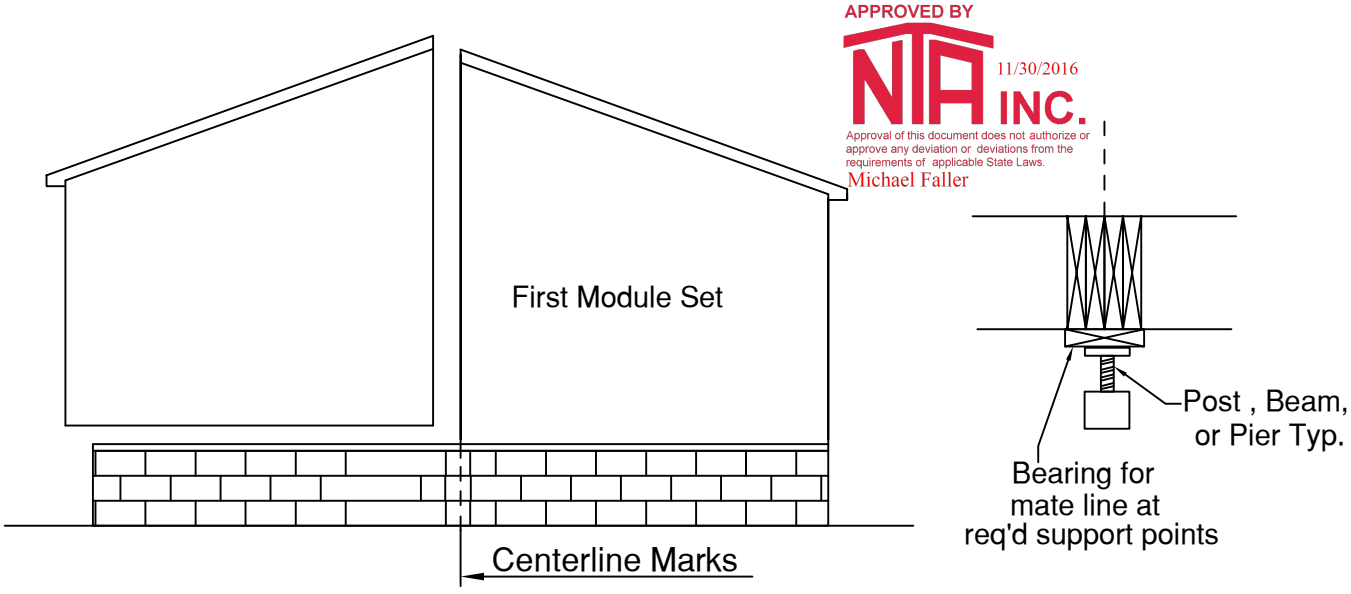
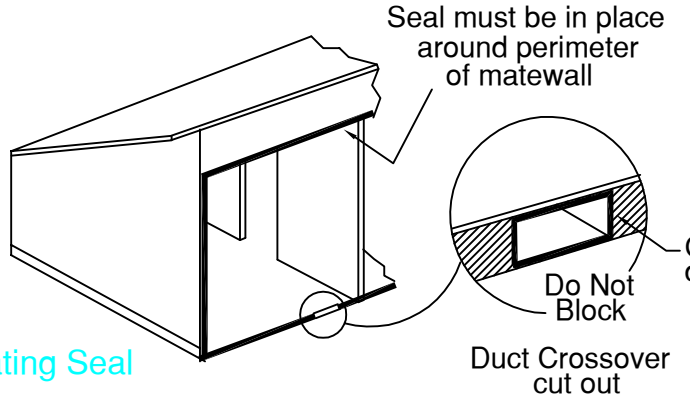


Fig. 4. 2 - Roll -On Module Set

9. Next place second half of home as close as possible to foundation, but allow at least 4 feet of solid ground as working area both sides of module. Insure that all material has been cleared from both marriage wall surfaces to accommodate tight mating of sections. Insure that mating seal is installed and in tact along entire perimeter of mating wall area on at least one of the home section mating walls . (See Fig. 4.3)



Refer to Fig. 4.4 for factory installed duct cross-over reinforcement that must remain in place.

Fig. 4. 3 - Mating Seal

For crossover air duct connection refer to Chapter 7 Fig. 7.3

10. Repeat steps 4 through 8 for second section of home.

11. Complete closing units together by using come-along and mate the home sections. Care and proper assembly methods will assure a close fit without binding. Keep in mind that the integrity of the mating seals must be kept in tact to insure an air-tight seal between home sections. If home is constructed with in-floor heat duct crossovers as shown in the above illustration, a duct-board gasket or other appropriate seal is to be applied to the rim joist area around the duct cutout to provide a tight seal at the crossover locations as well.

12. Use large clamps at each marriage wall opening to draw halves together. When sections are properly mated, they are to be fastened together as described in Chapter 6 using supplied fasteners in ship loose materials. These bolts are to be installed at the spacing specified through the marriage line rim joists. Do not tighten bolts until openings are properly aligned.

13. After leveling home, secure home to sill plate and support columns.

14. Stack transporter frames after set is complete. (Fig. 4.7)

15. For hinged roof close-up, refer to roof set up section.

4.4 Crane-Set Site Preparation (Before Crane Arrives)

1. To accommodate removal of crane cables during home set, small sections of foundation sill plate at pre-determined lifting cable locations may be necessary. These sections of sill plate are to be re-installed after cables are removed.

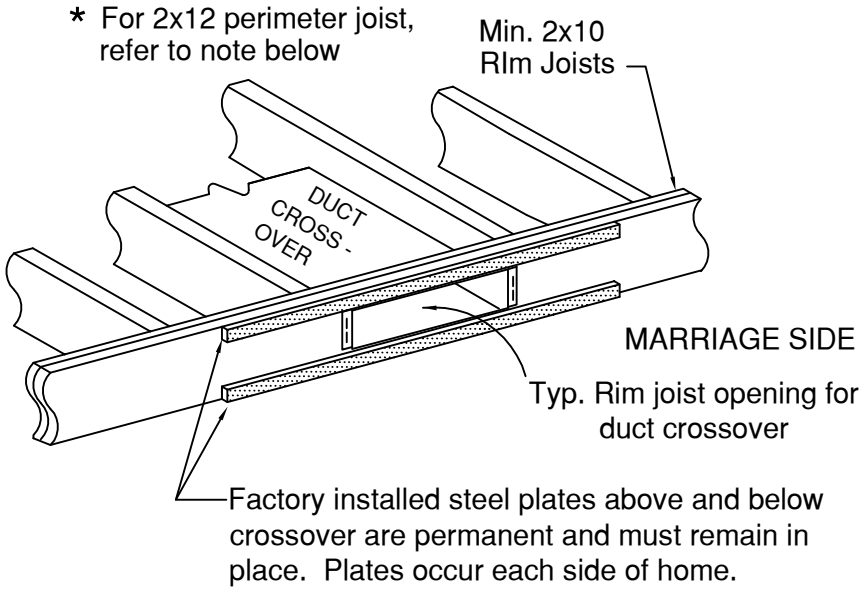
NOTE: Some homes may be provided with crane-ready factory installed cable chases which are pre-drilled reinforced pick-up points on the perimeter joists of the home. In this case, the lifting points have been pre-determined by the home manufacturer. Sill plate notching for accommodation of crane cable removal will not be required by the site installer when crane cable chase feature is present.

2. The site preparation procedures for crane setting are basically the same as described for the Roll-on set preparations. (Refer to paragraph 4.2.1)

3. Before ordering a crane, the approximate weight of the home should be determined per the following: Multiply the home module floor area(sq. ft.) x 39 (Use multiplier of 47 for Cape or Attic Storage roofs) = Approximate weight per section. Example: 14' wide x 60' long module = 840 sq.ft. (840 x 39 = 32,760 pounds) Using the same example for a Cape or Attic Storage roof (840 x 47 = 39,480 pounds).

4. The rating of the crane and lifting equipment must exceed the calculated weight of each module to be set.

IN-FLOOR DUCT CROSS-OVER APPLICATION



* Note: Reinforcement of crossover opening is not required for floor systems constructed with 2x12 perimeter joists provided that the mate line floor girder spans between between foundation supports do not exceed the maximum spans for 2x10 perimeter joist specifications.

Fig. 4. 4 - Factory Installed Duct Crossover Reinforcemnt

4.5 Set Procedure Using a Crane

THIS TYPE OF SET UP MUST ONLY BE DONE BY AN EXPERIENCED INSTALLER. The following are the minimum guidelines for craning a standard ranch home only. Refer to Fig. 4.5 for typical craning illustrations and lifting point details.

1. **Insure that all factory installed lags or other fasteners used to secure home to carrier chassis during transit are removed prior to craning**. Properly rated craning straps or cables may be used. Straps are recommended to reduce the potential for damage at lifting points. Additional reinforcements and protection measures are required at the edges of the floor and roof where lifting straps are in contact with the home. It is the responsibility of the installer to protect the home against damage at the pressure points during the lifting and setting procedures.

2. Homes up to 44'-0" in length would require two lifting points. Lifting points must be at quarter points (module length/4) from each end. For example: Lifting points for a 40' module length (40/4) = 10' from each end. Modules exceeding 44'-0" in length would require two additional lifting points. See illustrations for locations of cables.

Note: Homes which have been factory constructed with crane-ready lifting point cable chases need not be site calculated for lifting points since the lifting points have been pre-determined and placed by the manufacturer.

3. The use of spreader bars between cables are required to reduce pressure points at the sidewall and floor. Home must be set on a foundation that is level and square. Refer to home design package for foundation layout, attachments, and other requirements.

4. If home has a hinged roof, it is recommended that the roof system be raised after the home has been craned onto the foundation. The crane can also aid in lifting the roof and installing peak sections. Refer also to raising hinged roof section of this manual.

5. **If the home being set does not have a crane-ready floor system**, crane straps/cables should be placed as shown in Flg. 4.5. Cable holes may be drilled in perimeter joists 2" maximum from bottom of joists. (Refer to Fig. 4.5A). Providing such holes will prevent the straps or cables from being trapped between the sill plate and the floor system. The floor joists are not to be notched or cut. Insure that site bored holes in exterior rim joist occur below a wall stud or add a temporary stud above hole location. Mate line cable hole details are also shown on Fig 4.5A. (Once cable is removed and home is set, ***mating rim joist*** cable hole re-inforcement is required in accordance with Fig 4.5A)

6. Lower sling/straps over unit to be set. Place straps under home and attach to sling. Locate straps/cables so that there is solid contact with the floor joists and so they are under wall studs and roof trusses to insure proper lifting support. If home is equipped with crane-ready floor system, run straps/cables through the factory installed chases provided at the perimeter floor joists.

7. Lift sling over module until until straps are taut. Each half can be lifted at a slight angle to make it easier to position onto foundation. (Lift module off carrier about 12" to insure correct weight distribution and solid contact to module.)

8. To set the module exactly square on foundation, place the first section to the previously marked center alignment marks.

9. A length of strap (tag line) should be fastened to the two opposite corners of the module being set. These are to assist in the positioning the section during set from a safe distance.

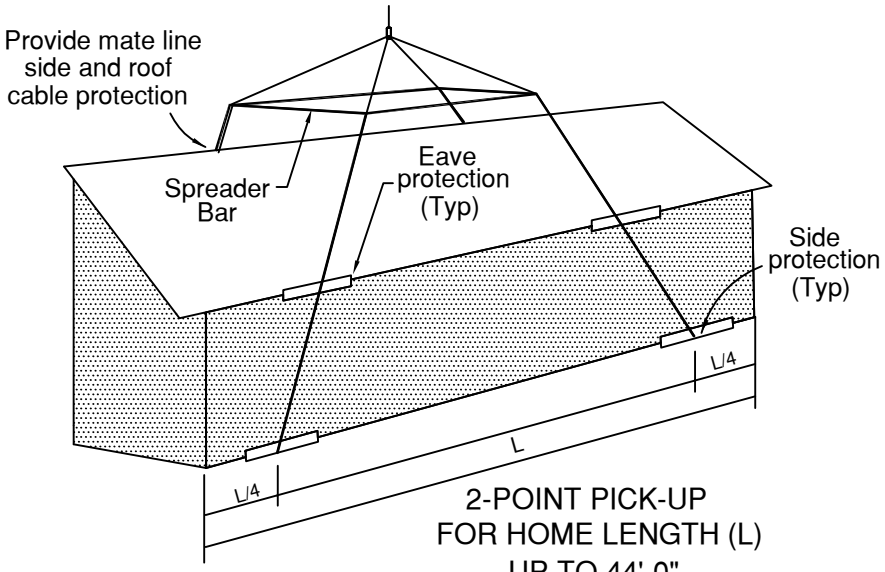
10. Locate the first module flush with the rear end wall. A dimension check should be made from the mate line to the outside of the foundation to assure exact placement of modules. The distance from the centerline origin point should be split so that the outside floor edge of the module will align with the outside edge of the foundation and so that the OSB sheathing on the module side wall overhangs the foundation.

11. Place the basement support column with half of the column bearing plate under the module mating edge rim joists.

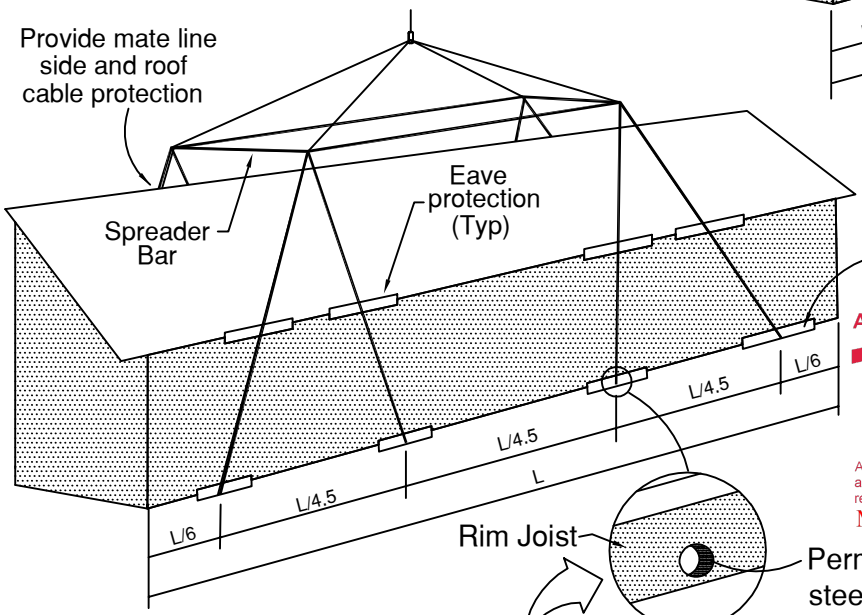
Fig. 4.5 - Crane Lifting Points

Crane setting is recommended only for off-frame modular homes. For on-frame homes roll-on set only is recommended.

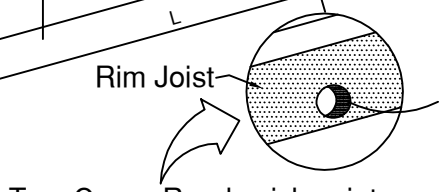
NOTE: This detail is intended only in cases where home is not equipped with factory installed crane cable tubes. Such factory equipped homes are crane-ready with pick points already located.



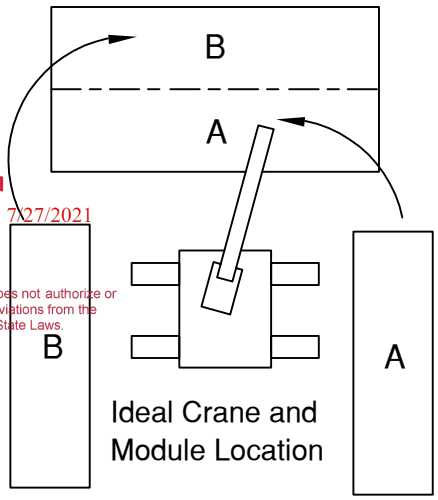
2-POINT PICK-UP FOR HOME LENGTH (L) UP TO 44'-0"



4-POINT PICK-UP FOR HOME LENGTH (L) OVER 44'-0"



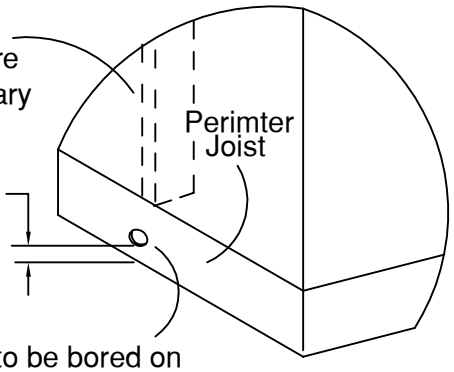
Typ. Crane-Ready pick point application w/factory-installed lift system. Cable or lift strap is fed through joist cavity with re-inforced opening in ext. & mating rim joists.



Ideal Crane and Module Location

Fig. 4.5A - Alt. On Site Provisions For Crane Cable

Insure that hole is located beneath a wall stud. Where no stud exists add temporary support stud above hole.

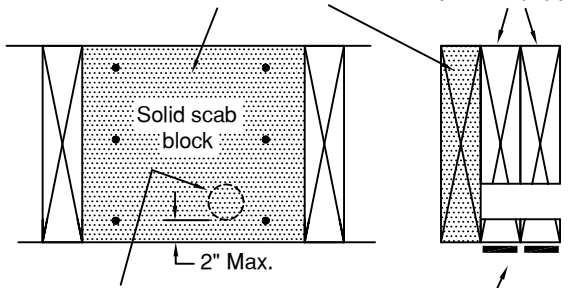


SIDE WALL RIM CABLE HOLE

If cable holes need to be bored on site, hole should be no greater than 1" in diameter and edge of hole to be no more than 2" from the bottom of rim joist.

2x10 #2 SPF block to fully cover inner rim joist face between floor joists at hole location. Use full glue and (6) 0.148 x 3" evenly distributed nails.

Double rim mating joists (Typ)



1" max. cable hole located 2" max from bottom edge

MATE LINE RIM CABLE HOLE

In addition, (2) Simpson CS14 w/ (11) 0.148" x 3" nails per end. Straps centered at hole location. Do not nail at hole area. (Straps not required when hole is within 10" of a foundation pier.)

12. After the first module is in final position on the foundation, unhook sling and remove crane straps/cables through wedges cut in sill plates or site bored cable holes or from crane-ready chases in floor.

13. Confirm that all adjoining mating surfaces have been cleared of obstructions such as transit wrap, nails, wire, etc. that may hinder mating of modules. Insure that perimeter of mating surface and all openings are prepped for mating seals as per Fig. 4.3.

14. If home has duct crossovers cut into the mating rim joists, these openings must be totally cleared and sealed around. (Not all homes have such in-floor duct crossovers).

15. Set the second module close to the first installed module according to the same procedure. Bring the module as close to the first module as possible without hindering strap/cable removal. Come-alongs fastened to the exterior corners of the units can be used to complete the closing of the set. While pulling come-alongs, insure that all parts are coming together properly. They will mate without binding if care and proper assembly methods are applied.

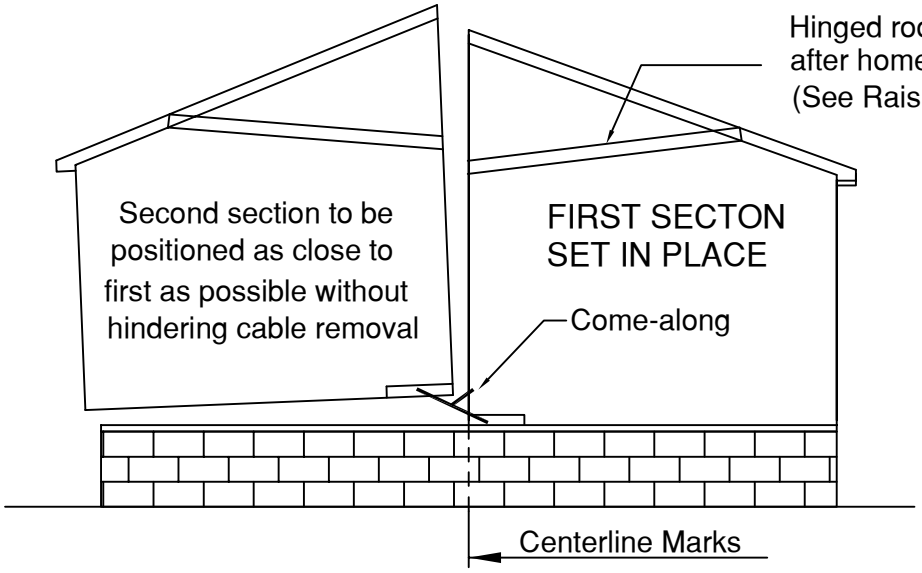


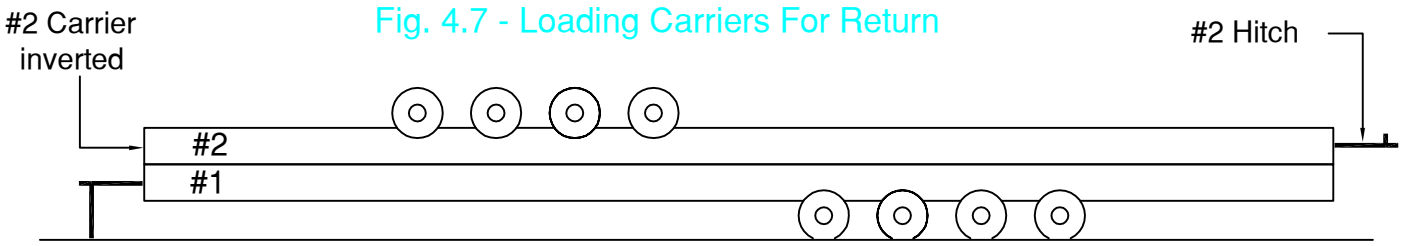
Fig. 4.6 - Mating 2nd Module to First

16. Use large clamps at each marriage wall opening to draw halves together. When sections are properly mated, they are to be fastened together as described in Chapter 6 using supplied fasteners in ship loose materials. These bolts are to be installed at the spacing specified through the marriage line rim joists. Do not tighten bolts until openings are properly aligned and shimmed as required. (See Chapter 5 for gap closure)

16. After leveling home, secure home to sill plate and support columns.

17. Stack transporter frames after set is complete.

Fig. 4.7 - Loading Carriers For Return



NOTE : Park carriers as close to highway as possible
Carrier #2 is to be flipped & set on Carrier #1 as shown.

4.6 Roof Set-Up Guidelines

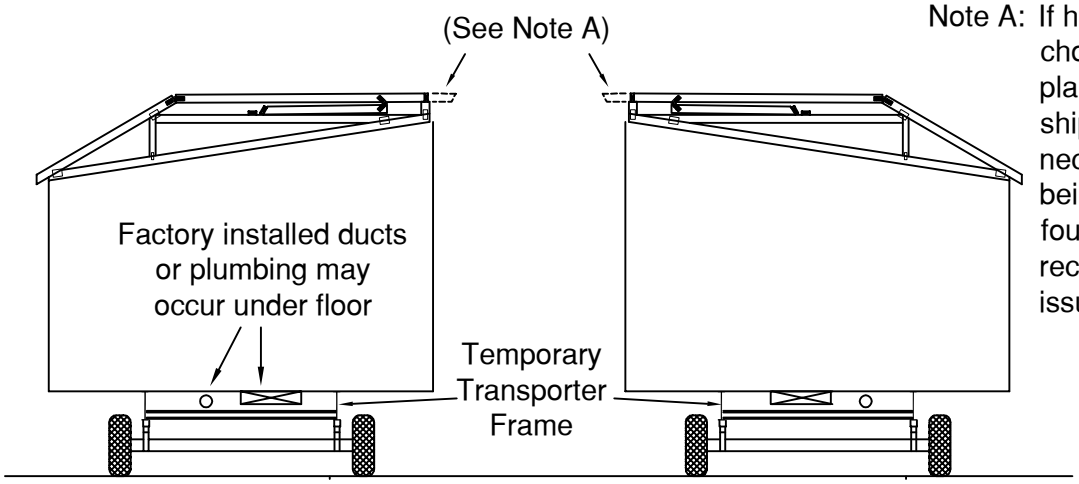
This section addresses set up of the basic non-storage type roof system. ROOF SET-UP IS ONLY TO BE PERFORMED BY EXPERIENCED PROFESSIONALS HAVING THE PROPER EQUIPMENT AND SKILLS . Roof interconnection requirements between the home sections (limited to non-storage hinged roof set up) are covered in this section. For additional details refer to Chapter 5 - "Module Close-up and Interconnections". Always refer to specific home design package for any special roof connections.

4.6.1 Typical Hinged Roof Procedure

The following is a general application for raising hinged roofs on non-storage homes. The illustrations depict a cathedral ceiling truss, but the the procedure is applicable to flat ceiling trusses as well. It is recommended that the roof sections be raised after the home sections are in place on the foundation. Crane setting is recommended as well. In some instances the home may arrive with truss top chords which protrude across the mating plane. In such cases one or both home sections may require that the roof be raised before the sections are set in their permanent positions. Refer to Roll-on or Crane set procedures addressed earlier in this chapter for applicable home set preparations and procedures.

1. The home has been shipped with the roof in it's collapsed position as shown in Fig. 4.8 below. Remove all shipping material from the roof and mating walls of both home sections.

2. The hinged top chords of the roof trusses have been tied together in the factory using a 2x tie rail. This rail is continuous and has been permanently fastened to the ends of the top chords in order to maintain proper spacing and to facilitate uniform lifting of the roof section.



Note A: If home has full length top chords which cross the mating plane rather than a hinged or shipped loose peak, it may be necessary to raise roof prior to being in permanent position on foundation. Crane set is recommended due to safety issues with this condition.

Fig. 4.8 - Roof (Collapsed Position)

3. The use of a crane is highly recommended as the most efficient and safest method of raising the roof. Where a crane is not available, raise the roof by the use of appropriate lifting devices. The lifts must be placed to allow no more than six feet between the jacks and so there is a jack at each end of the roof. THE LIFTING DEVICES MUST BE SECURE AND STABLE. IF JACKING, THE JACKS MUST BE POSITIONED OVER SOLID STRUCTURE SUCH AS STUDS OR SUPPORT COLUMNS. NEVER JACK AGAINST THE CEILING BOARD ALONE.

4. Raise the hinged roof high enough to allow the hinged top chord support members of the trusses to be moved into their support position. These support members or (knee wall members) have also been tied together in 8 to 12 foot sections at the factory so that they can be to facilitate ease of placement. These support members will typically rest upon the king post block at the mating side of the home section. DO NOT OVER RAISE THE ROOF SECTION as this can damage the main truss hinge. Refer to Fig. 4.9 for illustration and fastening requirements.

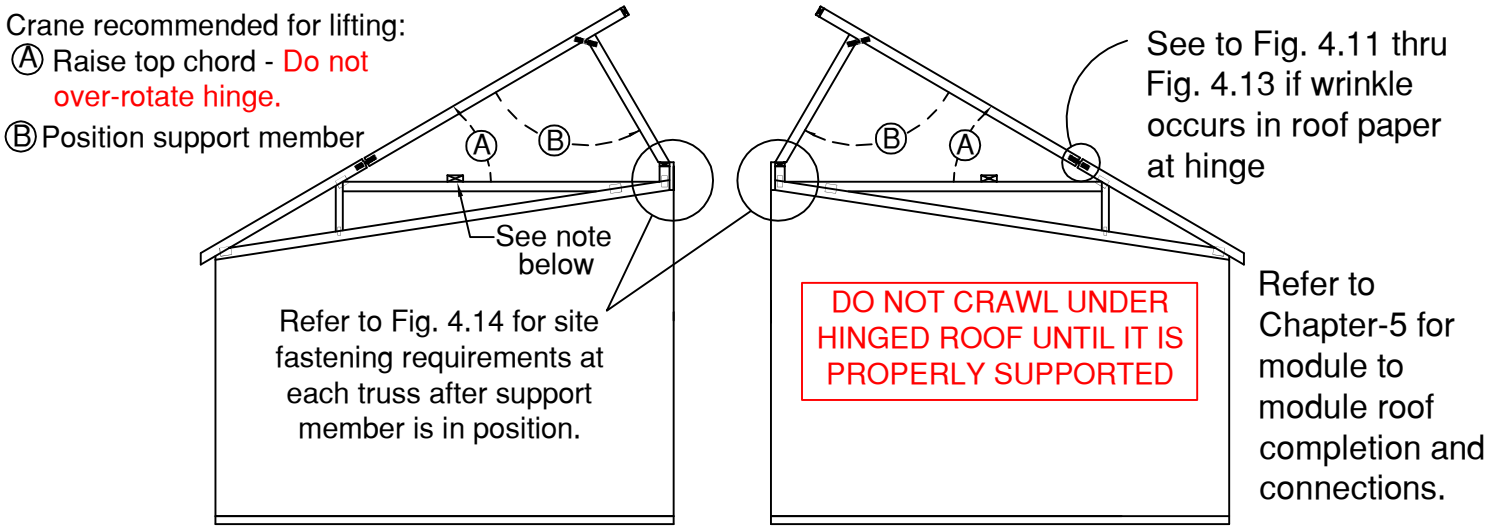


Fig. 4.9 - Roof (Raised Position)

Note: Refer to truss in home design package for location of **web bracing** members. If these were not installed at the factory, use 2x4 members attached to each truss with (2) 10d nails or #8x3" screws at each contact point.

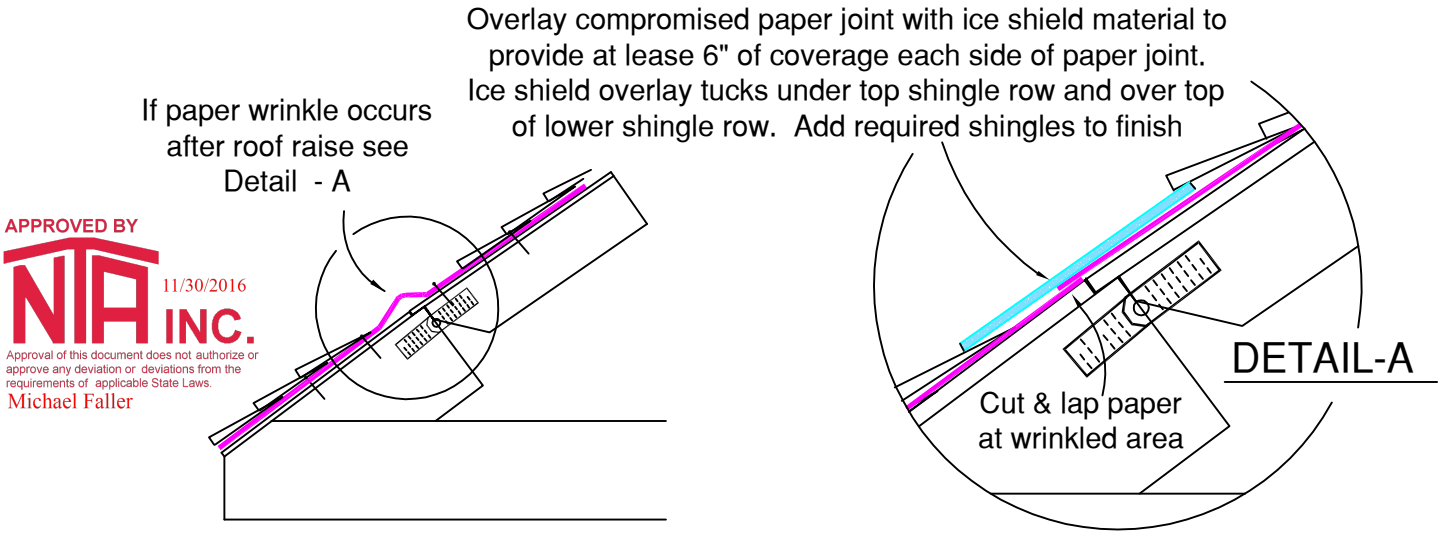


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Fig. 4.10 - Roofing Wrinkle at Hinge Repair (Non-Ice Shield Condition)

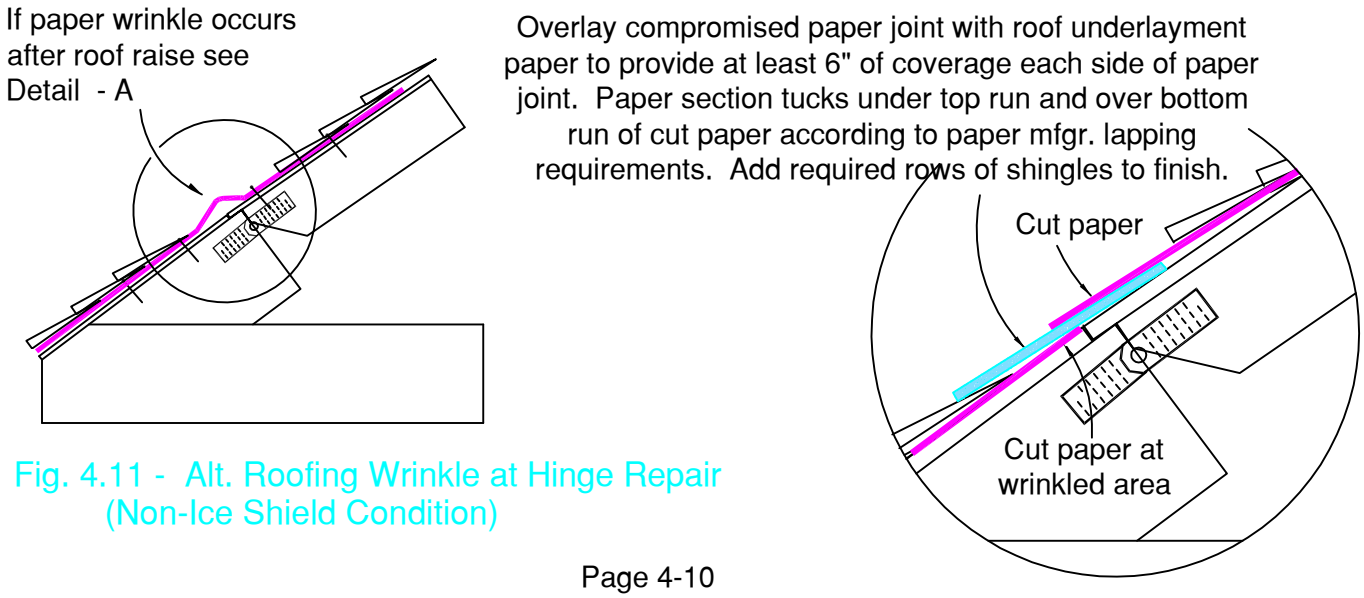

Fig. 4.11 - Alt. Roofing Wrinkle at Hinge Repair (Non-Ice Shield Condition)

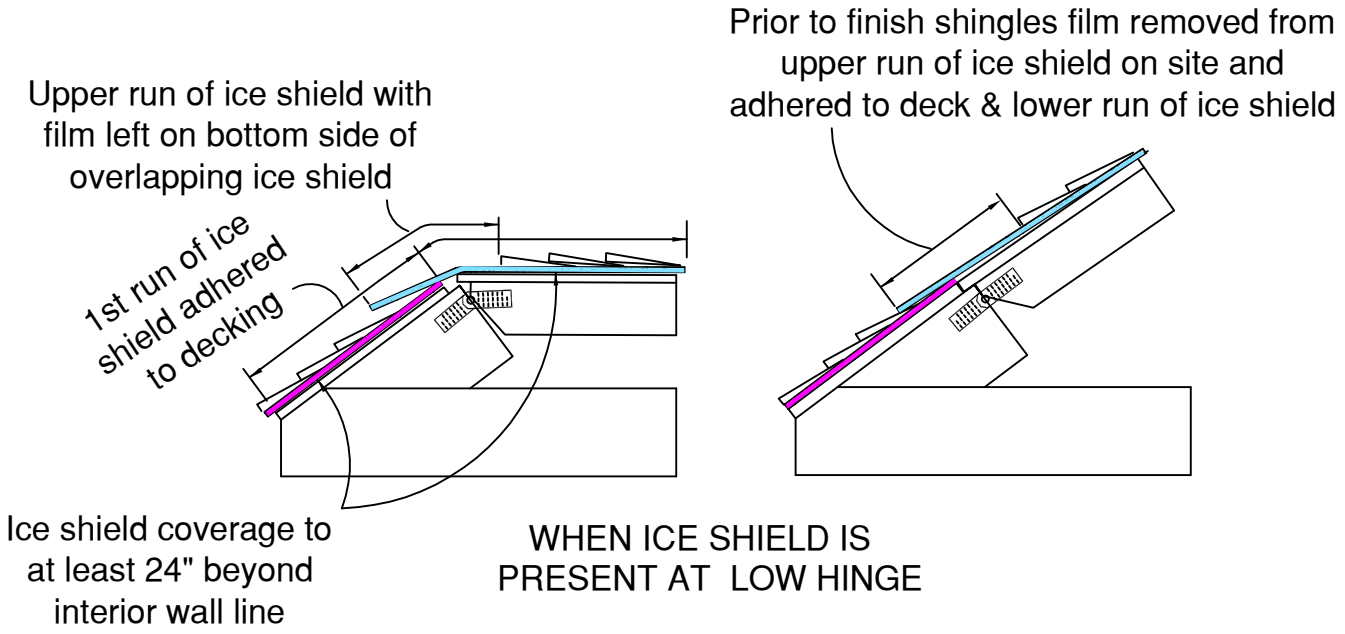

Fig. 4.12 - Roofing Wrinkle at Low Hinge Repair (Ice Shield Condition)

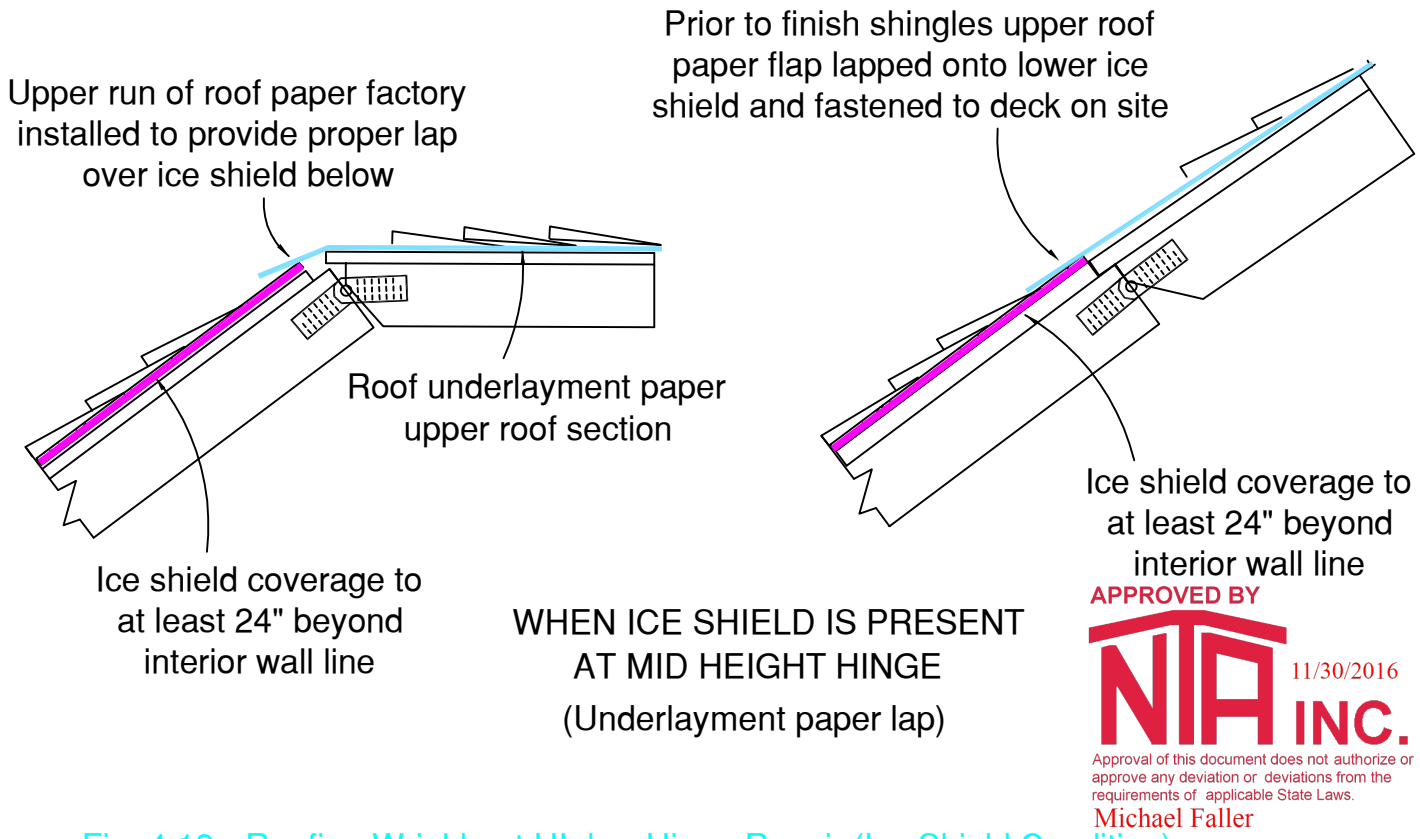

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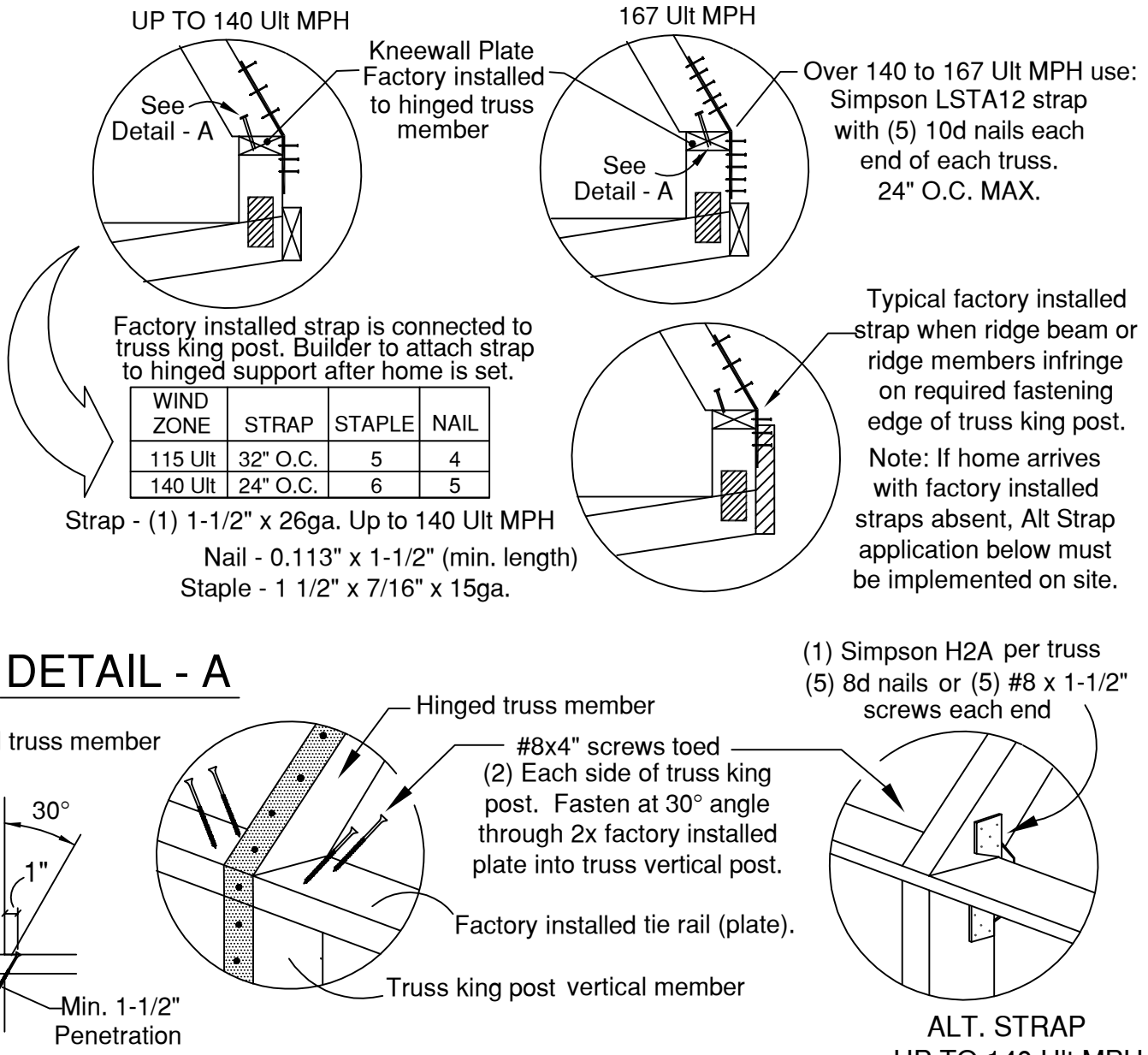
Fig. 4.13 - Roofing Wrinkle at HIgher Hinge Repair (Ice Shield Condition)



WIND ZONE	STRAP	STAPLE	NAIL
115 Ult	32" O.C.	5	4
140 Ult	24" O.C.	6	5

Where gaps up to 1-1/2"occur, add solid wood lumber filler & assure that fastener is of sufficient length to achieve min. 1-1/2" penetration.

Fig. 4.14 - Truss Hinged Top Chord Support Member Connecton

5. Furnace, water heater, or plumbing stacks may have been factory stubbed into the attic area beneath the folding sections of roof. These must be located extended to the exterior of the roof and terminated in accordance with all local codes which apply.

6. For typical roof peak close up procedures and other module interconnections refer to Chapter 5.

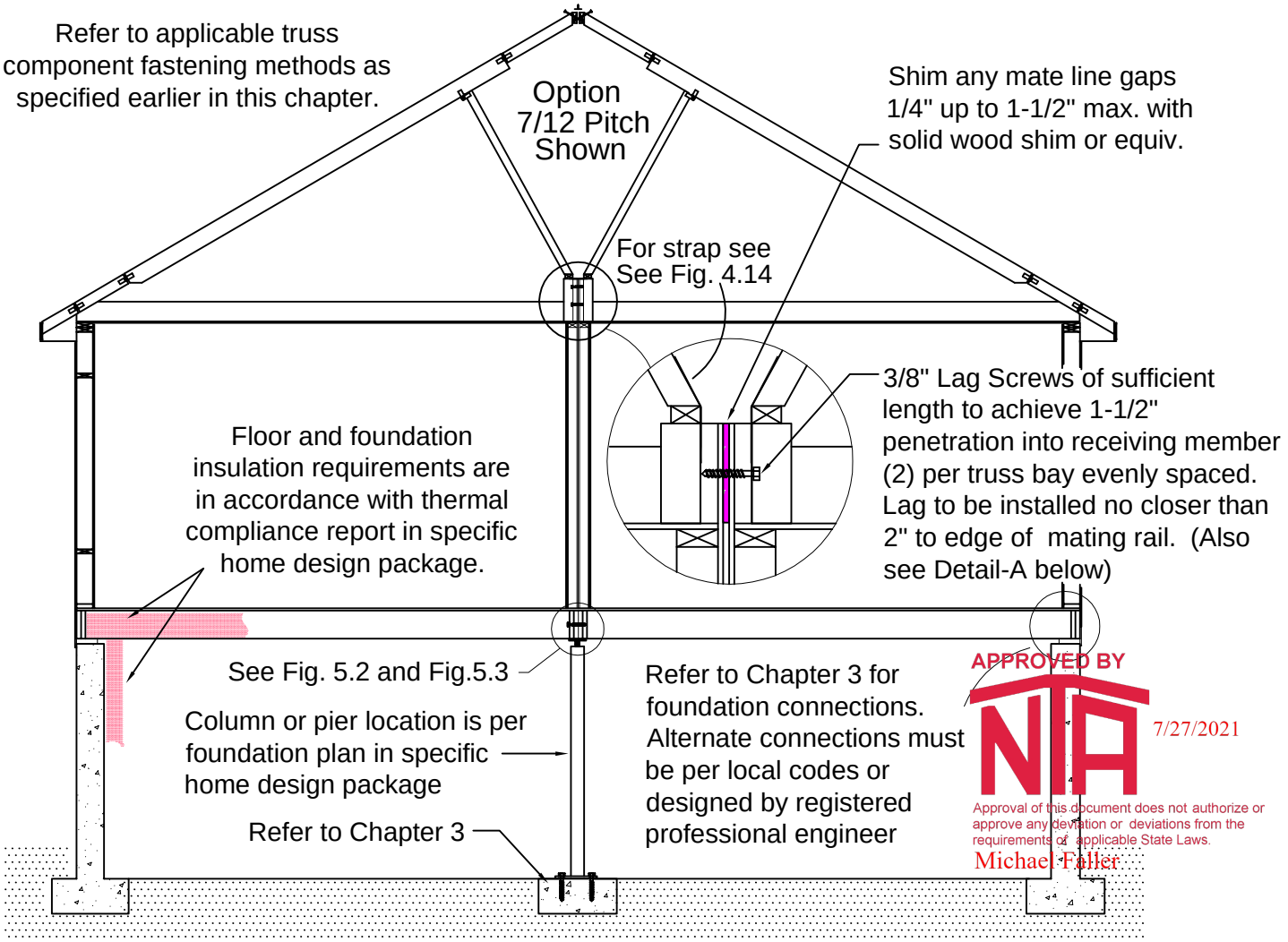
4.6.2 In Reference to Cape and Storage Roof Systems

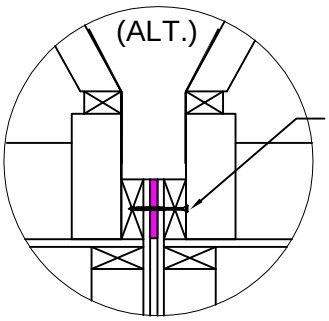
The preceding typical hinged roof set up information is applicable to general roof set up for non-storage roof systems. For Cape Cod or Attic Storage roof systems refer to Chapter-5 where connections are addressed on the building cross sections for these type homes. Insulation and other compliance measures for these types of homes are also addressed in Chapter-5.

Chapter 5 - Module Close-Up and Interconnections

5.1. Typical Ranch Home

This section illustrates typical ranch style building cross section with or without basement. Refer to applicable sections in this manual for more detailed information regarding foundation, option roof features, and other interconnection requirements. Always consult specific home design package for other applicable structural requirements that may apply.





DETAIL - A

With 2x4 min. mating rail, fasten rail to rail using min. #8 x 3" screws. Use (2) per bay up to 115 mph and (3) per bay up to 150 mph staggered and evenly spaced. Note that alternate method is applicable only when located over the mating wall.

Fig. 5.1 - Basic Typical Ranch Section

NOTES:

1. Refer to information presented later in this chapter for floor, end wall, mate wall, and roof close-up and fastening.
2. Refer to Chapter 7 for typical duct systems. Refer to Chapter 6 for optional roof features that may be applicable.
3. For other building types, refer to applicable typical building cross section covered later in this chapter.

5.2. Floor to Floor Connection

ANY GAP BETWEEN HOME SECTIONS MUST BE SHIMMED AND SEALED.

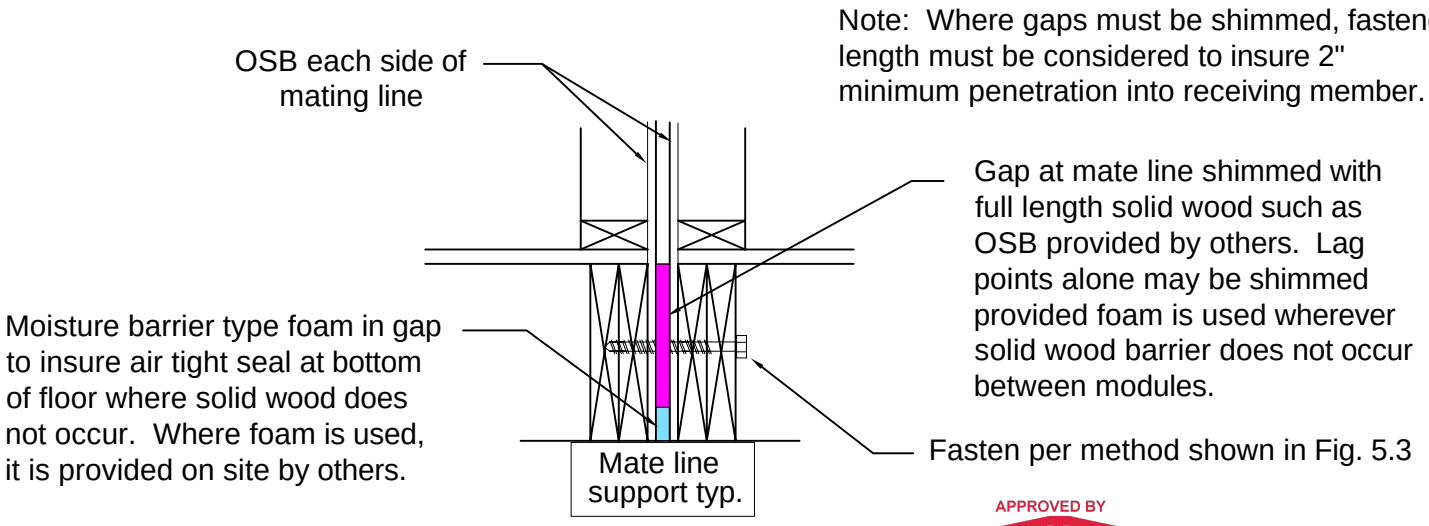


Fig. 5.2 - Gap at Floor Mate Line

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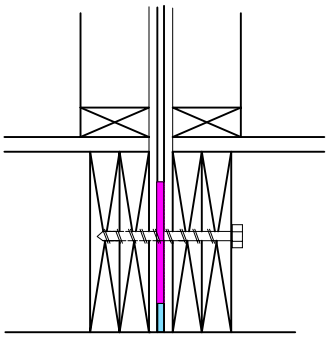
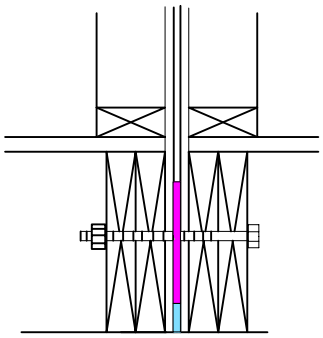


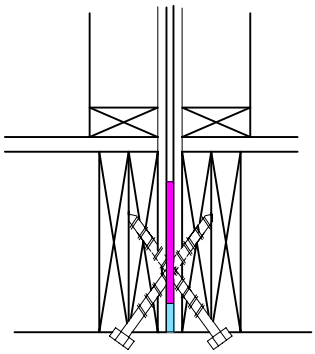
3/8" Lag screw minimum @ 24" o.c. max. to achieve min. 2" penetration into receiving member. Applicable @ 115 Ult, 140 Ult, and 167 Ult mph.

METHOD 1



3/8" Threaded bolt minimum @ 24" o.c. Applicable @ 115 Ult, 140 Ult, and 167 Ult mph.

METHOD 2



3/8" Lag screw to minimum toed to achieve min. 2" penetration into receiving member staggered @ 24" o.c. minimum. Applicable @ 115 Ult, 140 Ult, and 167 Ult mph.

METHOD 3

Methods shown are applicable with or without gap at mate line. If gap occurs, required shims and draft-stopping must be installed and fasteners sized to appropriate length to achieve required penetration into receiving member. Regardless, appropriate foam or caulk must be applied between home sections to alleviate air infiltration at the floor mating line.

Fig. 5.3 - Floor to Floor Fastening Methods

5.3. Mating Wall Closure and Connection

1. Fasten interior mating wall openings (including door openings) together using #8 x 4" wood screws or equivalent. Toe fasten at 12" o.c. with specified screws or (6" o.c. w/16d nails), in an alternating pattern from one side of the mate line to the other. It is optional (but recommended) that archways be strapped together as well to protect from future cracking.

2. As an alternate, 3/8" x 5" lag screws (provided by others) toe fastened at 24" on center may be used. When lag screws are used as specified, they do not need to be alternated one side to the other as with wood screws or nails. It is recommended, however, that that members be pre-drilled to avoid splits when driving the lags.

3. Alternate Strap Connection: A minimum of (4) 20 gauge steel straps may be used as a substitute for the wood screws, nails, or lag screws for the vertical mate line connection. The steel straps are to be at least 1-1/2" in width and 7" in length evenly spaced 24" max. over the length of the vertical joint. The straps are to be fastened with a minimum of (4) - 0.131 pd nails each end of each strap. The fasteners shall be of sufficient length to penetrate the receiving member by no less than 1-1/2". (Straps & fasteners provided by others).

4. Alternate Mending Plate Connection: A minimum 26 gauge "mending plate" may be used as a substitute for the wood screws, nails, or lag screws for the mate line connection. The plates are to be at least 1-1/2" in width and 7" in length spaced no more than 16" apart over the length of the vertical joint. The plates are to be fastened to the studding at each side of the joint with a minimum of (4) - 8d nails each end of the plate, or in accordance to the plate manufacturer's specifications where manufactured plates for such application are being used. (Plates & fasteners provided by others).

Note For Mate Line Door Openings: If door jambs have been factory installed to one side of a mate line door opening, fasteners are not required to be alternated side to side

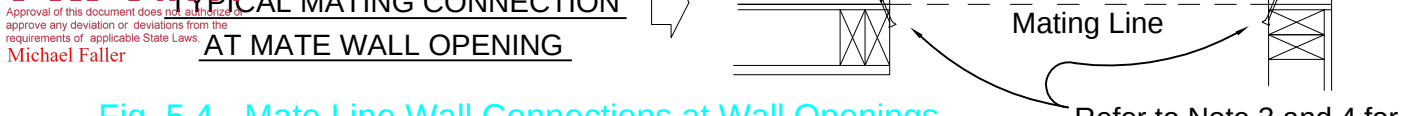
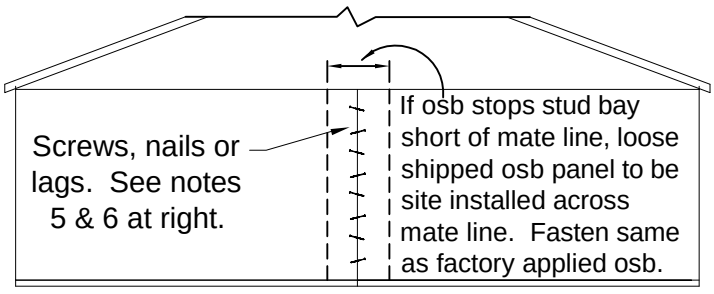
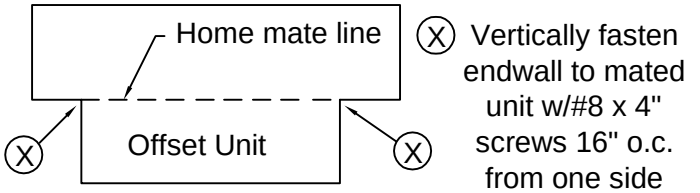


Fig. 5.4 - Mate Line Wall Connections at Wall Openings



TYPICAL MATING CONNECTION - EXTERIOR WALL



Alt. Endwall Fastening for Offset Unit Appl.

5. Fasten end wall sections together with #8 wood screws, 16d nails, or 3/8" lag screws of adequate length to achieve a minimum 1-1/2" penetration. Any fastener that is exposed to the weather must be galvanized or zinc coated.

6. When securing end walls at mate line, toe fasten alternating side to side along joint as shown in Fig. 5.4. Screws are to be spaced 12" o.c. max. and nails 6" o.c. max. If lags are used, members should be pre-drilled. Lag spacing may be 24" o.c. alternating side to side.

Fig. 5.5 - Mate Line End Wall Connections

7. Where gaps up to 1-1/2" maximum occur between home sections at interior or exterior wall mate line, add solid lumber filler at gapped area and increase length of fastener to attain 1-1/2" min. penetration into single member or 2" penetration where fastener penetrates multiple receiving members.

5.4. Typical Roof Closure and Connection

1. Furnace, water heater, or plumbing stacks may have been factory stubbed into the attic area beneath the folding sections of roof. These must be located extended to the exterior of the roof and terminated in accordance with all local codes which apply.

2. The following details illustrate typical peak closure applications for hinged roofs as well as roof to roof connection applicable to roofs in general. The peak closure components have been factory assembled and shipped loose as "drop-in" sections (Fig. 5.6) or the peak members may be hinged to the main roof truss top chord to be rotated into place after both home sections are set (Fig. 5.7).

Locate one of the ridge drop-in sections. Position this section at one end of the home and fasten it in place using #8 x 4" screws toed through the truss tie rail at 4" on center starting no more than 6" from the ends Position and fasten remaining sections in place in the same fashion. **Insure that each peak member in the peak section is in alignment with each truss top chord (applies at multiple truss clusters as well). If peak members need to be added to line up with trusses, they are to be toe-nailed into peak rails w/(2) 16d nails each end. (May be fastened to side face of adjacent peak member when doubled).**

5/16" lag screws may be substituted where ever #8 wood screws are specified on this page. When using lag screws, pre-drill member to prevent splitting. The minimum length of lag screw is to be at least equal to that of the wood screws specified.

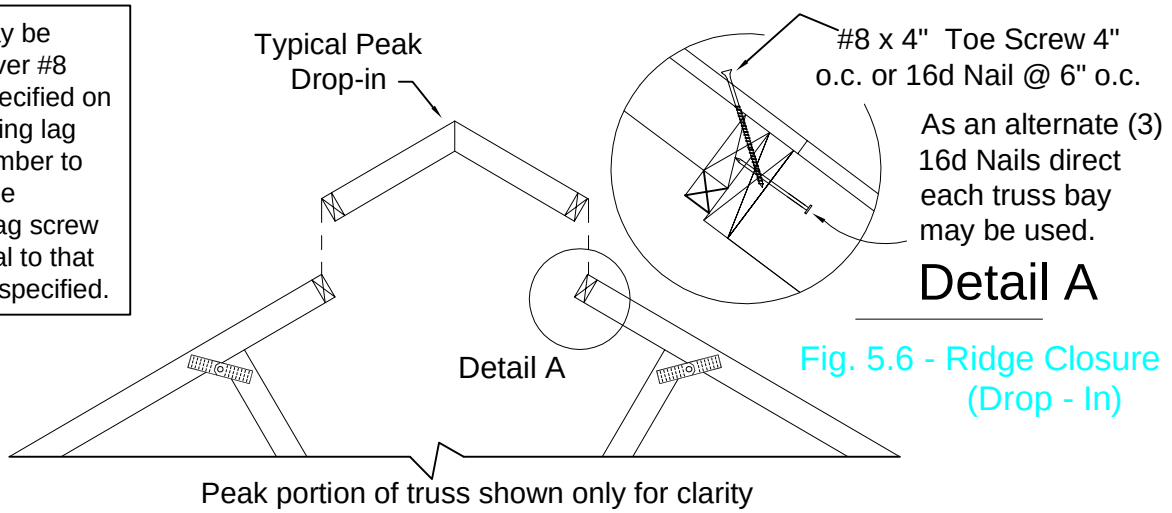
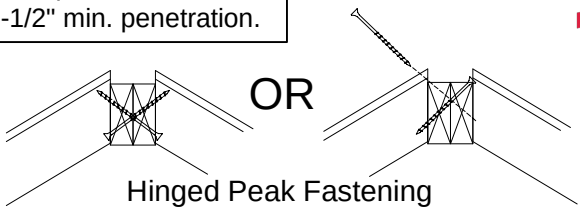


Fig. 5.6 - Ridge Closure (Drop - In)

Where gaps up to 1-1/2" max. occur between members , add solid lumber filler and increase fastener length as required to achieve 1-1/2" min. penetration.



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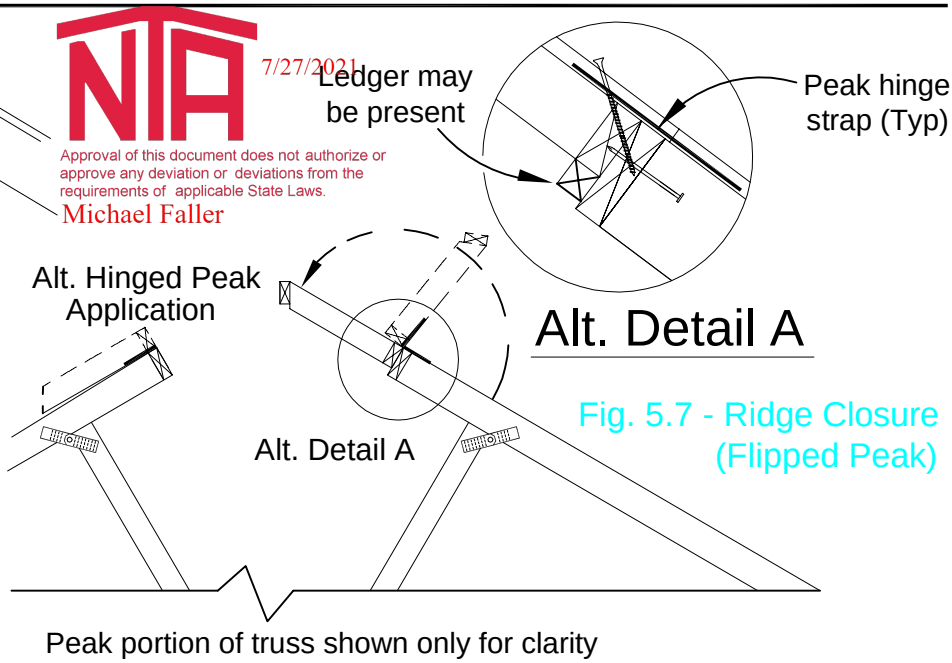


Fig. 5.7 - Ridge Closure (Flipped Peak)

Insure there is a corresponding flip member to align with each factory installed truss. Peak members may need to be added on site where a truss does not have a peak member in alignment. (This also applies for multiple truss clusters) Fasten in like manner as described for drop-in appl.

Peak Flip Application (See Figure 5.7):

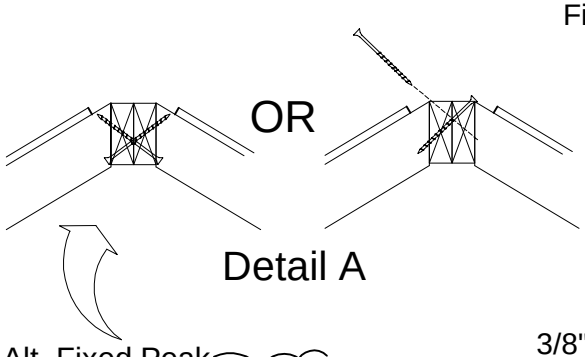
Some homes may be shipped with peak sections which are factory framed and flipped back onto the main and to be rotated into place an fastened in the field. This method of roof peak closure is particularly prevalent on Cape or other steep pitch roofs due to the large size of the peak panels involved. It is recommended that lifting be done by the crane.

These sections are attached to the main roof at the factory using a nylon or other appropriate strapping at interval points along the length of the roof. The strap is of adequate length to stabilize the peak in transit and to also accommodate rotation and positioning in the field. There is typically a ledger on the top rail of the main roof for the rotated peak section to rest upon in order to aid in lining up the sections with the plane of the main roof during fastening. (LIFTING METHOD, PICK POINTS, AND ROTATING PROCEDURE ARE THE RESPONSIBILITY OF THE INSTALLER).

5.5. Typical Fixed Peak and Mate Line Connection

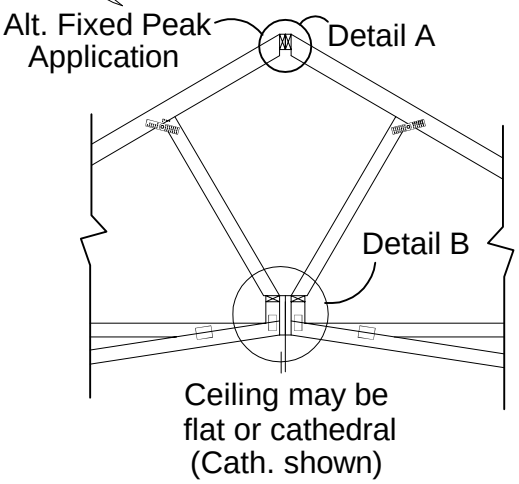
1. Detail - A in Figure 5.8 below illustrates connection condition when home has a fixed truss chord at the peak which does not require a "drop-in" section or a hinged over peak.

2. Detail - B in Figure 5.8 illustrates the typical mate line fastening at the ceiling rails of the home.

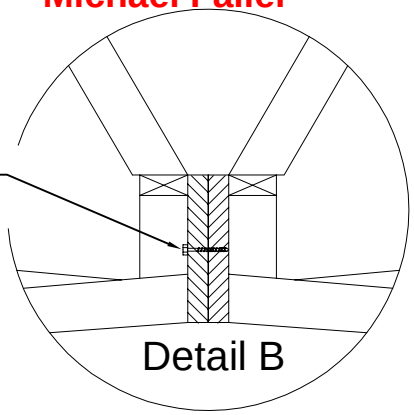


Fixed Peak Fastening up to 167 Ult mph:
#8 x 5" Wood screw
at 8" o.c. or 16d Nail
at 4" o.c. staggered

Confirm that the roof peak is even when fastening the roofs together.



3/8" Lag Screws of sufficient length to achieve 1-1/2" penetration into receiving member (2) per truss bay evenly spaced. Lag to be installed no closer than 2" to edge of mating rail.



Ridge Rail to Ridge Rail Connection

Note: Any gaps between home sections greater than 1/4" up to 1-1/2" maximum must be shimmed. Increase length of fastener to maintain 1-1/2" minimum penetration into a single receiving member or 2" for multiple receiving members.

Fig. 5.8 - Roof to Roof Connection

NOTE: ALSO REFER TO APPLICABLE BUILDING CROSS-SECTIONS INCLUDED LATER IN THE CHAPTER FOR ACCOMPANYING INFORMATION REGARDING RANCH, CAPE, AND TWO-STORY APPLICATIONS.

5.6. Roofing Closure at Mating Line Roof Peak (See Figure 5.9)

1. Lap roofing paper from one section of home over the other at peak joint and secure with staples or roof nails.

2. Apply shingles as needed to last row according to roofing manufacturer's instructions. ***DO NOT BLOCK RIDGE VENT AREAS IN DECKING.***

3. Ridge Vent sections are to be installed so they overlap the vent openings a minimum of 2" and/or according to ridge vent manufacturer's instructions.

4. Apply ridge vent cap shingles with roofing nails of sufficient length to achieve full penetration of roof decking. Also consult shingle and ridge vent manufacturer's instructions to insure that manufacturer's fastening requirements are met.

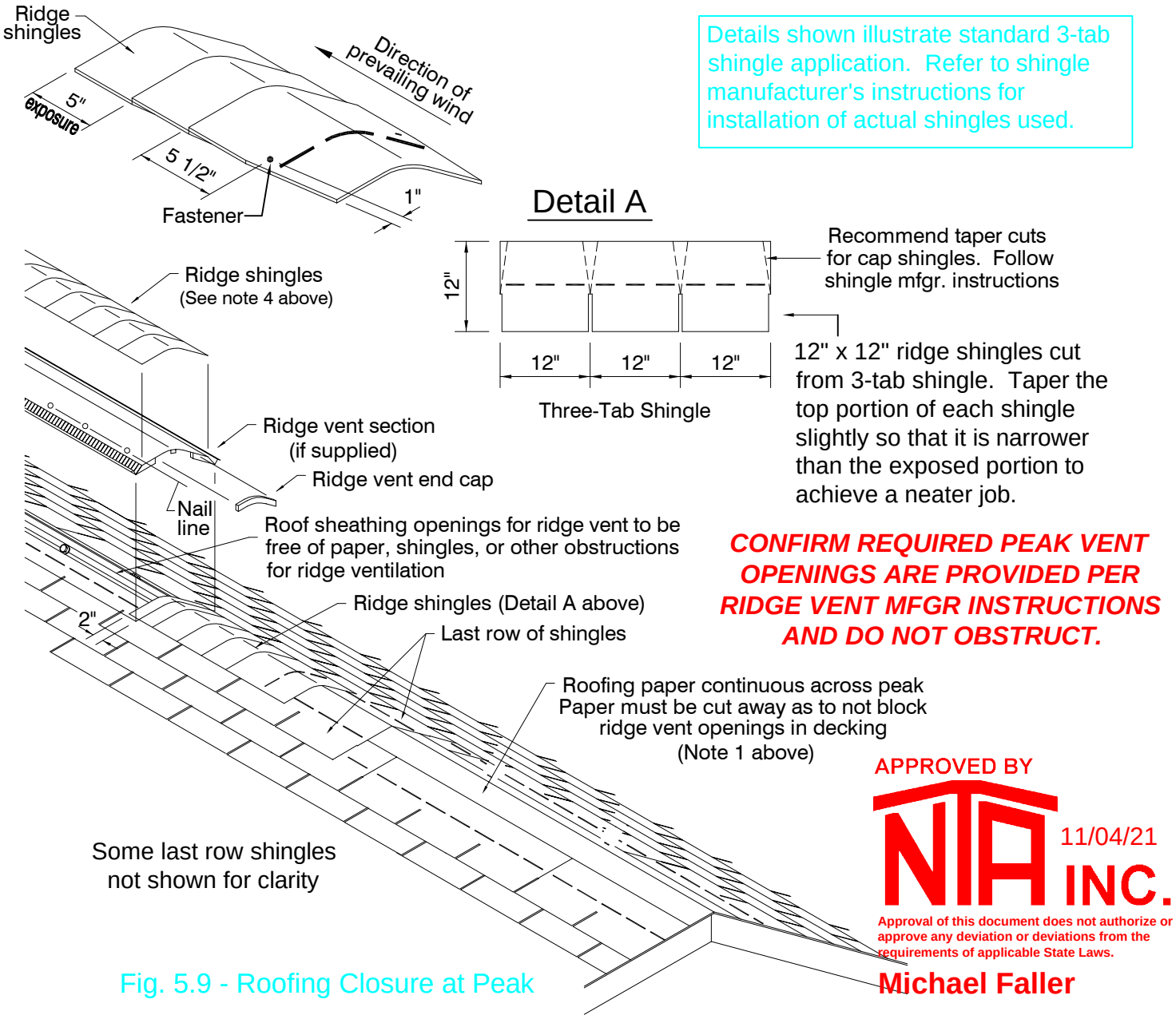


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Fig. 5.9 - Roofing Closure at Peak

5.7. Shingle Application at Valley

Roof valleys often occur due to dormers, bonus boxes, or other adjoining building structures. Please be aware of the following general guidelines:

1. Prior to applying shingles, line valley by centering and applying 36" wide self-adhering waterproofing shingle underlayment or 50# underlayment directly to the deck or as specified by shingle manufacturer.

2. Lay the first shingle course along the eaves of the first roof plane and extend courses across the valley, onto the adjoining roof plane. Extend past the valley center line by at least 12" and press the shingles firmly into the valley before fastening.

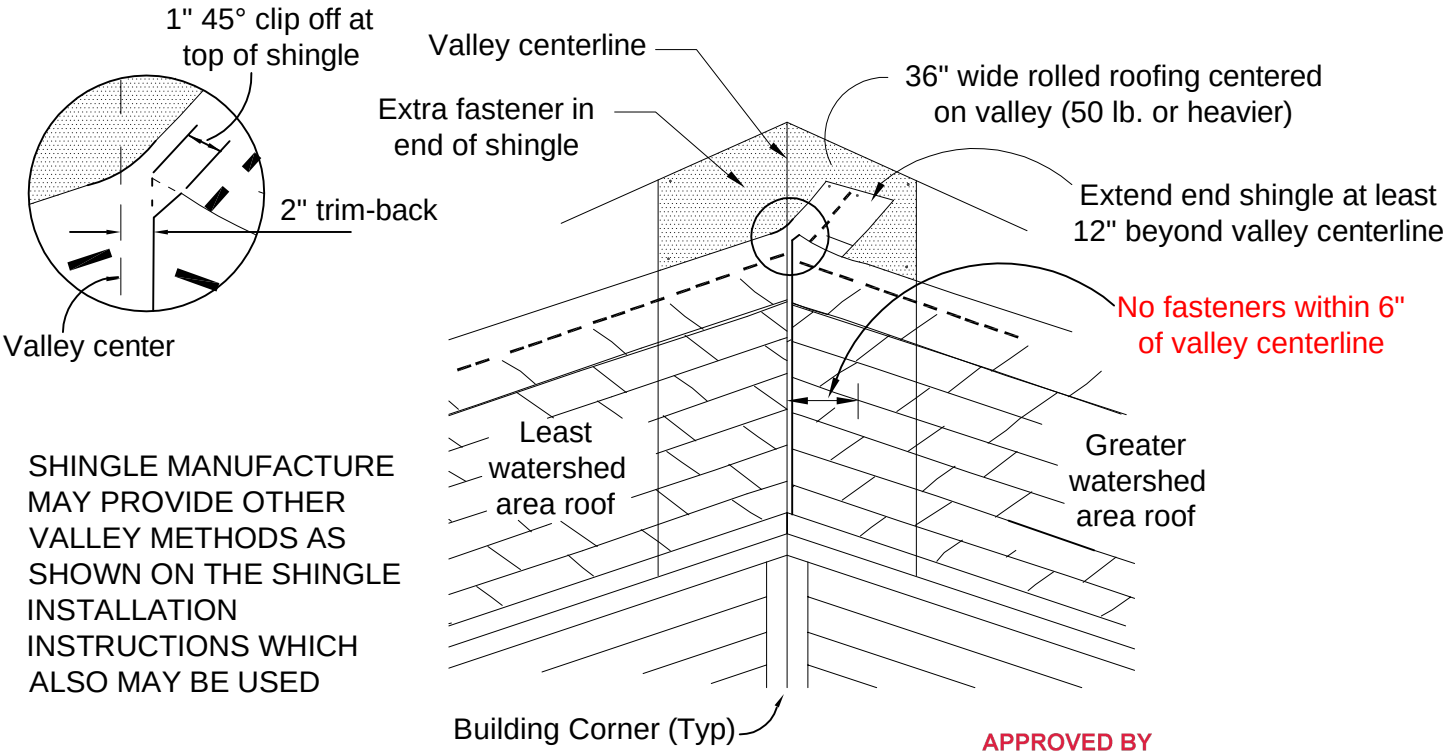
THE SHINGLES ON THE DECK WITH THE LEAST AREA OF WATERSHED ARE THE SHINGLES THAT SHOULD BE APPLIED FIRST TO GO UNDERNEATH THE SHINGLES ON THE ADJOINING DECK. THE SHINGLES ON THE ADJOINING DECK (deck with the greater watershed area) ARE THE SHINGLES WHICH SHOULD BE CUT AND OVERLAY THE FIRST DECK SHINGLES

3. Follow standard shingle manufacturer fastening instructions EXCEPT THAT FASTENERS MUST NOT BE INSTALLED WITHIN 6" OF THE VALLEY CENTERLINE.

4. Follow the same procedure for succeeding courses going up the valley from one side.

5. Apply the first course of shingles along the eave of the adjoining roof area, extending it over the previously applied shingles on the adjacent roof plane. Follow the same procedure for for succeeding courses. When complete, snap a chalk line 2" back from the centerline of the side just installed (greater watershed side). Neatly cut 2" back from the valley centerline following the chalked line as a guide.

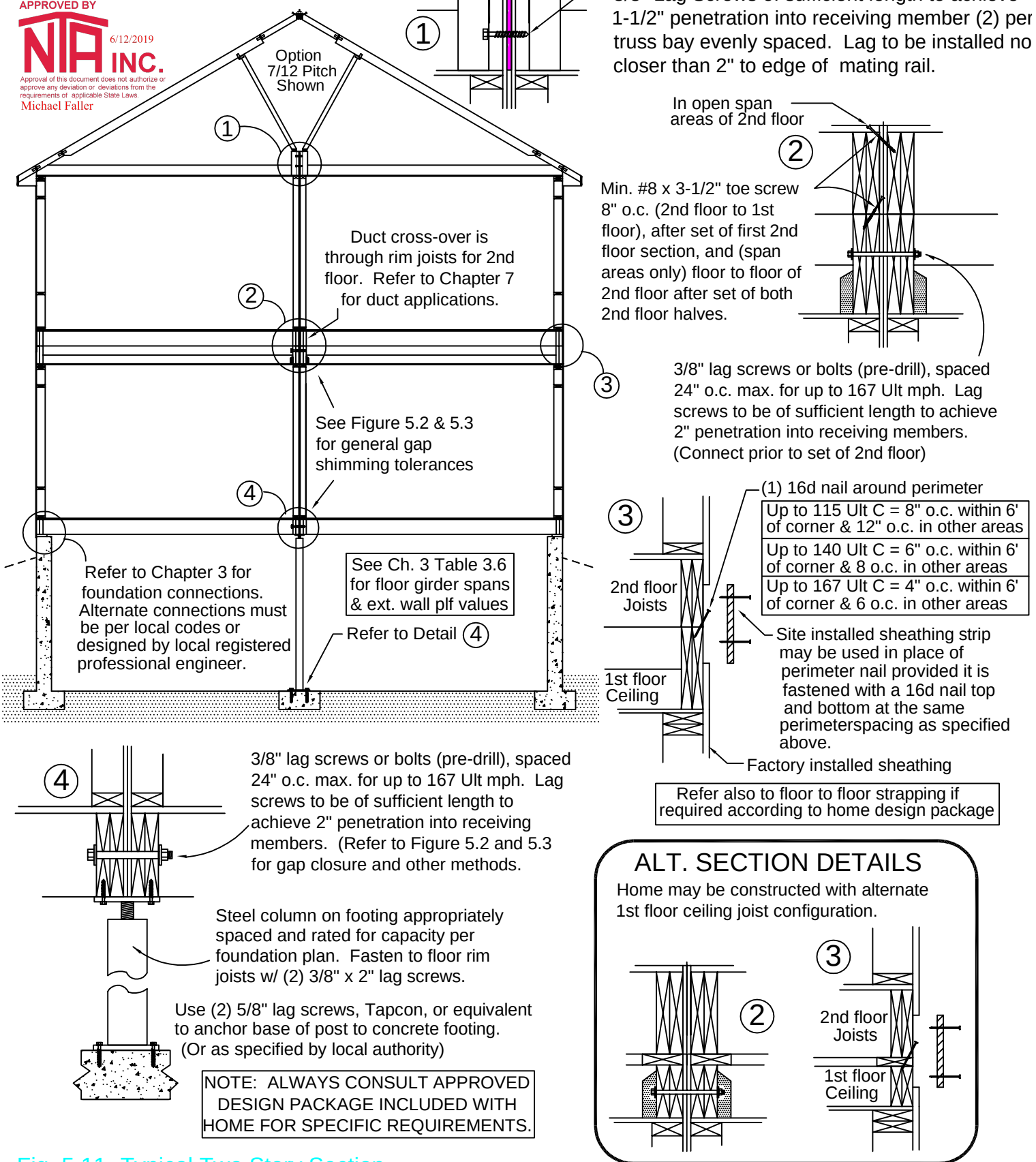
6. Cut 2" diagonally off the upper corner of each previously trimmed shingle (at approx. 45° angle) to direct water into the valley. Take care not to cut the shingles beneath.



SHINGLE MANUFACTURE MAY PROVIDE OTHER VALLEY METHODS AS SHOWN ON THE SHINGLE INSTALLATION INSTRUCTIONS WHICH ALSO MAY BE USED

Fig. 5.10 - Typical Closed Cut Valley

5.8. Typical Two Story Home

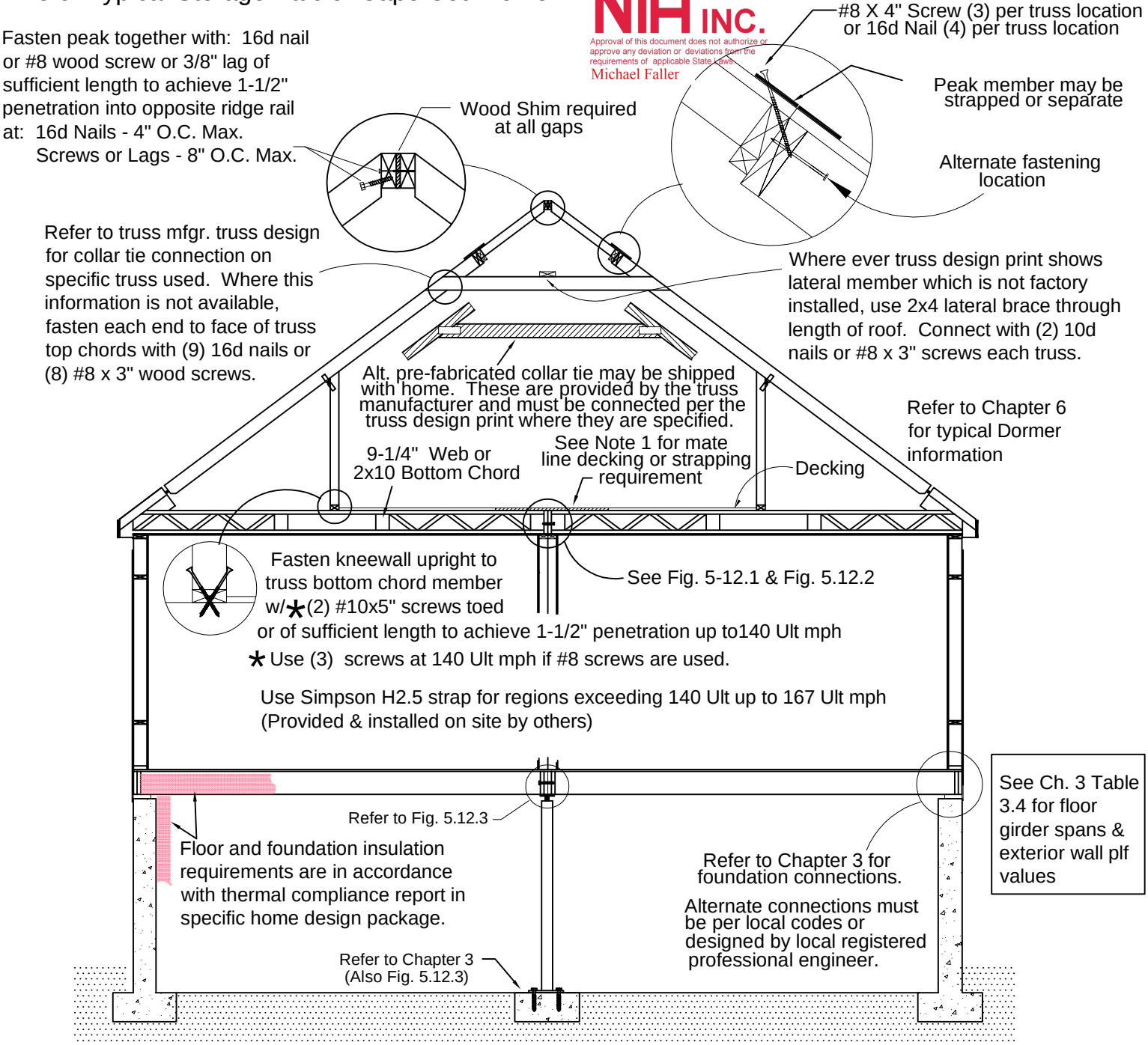


ALT. SECTION DETAILS

Home may be constructed with alternate 1st floor ceiling joist configuration.

Fig. 5.11- Typical Two Story Section

5.9. Typical Storage Attic or Cape Cod Home



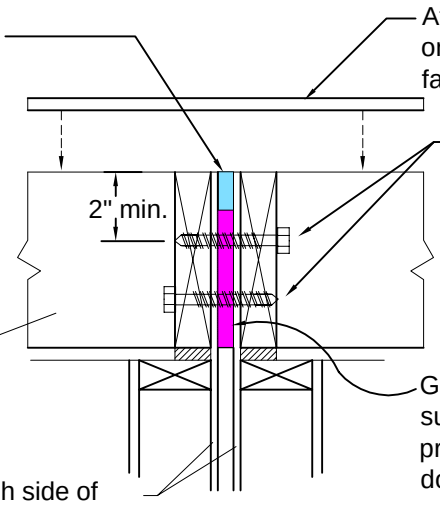
ALWAYS CONSULT APPROVED DESIGN PACKAGE INCLUDED WITH HOME FOR SPECIFIC REQUIREMENTS.

NOTES:

1. Rated floor sheathing must be installed in such a manner that it is continuous across the mate line of the home and fastened using at least (9) 0.131 nails and 1" penetration each side of mate line into each truss bottom chord. (Or install tension straps at each roof truss location per Fig. 5.12.1 and Fig. 5.12.2. (Decking fastening, other than mate line, is per IRC fastening schedule.)
2. Refer to upper floor ventilation details in this section if home is designed for attic storage or if upper level of Cape is not conditioned prior to being occupied. (Fig. 5.15)
3. Refer to earlier portions of this chapter for roof, end wall, and mating wall close-up, fastening. (Cape roof insulation details see Figure 5.14 & 5.14A.)
4. Refer to Chapter 7 for typical duct systems.

Fig. 5.12 Typical Storage/Cape Section

Moisture barrier type foam in gap to insure air tight seal at attic floor, where solid wood does not occur. Where foam is used, it is provided on site by others.



Attic floor decking to be continuous across mate line or Simpson LSTA-21 tension strap each truss location fastened w/(8) 10d nails each end (16 total)

(2) 3/8" Lag minimum each truss bay staggered to achieve min. 1-1/2" penetration into single member or 2" into multiple receiving members for 115 Ult, 140 Ult, and up to 167 Ult mph. Place lags 2" min. from edges of rail.

Open web or solid truss bottom chord

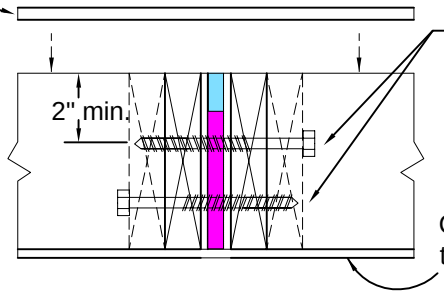
Gap at mate line shimmed with full length solid wood such as OSB. Lag points alone may be shimmed provided foam is used wherever solid wood barrier does not occur between modules.

OSB each side of mating line

Fig. 5.12.1 - Attic Floor at Mate Line

WARNING: GAPS BETWEEN HOME SECTIONS WITHOUT PROPER WOOD FILLER AND FOAM WILL RESULT IN CONTINUOUS CRACKING AND MOLD

Attic floor decking to be continuous across mate line or Simpson LSTA-21 tension strap each truss location fastened w/(8) 10d nails each end (16 total)

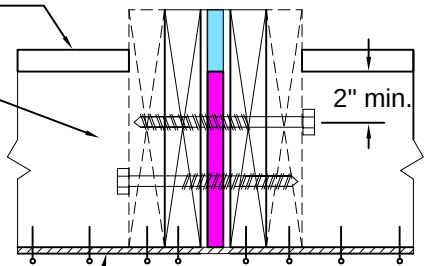


(2) 3/8" Lag minimum each truss bay staggered to achieve min. 1-1/2" penetration into single member or 2" into multiple receiving members for 115 Ult, 140 Ult, and up to 167 Ult mph. Place lags 2" min. from edges of rail.

Ceiling board through open span areas to be continuous across mate line

MATE BEAMS FLUSH WITH ATTIC FLOOR FRAMING

Attic floor decking

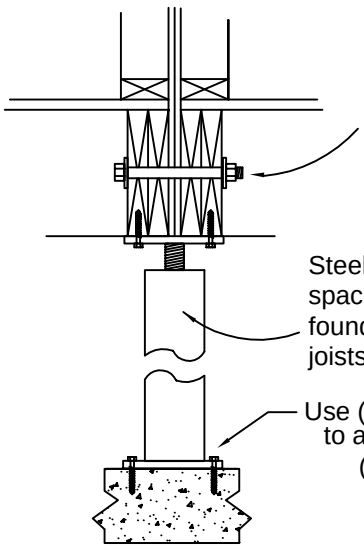


Simpson LSTA-21 strap across mate line at each truss location on ceiling side prior to installation of finished ceiling board. Fasten w/(8) 10d nails each end (16 total)

MATE BEAMS EXTEND INTO ATTIC

Ceiling board to be continuous across mate line

Fig. 5.12.2 -Attic Floor at Through Mate Wall Spans



Refer to Chapter 3
See also Fig. 5.2 and Fig. 5.3
for applicable alternate methods

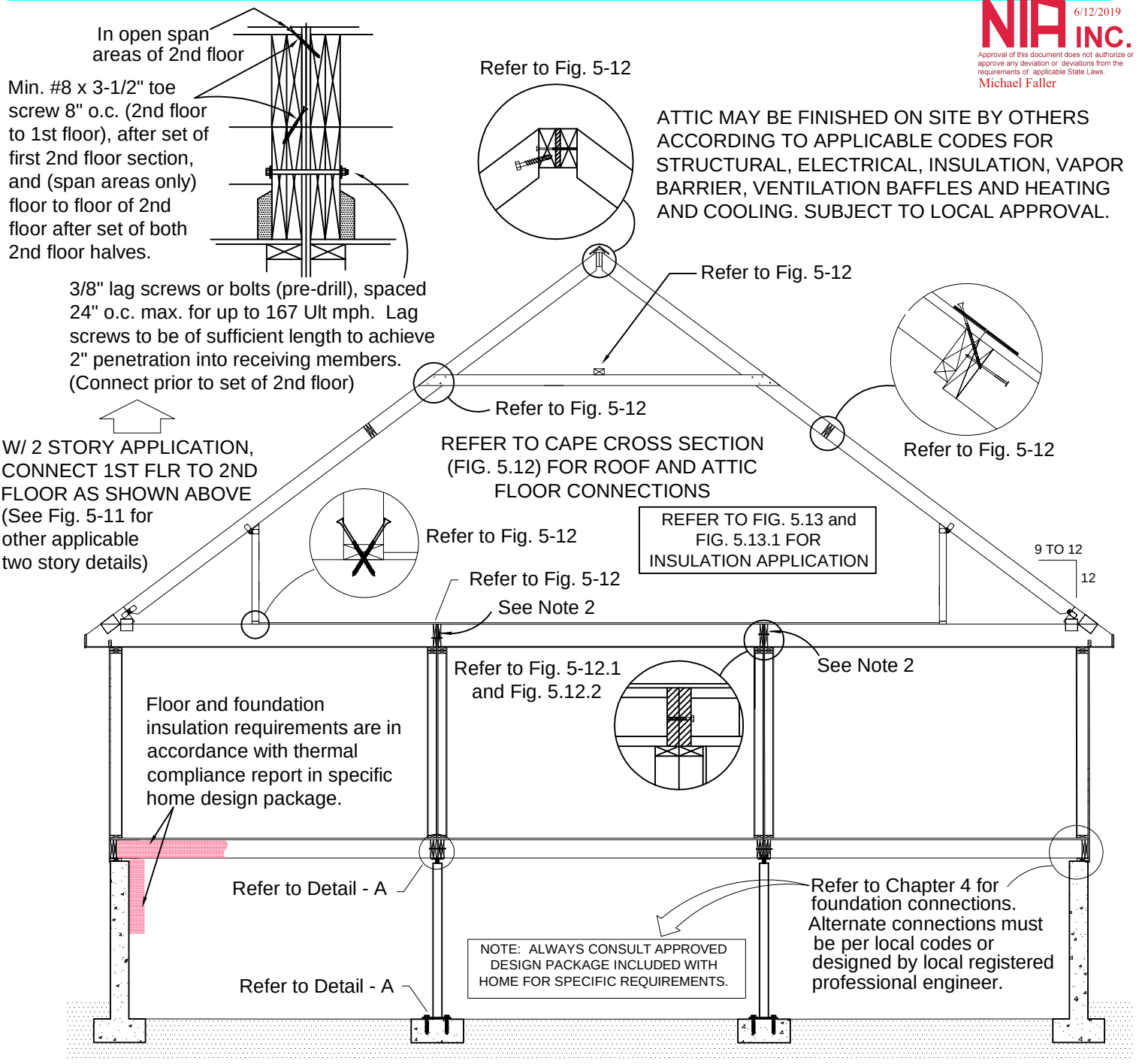
Attic floor decking to be continuous across mate line

Steel column on footing appropriately spaced and rated for capacity per foundation plan. Fasten to floor rim joists w/ (2) 3/8" x 2" lag screws.

NOTE: ALWAYS CONSULT APPROVED DESIGN PACKAGE INCLUDED WITH HOME FOR SPECIFIC REQUIREMENTS.

Use (2) 5/8" lag screws, Tapcon, or equivalent to anchor base of post to concrete footing. (Or as specified by local authority)

Fig. 5.12.3 - Typical Storage or Cape Mate Line Support



Notes:

1. Cape Cod notes included on Figure 5.12 are applicable for this cape detail

2. When necessary, it is permissible to drill or cut attic floor rim rails to allow for passage of cables, pipes, or similar interconnections. Any openings cut must be located over area which is fully supported by full height marriage walls. Cuts must be kept at least 1-1/2" beyond each side of mating door openings and 3" each side of other openings. ***Holes or cuts made must be located in a manner to accommodate required decking fastening across mate line.***

Fig. 5.13- Typical Full Triple Wide Cape

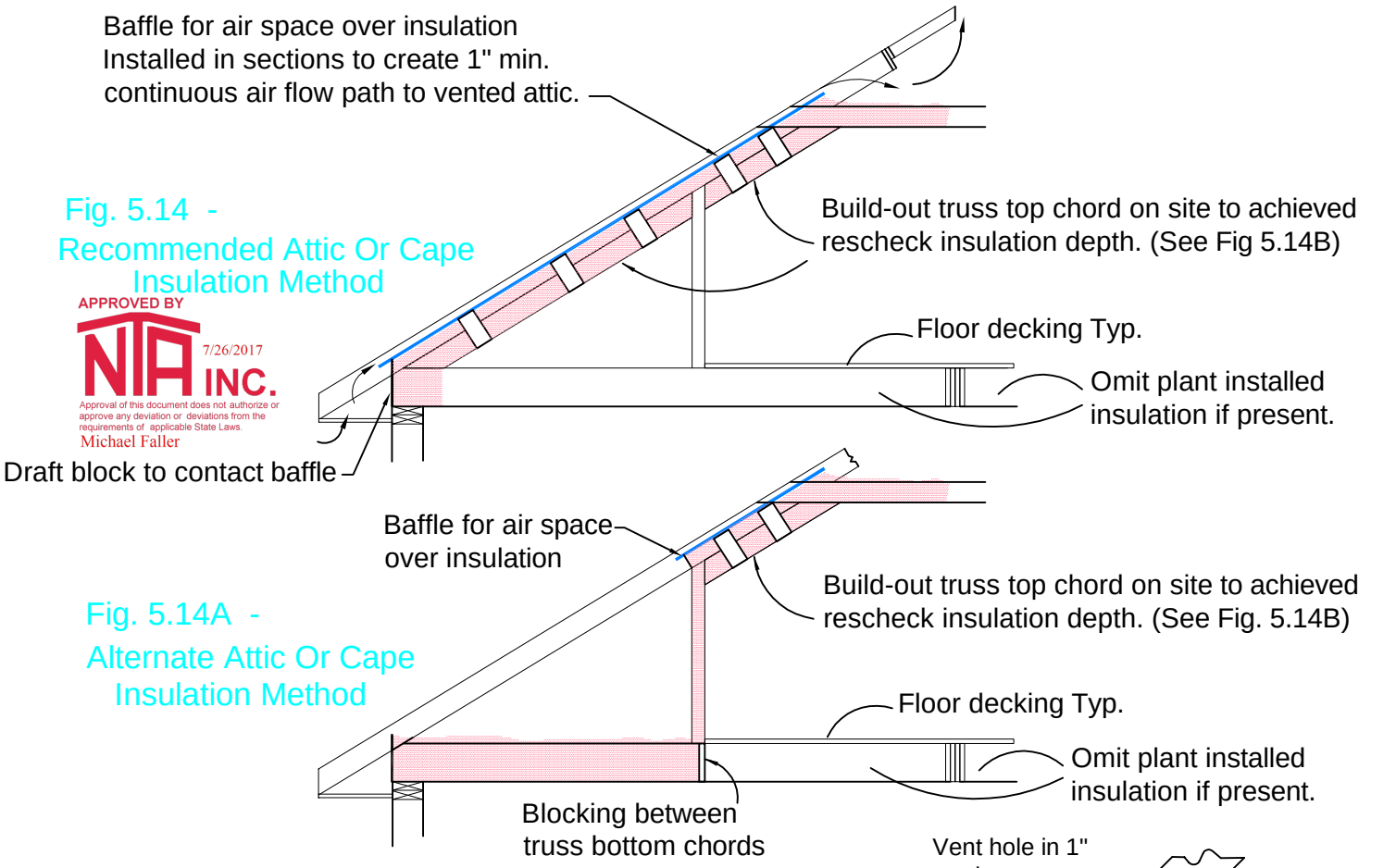


Fig. 5.14 - Recommended Attic Or Cape Insulation Method

Fig. 5.14A - Alternate Attic Or Cape Insulation Method

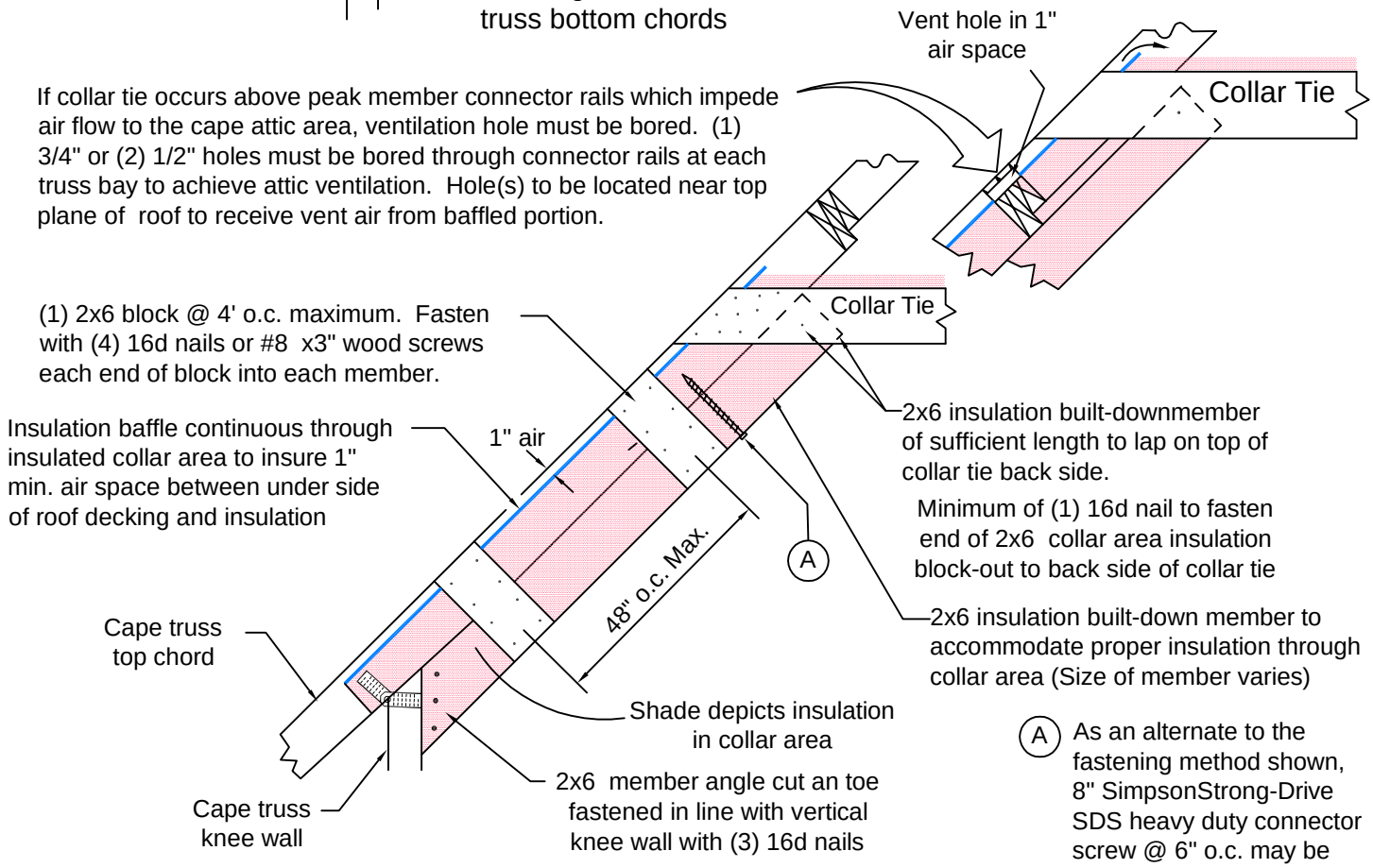
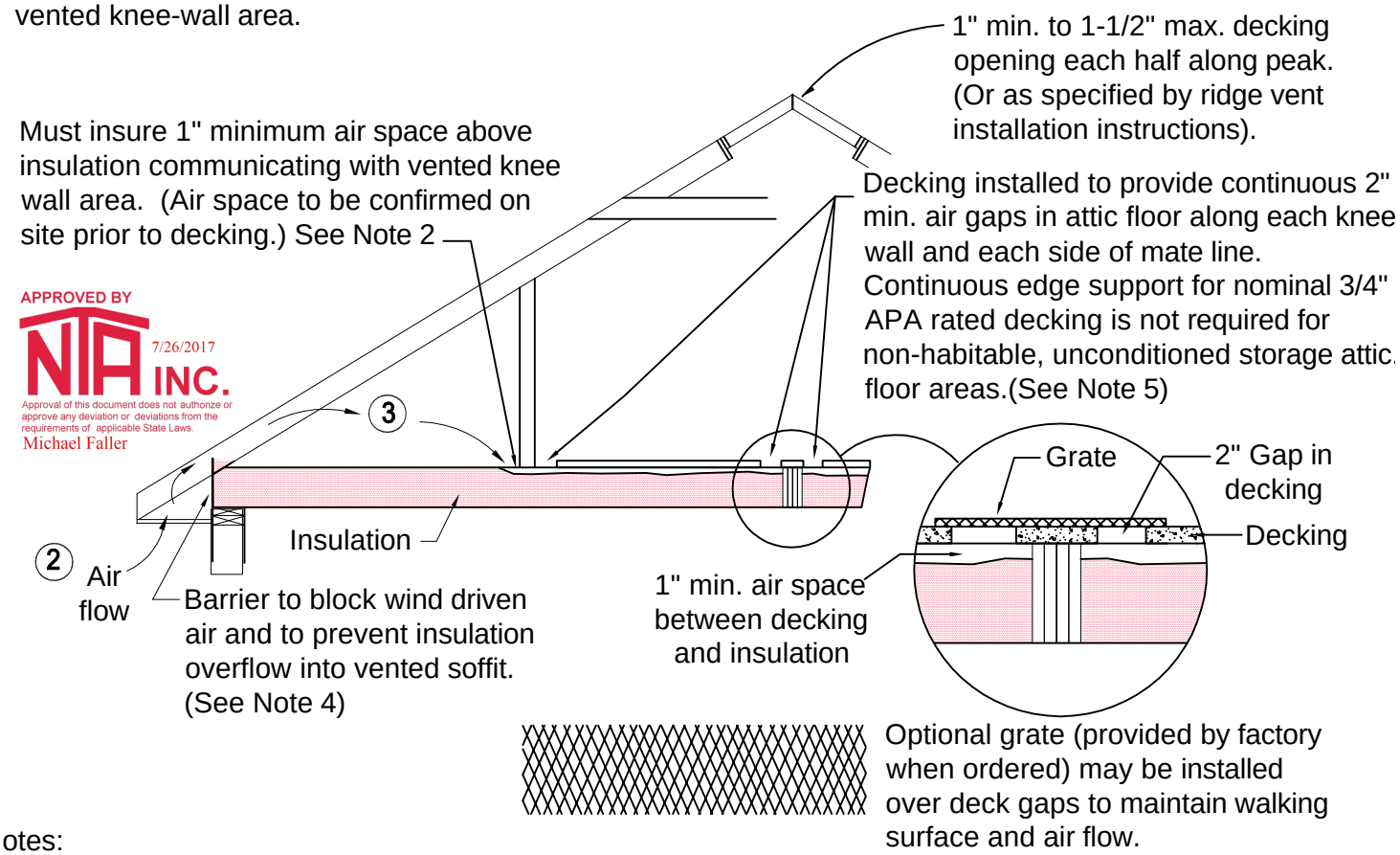


Fig. 5.14 B - Typical Cape Cod or Storage Attic Insulation Build-Out

ALT. INSULATION METHOD APPLICABLE FOR NON-HABITABLE STORAGE ATTIC ONLY

It is recommended that the insulation methods shown in Fig. 5.14 & 5.14A be used. However, a less desirable method is shown below in Fig. 5.15 in the event that the previous methods shown are not utilized for any reason. This alternate method, (which should only be used for non-habitable attic spaces), requires that gaps be provided in the attic floor decking to allow the insulated floor cavity to properly dissipate any moisture created by the warm living area directly below. Required also is a ventilation space between the bottom of the floor decking and the top of the insulation in the floor cavity which must communicate with the vented knee-wall area.



Notes:

1. Failure to ventilate unconditioned attic areas may result in wet insulation and moisture damage to the roof system and will void the warranty on homes.

2. Care is to be taken to ensure a clear air space is maintained between bottom of floor decking and top of insulation in floor cavity. This needs to be confirmed on site since insulation may shift and pile during transit and set up.

3. Inspect to confirm that air paths to under side of floor decking are not blocked at under knee wall.

4. Factory installed baffle or other method must be employed to prevent insulation from overflowing into vented soffit and/or blocking air flow from soffit to attic area. (For future habitable cape, this baffle must be a barrier against air infiltration into the porous insulation as well. FIberglass insulation would not qualify for this air barrier material. When converting to conditioned habitable cape refer to Figure 5.12). IMPORTANT: Two section width homes with roof pitch less than 9/12 typically ARE NOT DESIGNED FOR, and DO NOT PROVIDE FOR, required space in the attic to constitute a habitable area by code and must not be finished as such.

5. Any future conversion to living space requires that decking edges be continuously supported by blocking or by a solid T&G decking joint.

Fig. 5.15 - Typical Non-Habitable Storage Attic Insulation With Floor Ventilation

5.10 Attic Closure at Gable Ends

There are various methods employed to close off the gable ends of the home after the home modules are matec together, the roof system is raised, and secured in place. Most applications involve placing factory constructed "wedge" shaped framed walls between the end truss top chord and bottom chord. To accommodate this installation, the hinged "knee wall" support member of the truss may need to be removed prior to inserting the pre-built wedge walls. These walls provide support for the truss top chord as well as close off the ends of the attic from the outdoors. There is typically factory-installed OSB on the outside of the assembly which overhangs the perimeter of the framework. Once the wedge walls are in place, the framework is to be fastened to the truss members around the perimeter with #8 x 3" screws or equivalent: 12" o.c. 115 Ult mph, 6" o.c. 140 Ult mph, and 4" o.c. for up to 167 Ult mph. The edges of the over hanging sheathing material are to be fastened to the truss members that it contacts with: 7/16" x 1-1/2" X 16ga staples or equivalent at 12" o.c. Figure 5-16 below illustrates the typical installation of the gable walls between the truss top and bottom chords.

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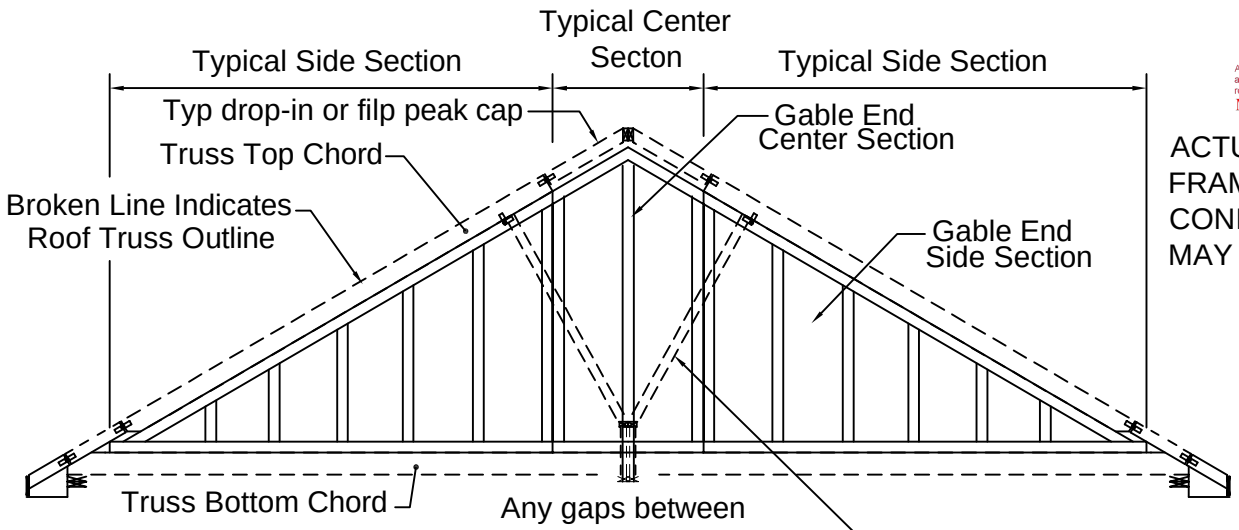
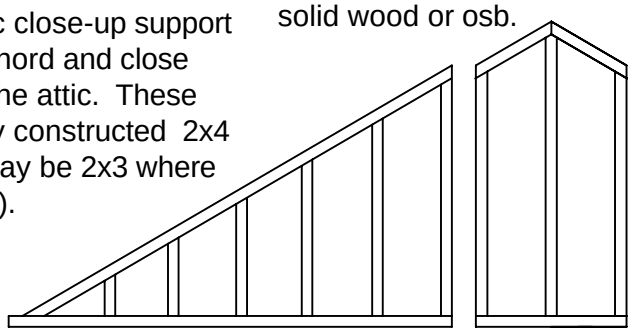
ACTUAL SECTION FRAMING CONFIGURATIONS MAY VARY



Factory supplied gable end sections for hinged roof attic close-up support the end truss top chord and close the gable ends of the attic. These are typically factory constructed 2x4 or 2x6 framing. (May be 2x3 where wind design allows).



OSB sheathing must cover the exterior face of the gable end walls and be fastened per paragraph above.

ACTUAL SECTION FRAMING CONFIGURATIONS MAY VARY

Fig. 5.16 - Typical Attic Closure at Gable Ends

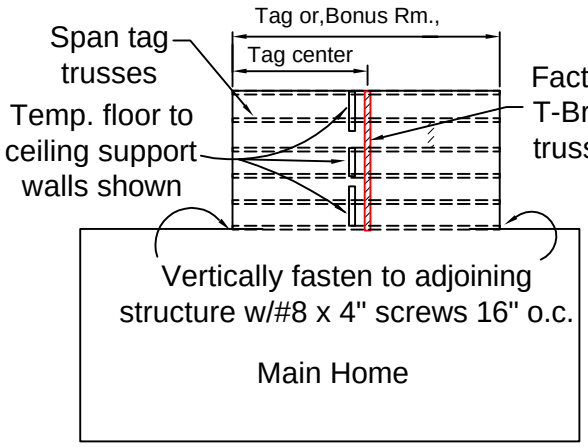
Alternate Factory Gable End Construction May Occur as Follows:

Some manufacturing facilities employ a method of setting the end truss of the home back 1-1/2" to allow for a factory built wedge assembly to rest on the end wall of the home directly adjacent to the face of the end truss. In this instance, the wedge walls are constructed with the dimensional lumber oriented flat so that it will sit on the 1-1/2" nominal space provided by the truss set-back. These walls are fastened in like manner as previously described except that the fasteners are driven through the outer face of the OSB covered gable assembly into the face of the end truss members. (Not illustrated)

5.11 Typical Full Span Tag / Bonus Room Truss Connections

Important Notice:

When full span (one piece) tag unit trusses are not properly supported, this can result in extreme deflection of the bottom chord of the truss necessitating costly on-site repairs. In order to insure that sagging does not occur in the bottom chord, temporary measures are implemented at the factory to effectively support the tag truss system in transit. These measures are not to be removed on site until all procedures and connections described below are completed.



1. Position unit and set up roof.
2. Connect knee walls to bottom chord as shown. (H2A straps provided)
3. Install and connect collar ties as shown.
4. Connect peak rails together and install Simpson angles to peak rails and and truss chords as shown.
5. **After all connections are complete**, the T-Brace member and any temporary floor to ceiling support walls may be removed.

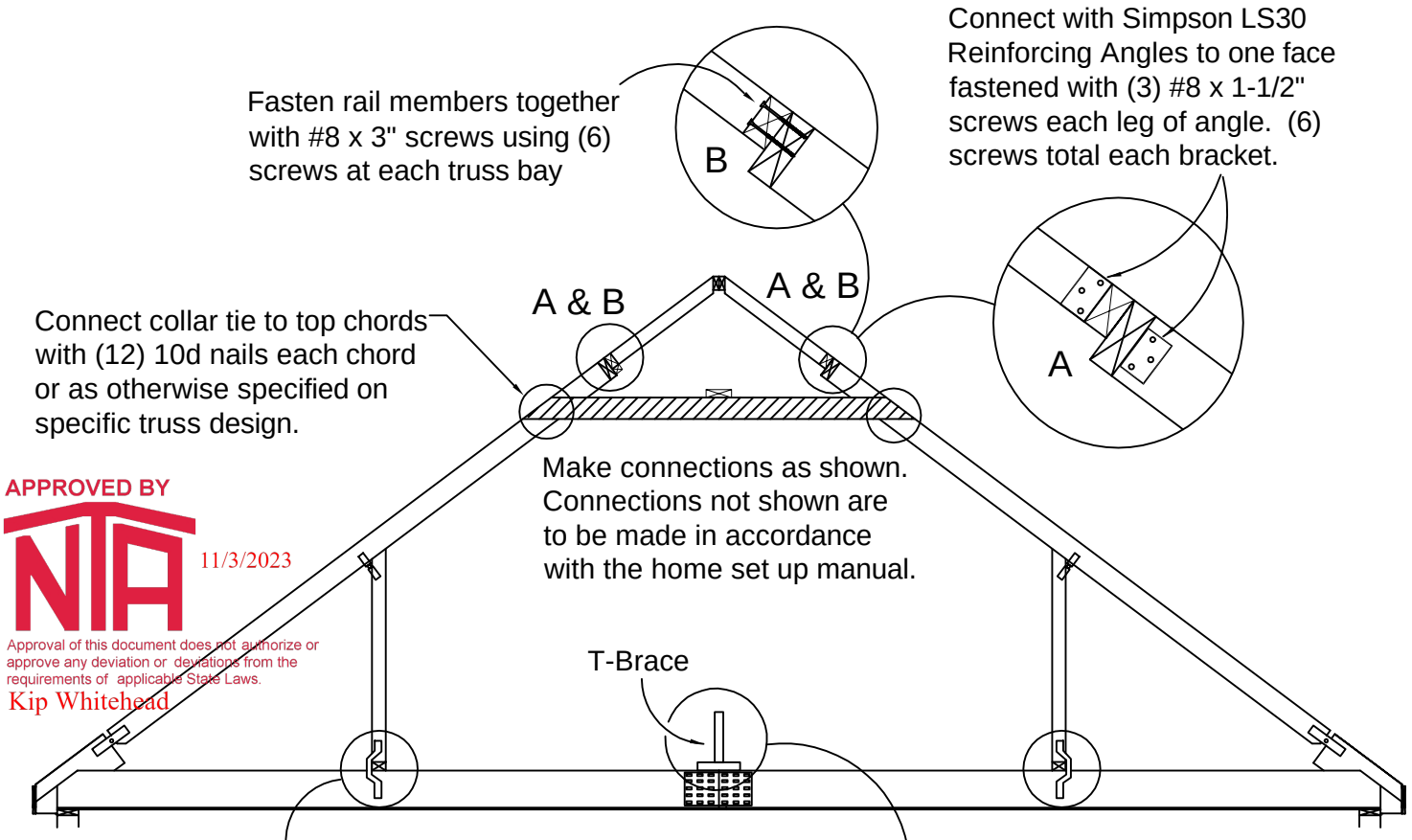
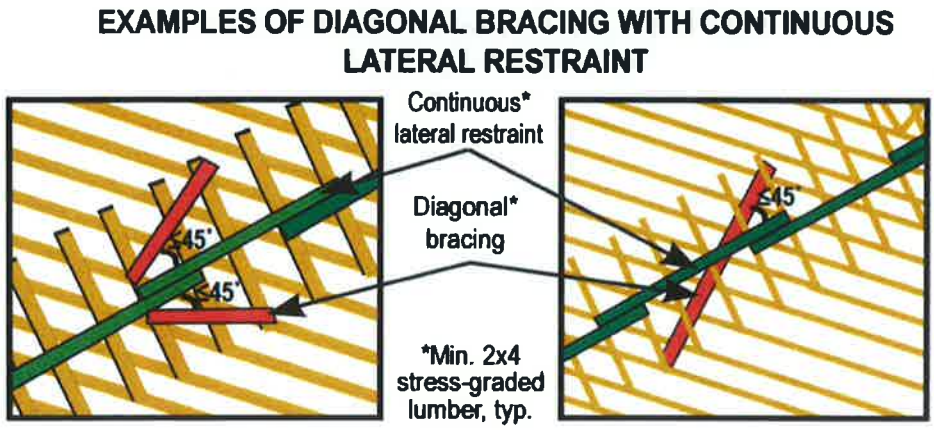
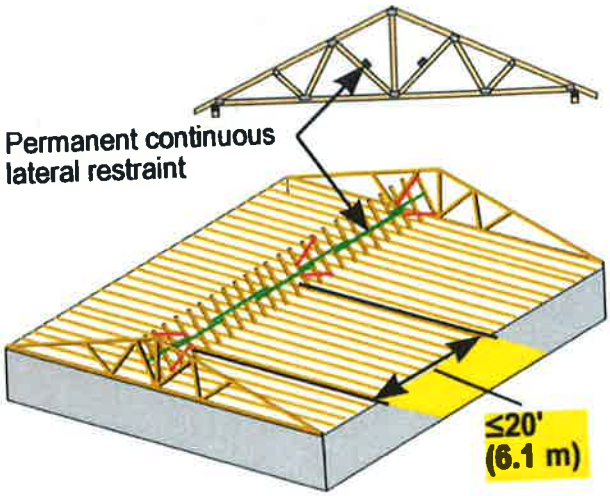
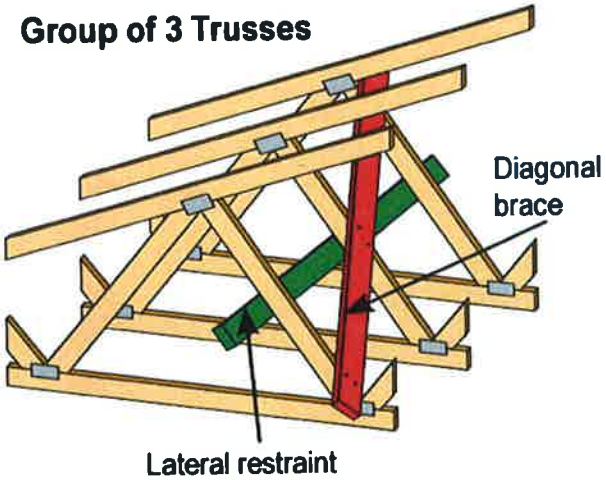


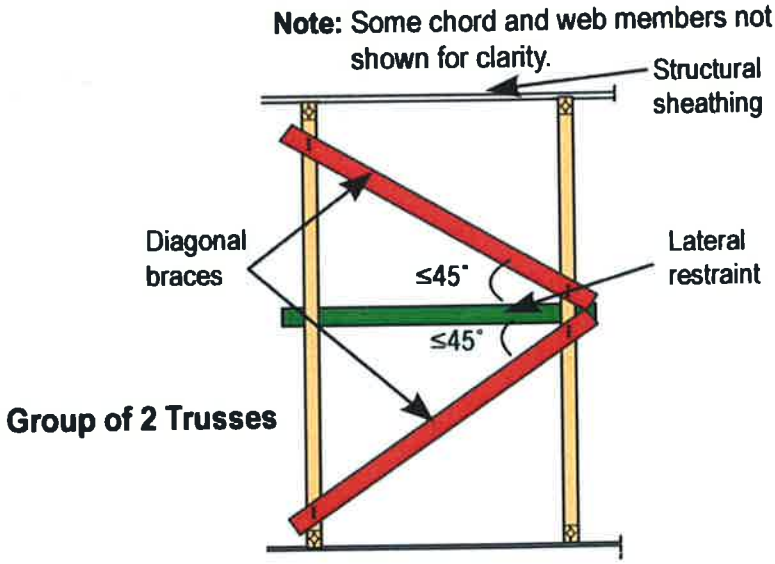
Fig. 5.17 Span Tag Truss Connections

5.12 Typical Truss Web Bracing Applications









Notes:

1. See truss diagram for req'd continuous lateral restraint locations along truss webs. If no bracing locations are shown, none shall be required.
2. Bracing material shall be min. 2x4 w/(2) 0.128" x 3" nails per truss.
3. Provide diagonal web braces as shown above along required continuous web bracing. (As required on truss design diagram)

Fig. 5.18 Truss Web Bracing

5.13 Bracing To Enhance Floor Rigidity

Wider home sections may produce vibration when walked on at limited locations of the floor. This is a common occurrence but does not indicate a condition of over deflection in the floor structure. In order to prevent or reduce this minor vibration, it is recommended that a floor stiffening T-brace be installed along the center of the floor beneath the joists of each floor section in homes exceeding 14' in width, or in any section, where sponginess is detected.

Unless the "T-brace" as described below has been installed at the factory, install a like brace to all floor sections wider than 14' on site. This bracing technique may also be applied to prevent vibration which may occur on any area of the floor regardless of section width. Refer to detail below for construction and attachment of the T-brace member.

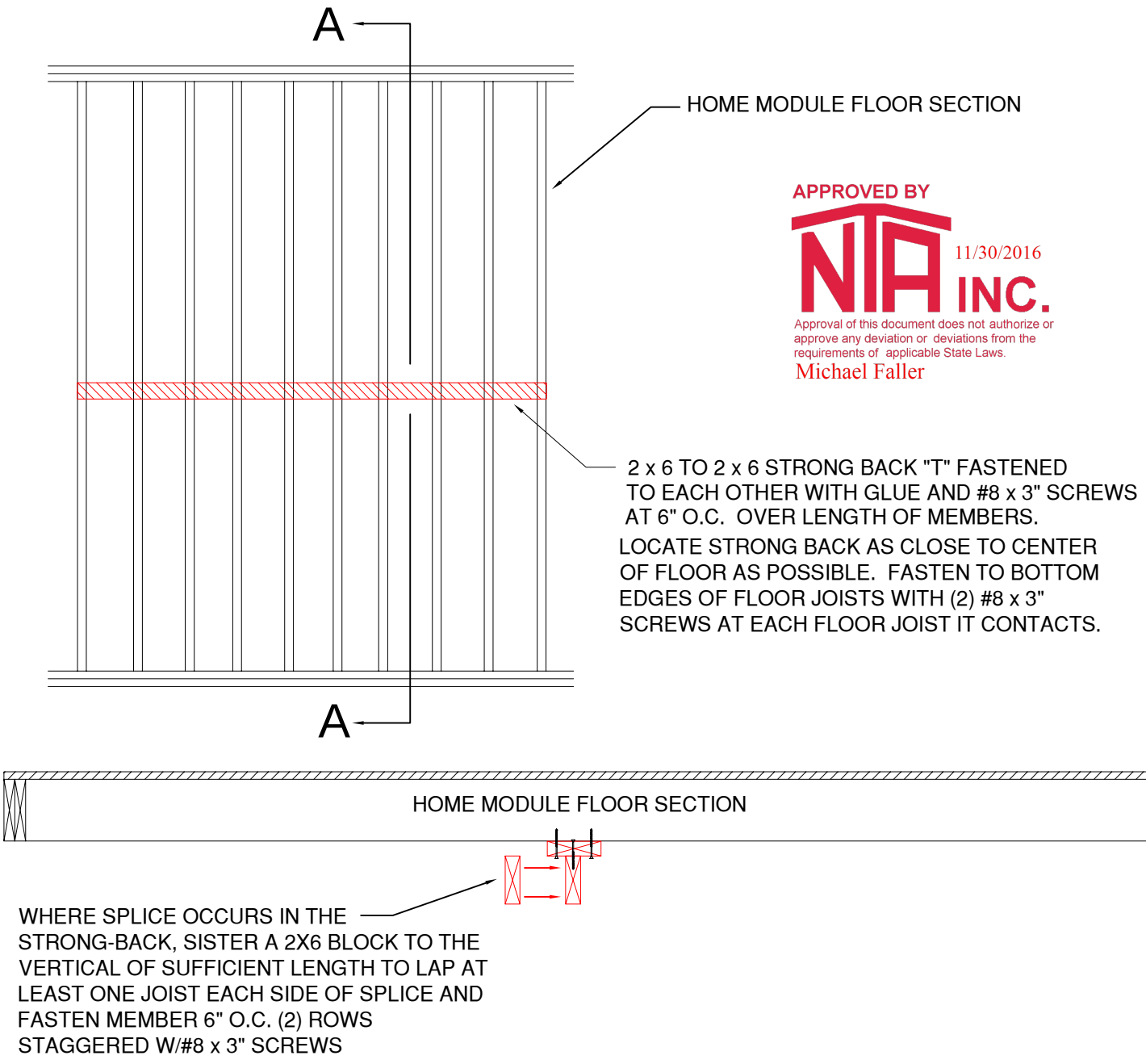


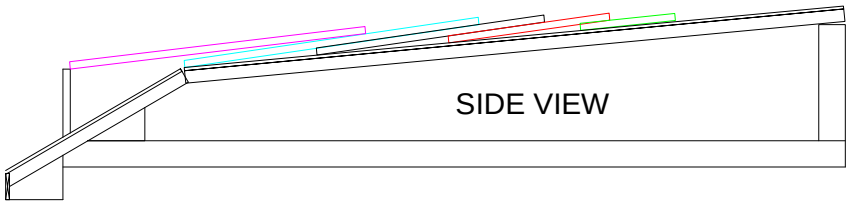
Fig. 5.19 T-Brace Floor Stiffener

6.1 Basic Dormer Applications

Optional roof dormers may be included with the home. These come in various applications and set up will depend on the style of dormer that is used. The dormers addressed here in are decorative and do not provide functionality from the interior of the home. The functional dormers which primarily occur on cape cod homes are addressed in the Cape and Storage sections of Chapter-5. Dormers for homes which have fixed-pitch (non-hinged) roof systems are completed in the factory and arrive with the dormer in place. Dormers which occur on hinged roofs are factory installed if the dormer is completely located below the main hinge line of the the homes roof. Dormers which cross over the main hinge line must be completed on site after the homes roof has been raised, fastened in place, and has been completed to the peak.

1. The hinged dormer kit is placed on the roof at the factory in a manner that the individual truss components are connected at their proper locations with a hinge to facilitate the tipping of trusses to their upright position on site. The hinge connection to the roof is non-structural and is only intended to aid in placement and set up. Some of the smaller trusses near the peak of the main home may need to be installed on site due to the absence of the main roof peak.

Typical folding dormer in colapsed positon.



① Raise the first hinged rafter on the non-hinged portion of the main roof. Block this rafter into plumb vertical position and secure it's bottom chords to the top chord of the vertical member it is hinged to. The example shown has only one hinged rafter located on the non-hinged portion of the main roof. Any additonal hinged rafters in this area are to be blocked and secured in the same fashion.

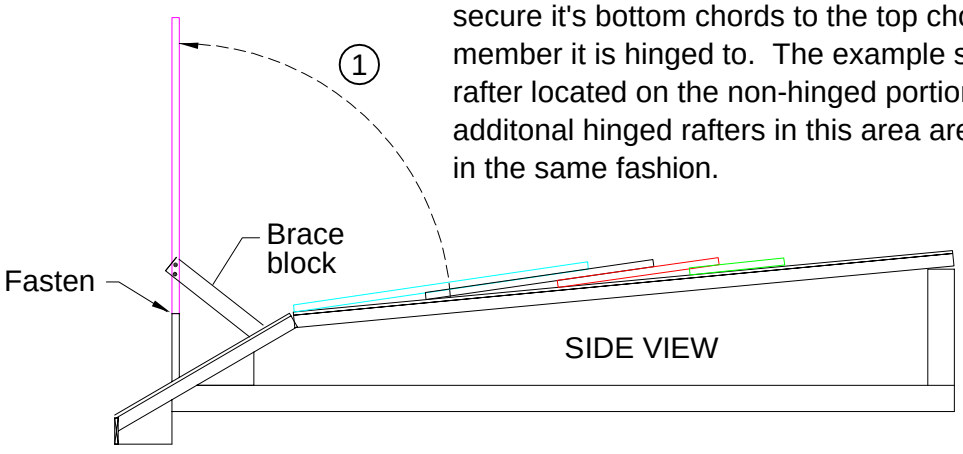
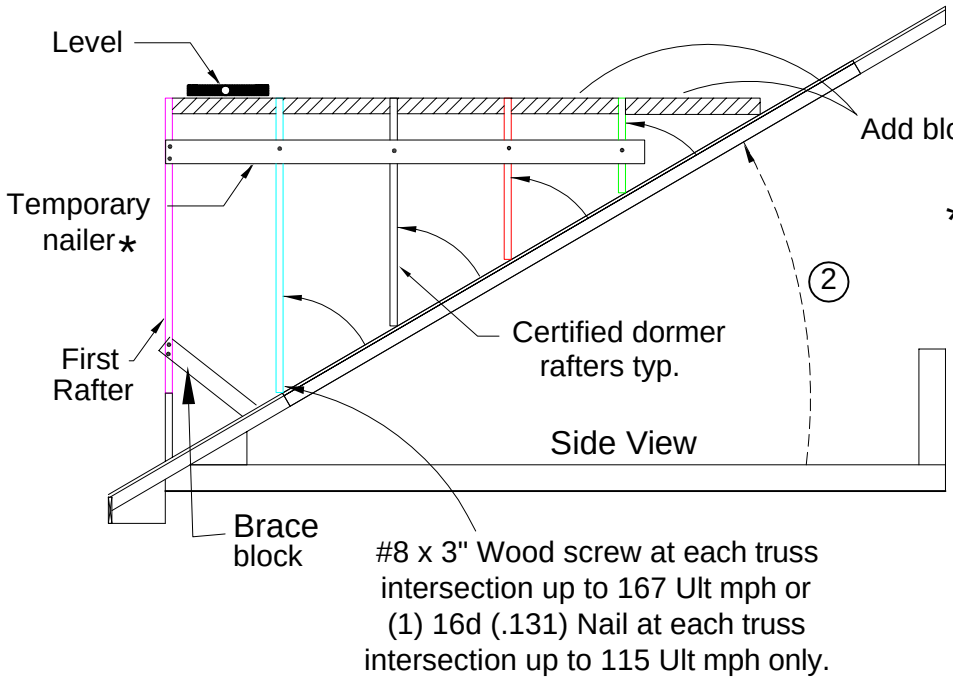


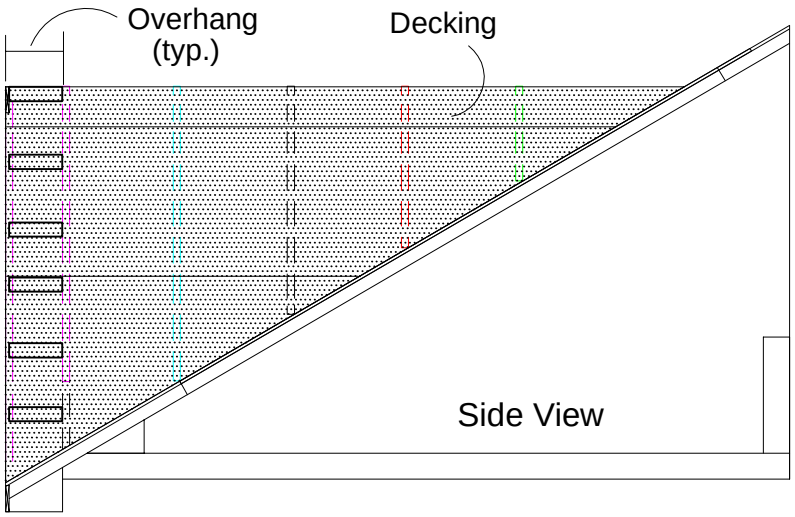
Fig. 6.1 - Typical Folding Dormer

② Raise the main roof and set according to standard hinged roof procedures.

*③ Mark out a temporary nailer for proper spacing of the hinged dormer rafters. Fasten nailer to the first rafter and to the other hinged dormer rafters as they are raised to the plumb vertical position.



* NOTE : Some dormer rafter kits have a notch designed into the peak for insertion of a 2x4 ridge rail. When this is the case, the temporary nailer and the blocking at the peak is not necessary. The ridge rail serves the function for both of these elements. Truss spacing and specific details are provided with the set-up package.



④ If brace blocks must be removed, ensure that enough decking is installed to the dormer to stabilize the rafters prior to removing the braces.

⑤ Add overhang and fascia board to end of dormer. (See Fig. 6.12)

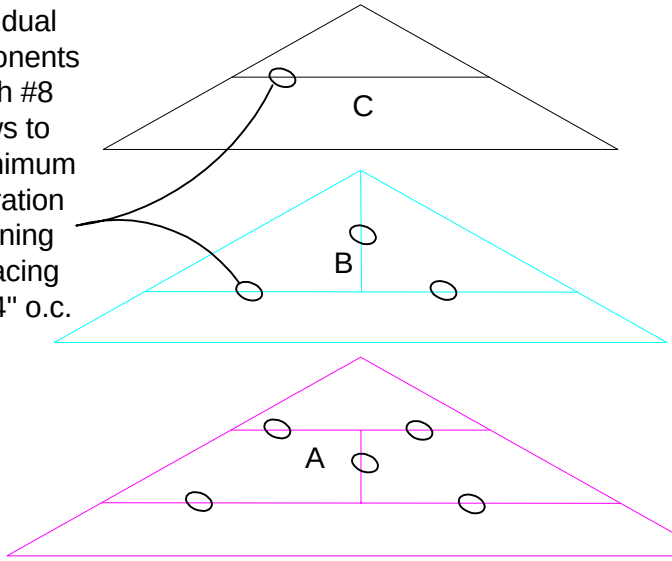
⑥ Deck the dormer as much as possible before removing the temporary nailer/ spacer board. Then finish decking the dormer.

⑦ Add paper and shingles and finish

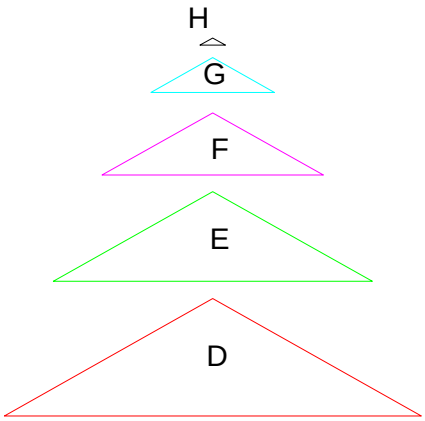
Fig. 6.1.1 - Typical Folding Dormer (Continued)

2. Shipped loose dormer kits consist of a package of dormer trusses to be positioned and installed individually on-site. Larger dormer trusses may consist of two or more sections which must be site-assembled before they are positioned and fastened to the main roof.

Attach individual dormer components together with #8 wood screws to achieve a minimum 1-1/4" penetration into all adjoining surfaces spacing fasteners at 4" o.c.



= Connection of components required



Larger trusses may be shipped in multiple sections for site assembly. Fasten such truss components together according to truss component fastening procedure described above.

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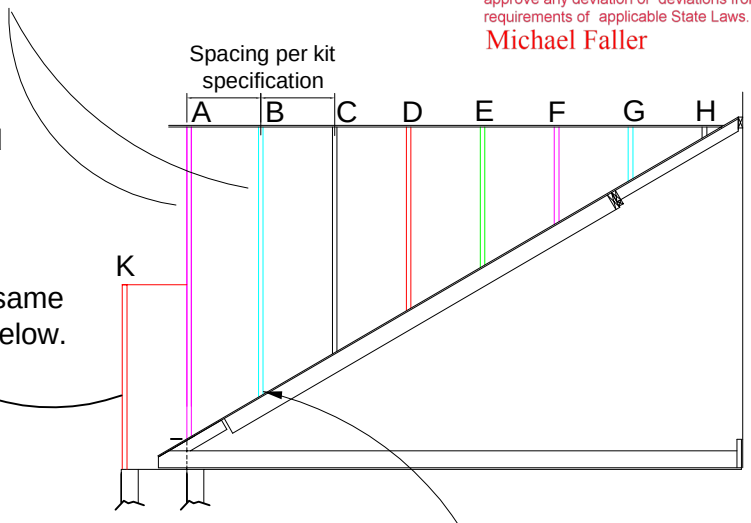
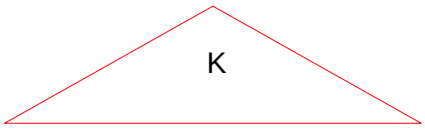
Typical shipped loose dormer kit size and number of dormer trusses varies per home.Trusses are shipped loose with home and positioned on site in accordance with proper spacing specified with dormer kit. Fasten to roof per typical dormer fastening procedure in this section.



Optional Double Dormer has the same fastening requirements outlined below.

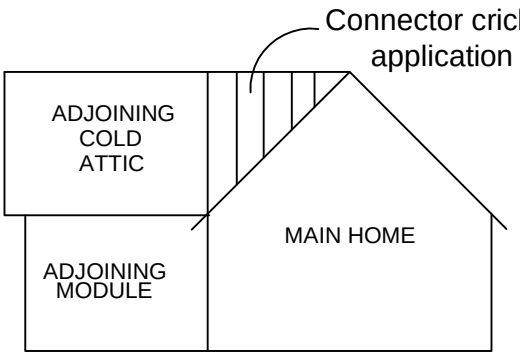


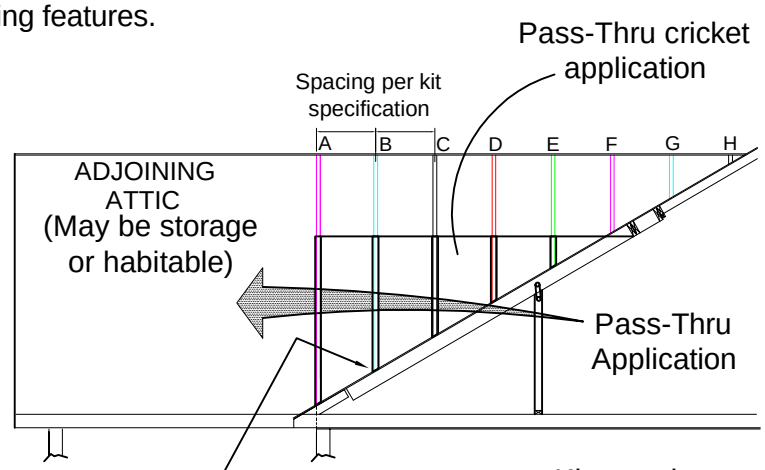
For completion of the ship loose dormer, see the finishing procedures outlined in the folding dormer application. (Fig. 6.1)
Steps 1-7 outlined in the folding dormer application are identical once the components have been erected on the main roof of the home.

#8 x 3" Wood screw at each truss intersection up to 167 Ult mph or (1) 16d (.131) Nail at each truss intersection up to 115 Ult mph only.

Fig. 6.2 - Typical Shipped-Loose Truss Dormer

3. Homes may need to have a connecting cricket dormer installed in order to complete the roof line of an adjoining module to the roof of the main home. Cape homes often are equipped with dormer trusses which are designed to provide a "pass-thru" passage to the adjoining attic roof area. These dormers usually also incorporate a functional window at the dormer gable end. These two types of dormers share the same basic set-up method. See Fig. 6.3 for their distinguishing features.





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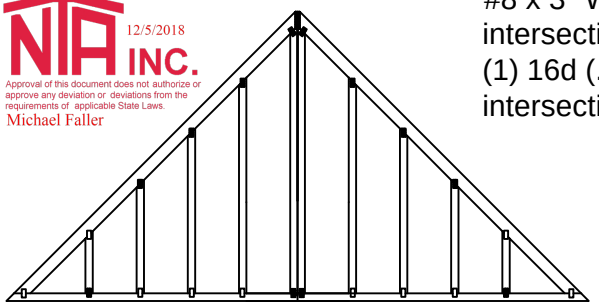
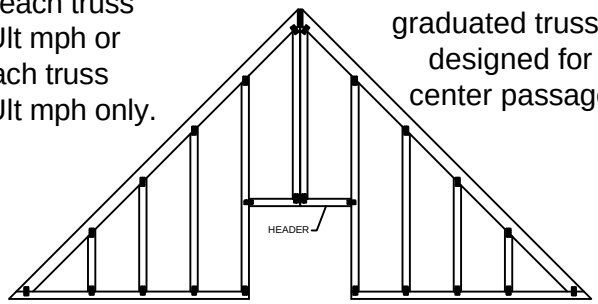
#8 x 3" Wood screw at each truss intersection up to 167 Ult mph or (1) 16d (.131) Nail at each truss intersection up to 115 Ult mph only.



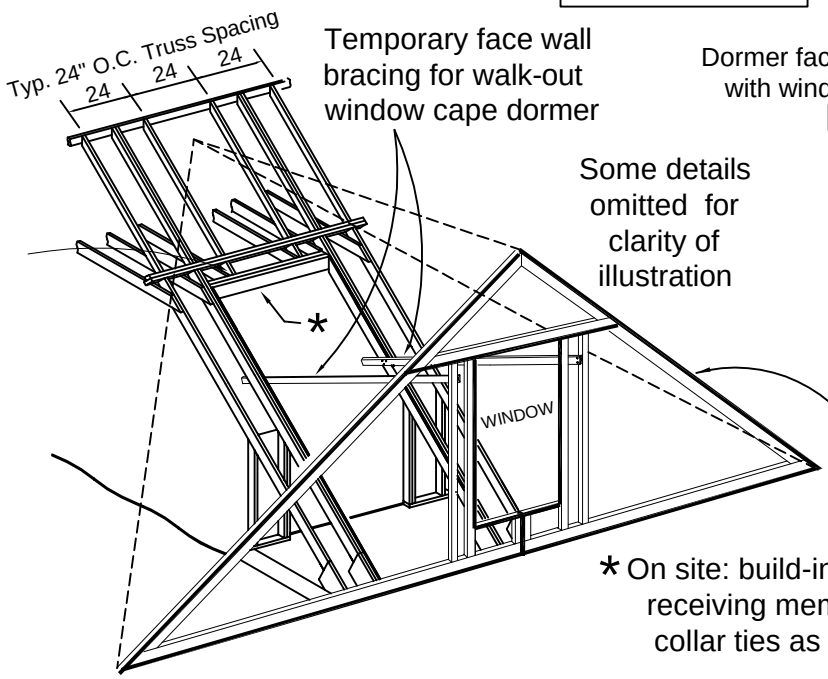
TYPICAL PRE-MANUFACTURED CONNECTOR "CRICKET"

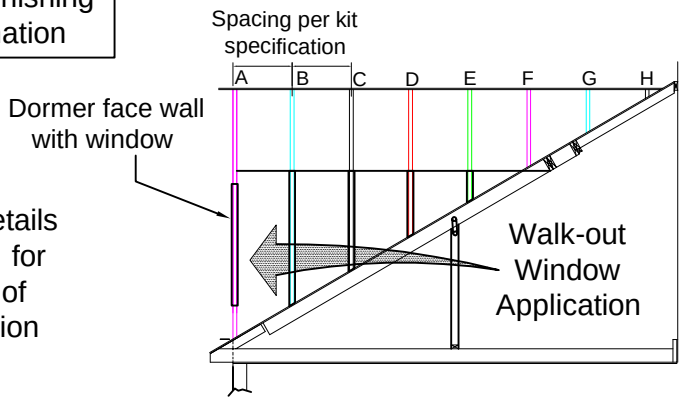
Kit contains graduated trusses designed for center passage



TYPICAL PRE-MANUFACTURED PASS-THRU "CRiCKET"

See Fig. 6-1.1 for typical finishing information





Plumb dormer face wall. Brace face wall to inside of roof opening temporarily until other dormer trusses are assembled and set.

* On site: build-in header & receiving members for collar ties as required

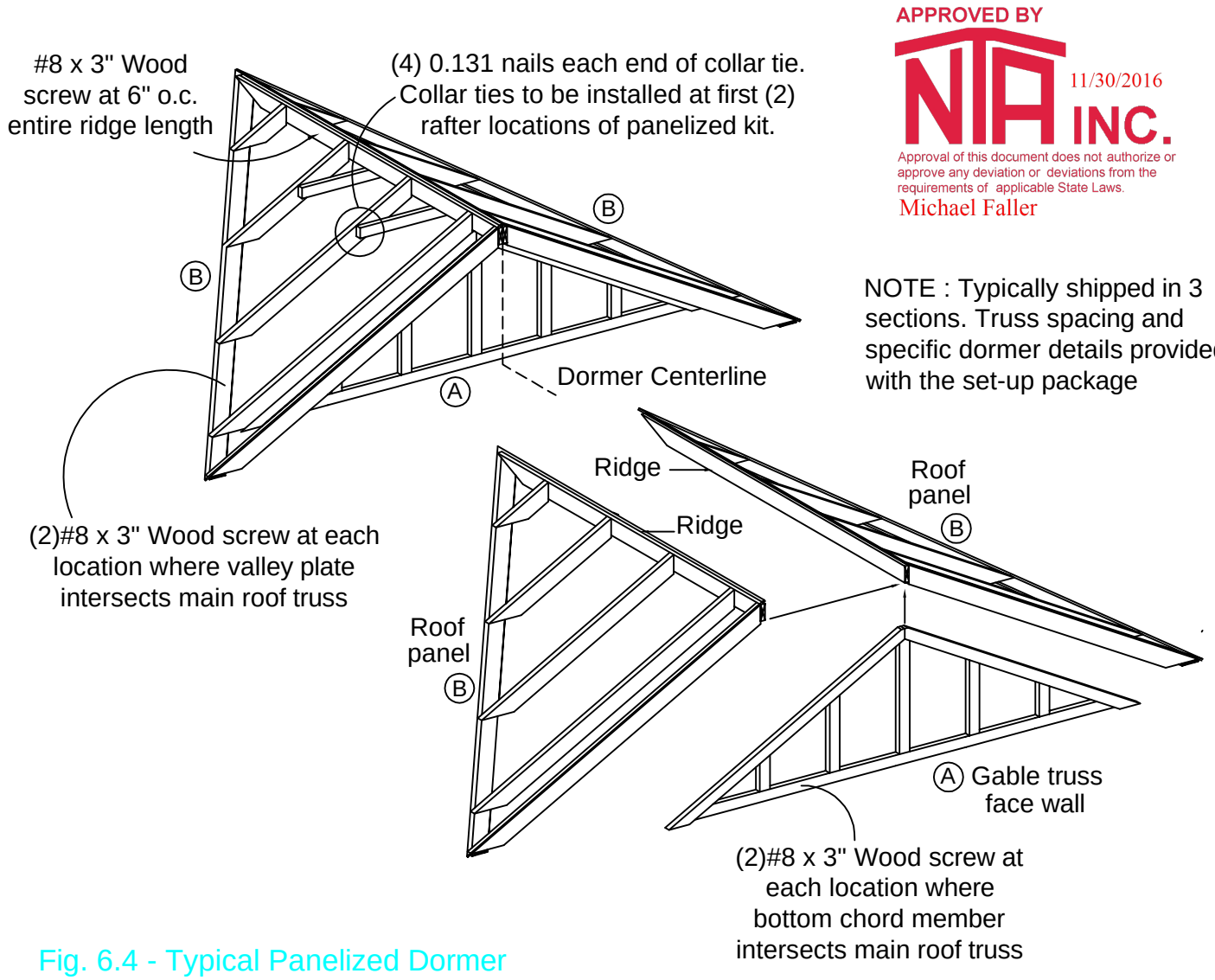
See Fig. 6.2 for typical component connections of multi-section dormer trusses

Fig. 6.3 - Typical Egress Dormer Field Connections

6.2 Typical Panelized Dormer

In some cases the dormer may be panelized. This typically arrives with a face wall and roof panels assembled from the factory. It may have other elements that will need assembled on site. The following is a general guideline to follow when starting the erection of the panelized dormer.

1. Mark centerline of dormer all the the way up roof deck to peak. Roof deck must be perpendicular to roof ridge line.(chalk line may be used or some other highly visible marking).
2. Mark dormer outline on roof deck. Reference provided dormer drawing for overall length and width.
3. Position gable support wall on roof deck, flush with exterior wall framing. Plumb gable support wall and place temporary bracing to hold in place. Fasten gable support wall at each main roof truss intersection per below requirements.
4. Fasten roof panels to roof deck along dormer outlines. Roof panels should meet together at the ends. Fasten to main roof deck per below requirements.
5.Fasten roof panels together along the ridge line per below requirements.
6. Install decking as shown in provided dormer drawing. Fasten decking to rafters with 10d nails 6" o.c. at all edges and 12" o.c. in the field.
7. Install 90# felt paper at valley areas. Install 15# felt paper and shingles per ARMA guidelines or per manufacturer's instructions.



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NOTE : Typically shipped in 3 sections. Truss spacing and specific dormer details provided with the set-up package

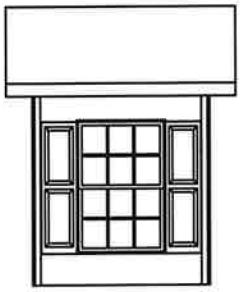
Fig. 6.4 - Typical Panelized Dormer

6.3 Typical Cape Dormers

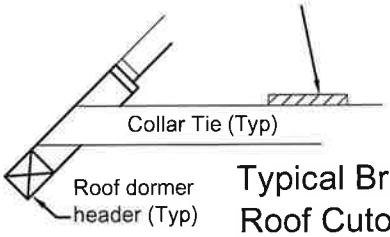
Refer to Fig. 6.5 and Fig. 6.6 for two basic types of cape dormers. These dormers may be factory constructed and shipped on the home transport carrier not installed on the roof. Any factory built dormer will need to be placed and positioned on the home utilizing a crane. There is also a panelized version of dormer where individual components are constructed in the factory with the intent the dormer is to be constructed in place on the home utilizing the separate components supplied by the factory. Refer to Fig. 6.7 for typical panelized dormer information.

Conventional Cape Dormer
See Fig. 6.5

Optional Shed Dormer
See Fig. 6.6

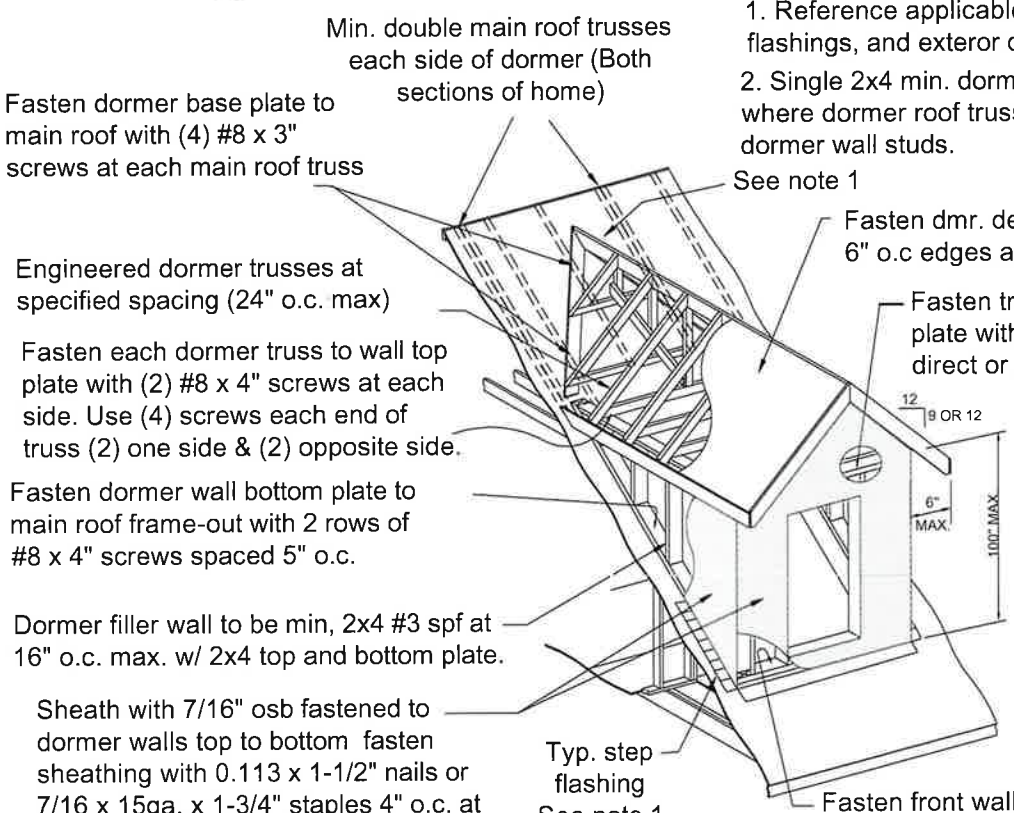


Brace member, when required, is shipped loose for site installation:
LVL member to extend to trusses each side of dormer opening. Fasten at each contact to end & intervening collar ties using (10) 0.131 nails per truss location.



Typical Bracing Over Roof Cutout Dormer

NOTES :
1. Reference applicable codes for roof underlayments, flashings, and exteror coverings such as shingles etc.
2. Single 2x4 min. dormer wall top plate is permissible where dormer roof trusses line up within 1-1/2" of dormer wall studs.

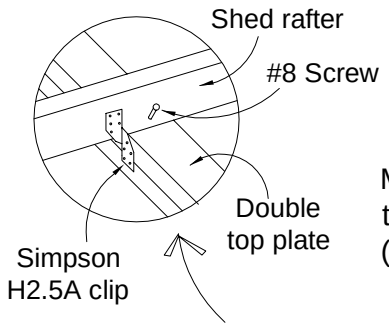


Alternately, where ever screws are specified, 5/16" lags to achieve 1-1/2" penetration. Lags to be spaced 24" o.c. max. if installed direct (16" o.c. if toe-lagged) To prevent splits, pilot holes to be drilled when lags are used.

150 Ult MPH MAXIMUM WIND

Fig. 6.5 - Conventional Cape Window Dormer

Note: If dormer face wall is designed continuous to attic floor, refer to Fig. 6.6 for fastening application.

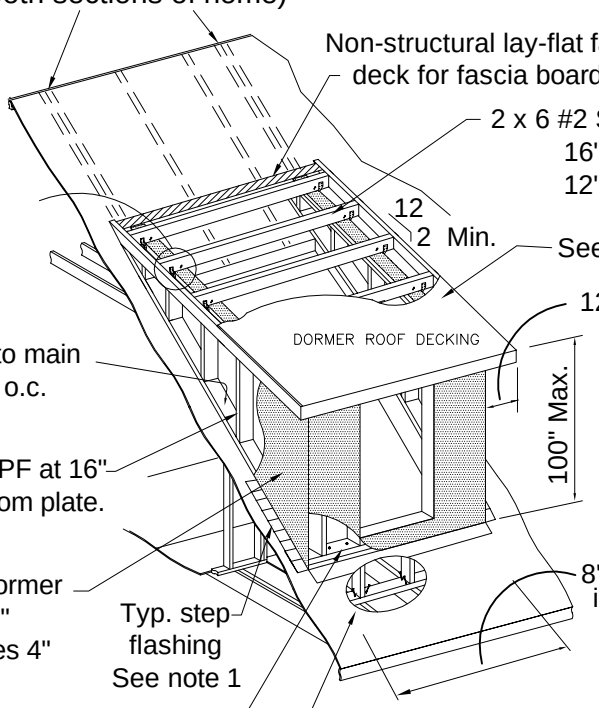


Fasten each dormer roof member to wall top plate each side w/ (1) Simpson H2.5A or equiv. rafter to top plate plus (1) #8 toe screw for 1-1/2" min. penetration See note 2

Notes :

1. Reference applicable codes for roof underlayments, flashings, and exterior coverings such as shingles, etc.
2. Double top plate required for dormer side walls. This is necessary to accommodate the installation of Simpson H2.5A connectors.

Min. double main roof trusses each side of dormer (Both sections of home)



Non-structural lay-flat fastened to roof deck for fascia board securement

2 x 6 #2 SPF min. roof framing spaced
16" o.c max. up to 60 p.s.f.
12" o.c max. up to 80 p.s.f.

See note 1

12" Max. O.H.

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167 Ult MPH MAXIMUM WIND

Fasten dormer wall bottom plate to main roof truss w/ #8 x 4" screws @ 4" o.c.

Dmr. side wall to be min. 2 x 4 #3 SPF at 16" o.c. max. w/ 2 x 4 min. top and bottom plate. See note 2

Sheath w/ 7/16" OSB fastened to dormer walls top to bottom w/ 0.113 x 1-1/2" nails or 7/16" x 15ga. x 1-3/4" staples 4" o.c. at perimeter and 6" o.c. in field.

Typ. step flashing See note 1

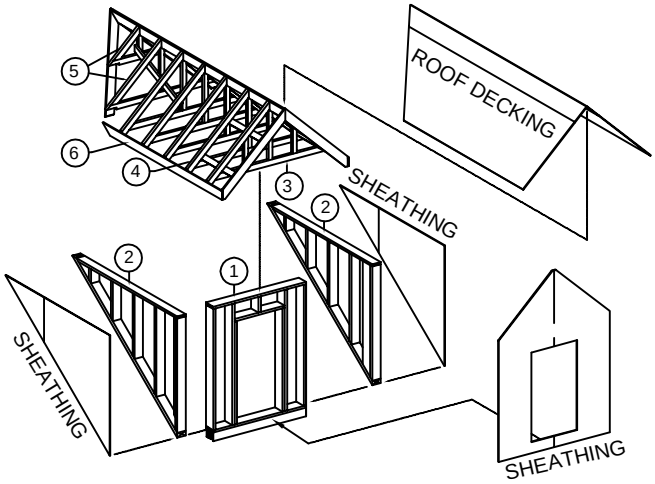
8'-0" max. opening width in main roof for dormer

If face dormer wall is designed to set on top of a stub wall: Fasten front wall bottom plate to lower stub wall top plate w/ (2) 0.131 nails or #8 screws each stud bay to achieve 1" penetration

If the face dormer wall is continuous to the floor of the attic. Fasten face wall bottom plate to attic floor framing with (2) 0.131 nails or #8 screws to achieve 1" min. penetration.

Fig. 6.6 - Typical Shed Window Type Dormer

Cape dormers are usually fully built at the factory and shipped as a component to be site positioned by a crane and connected to the roof as described in Figures 6.5 and 6.6. Fig. 6.7 describes the basic components and order of assembly in panelized format. Crane set is recommended.



① Face wall component - fastening and flashing per previous Figure details.

② Side wall component - fastening and step flashing per pervious Figure details.

③ Face truss designed with upright members and to bear on dormer sidewalls and fastened per previous Figure details.

④ Trusses or rafters designed to bear on dormer sidewalls and fastened per previous Figures.

⑤ Cricket trusses designed to bear bear on roof valley plate to complete dormer roof line.

⑥ Cricket trusses designed to bear bear on roof valley plate to complete dormer roof line.

Fig. 6.7 - Typical Panelized Window Dormer

6.4 Typical Cape Shed Roof

For Cape Shed Roof design (when available) as depicted below,there are multiple horizontal, lateral, and vertical connections. Generally these connections are calculated and need to be followed with accuracy to ensure that the proper structural stability is achieved on site. There are multiple steps that need to be achieved in sequence. There are also vital straps and connecting brackets that must match the calculated connections outlined in the design package for the home. Generally the calculated connections must be followed using Simpson brand straps and connectors or equivalent. Circled areas depicted on this page are critical structural site connections. **Reference the design package provided with the home for required strapping and fastening specifications.**

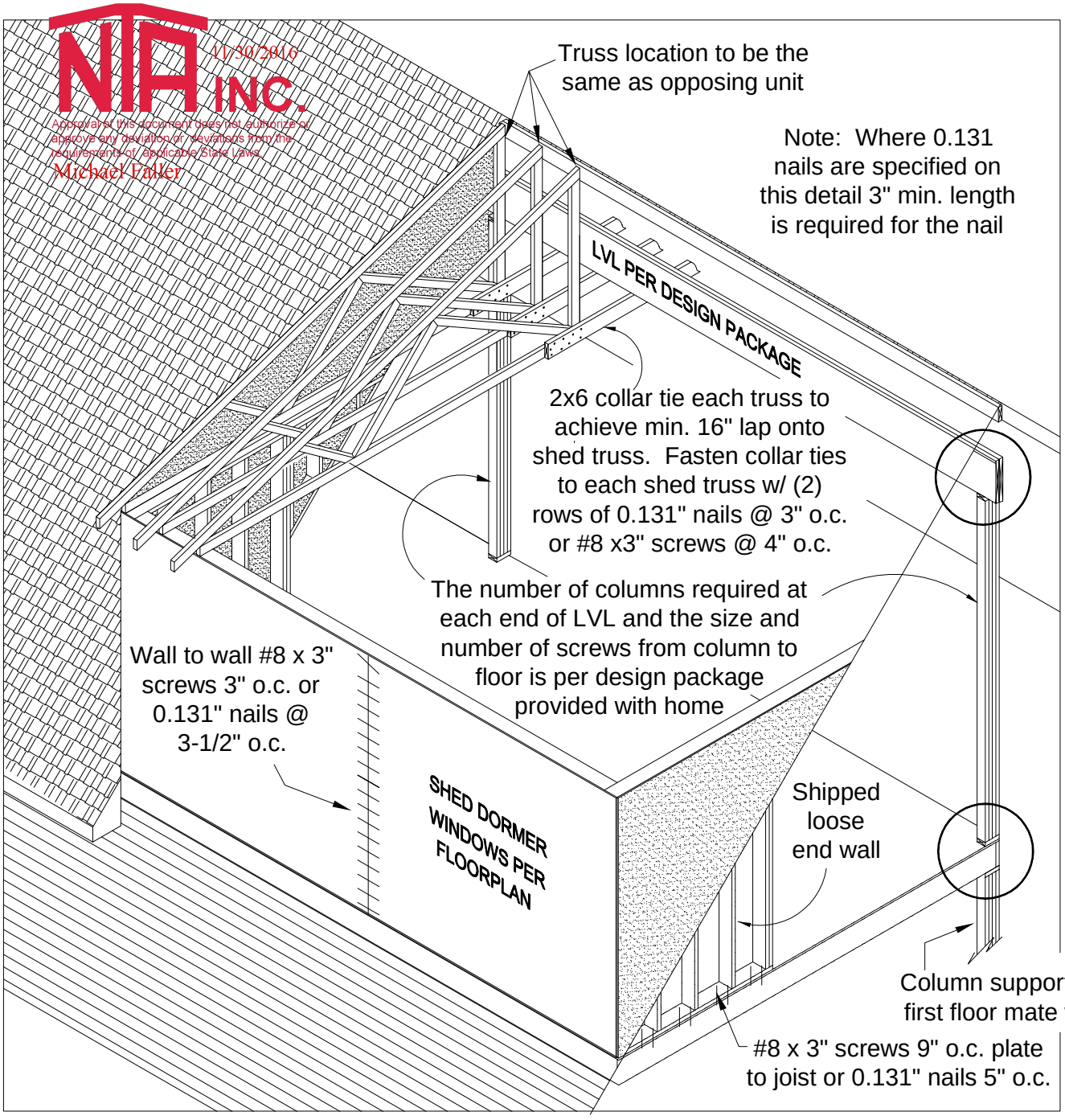
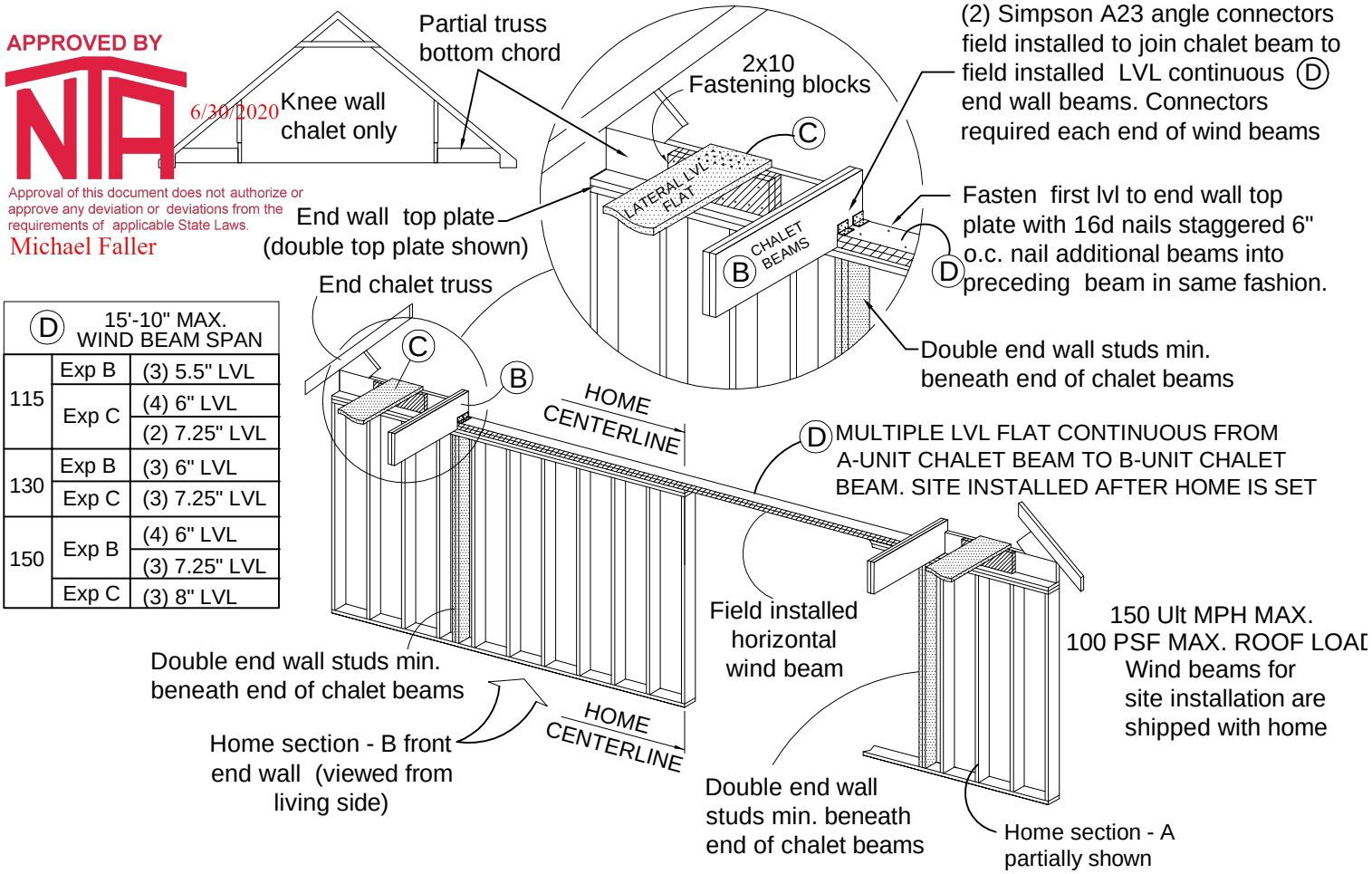


Fig. 6.8 - Shed Roof

6.5 Typical Knee Wall Chalet Wind Beam Installation

This detail is only applicable where the factory construction reflects the partial truss bottom chord connecting to the chalet beam over the home end wall each side of chalet area. Refer to site installed vertical wind wall details for chalet where full length truss bottom chord rests upon the end walls.



(D) 15'-10" MAX. WIND BEAM SPAN		
115	Exp B	(3) 5.5" LVL
	Exp C	(4) 6" LVL
		(2) 7.25" LVL
130	Exp B	(3) 6" LVL
	Exp C	(3) 7.25" LVL
150	Exp B	(4) 6" LVL
		(3) 7.25" LVL
	Exp C	(3) 8" LVL

GENERAL NOTES:

1. Factory installed temporary 2x10 cross framing in chalet area will need to be removed after home is set. If mating line shipping members are integral with home center beam, the temporary portion of the beam must be cut out of chalet area on site.
2. Attic endwall bottom plate must be notched at flat lvl beam location. **DO NOT CUT LAID FLAT LVL BEAM.**
3. If manufactured hinged knee wall is present, the knee wall need not be strapped at the hinged location on the top chord of the truss.
4. If the CHALET home you are erecting is different than the design depicted here, please reference the design package provided with the home.

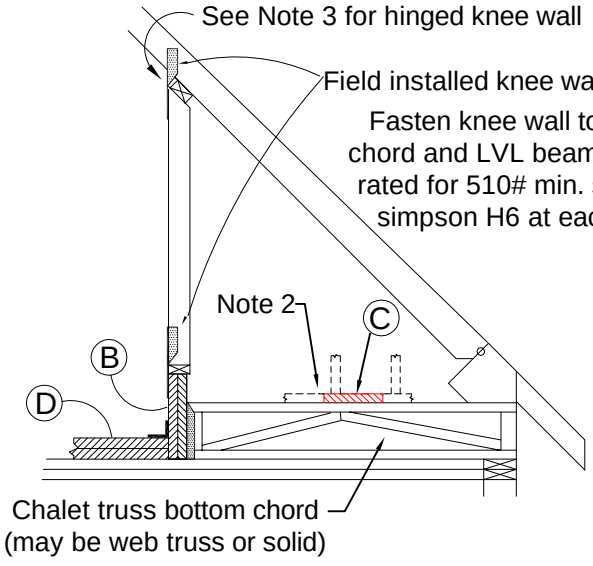
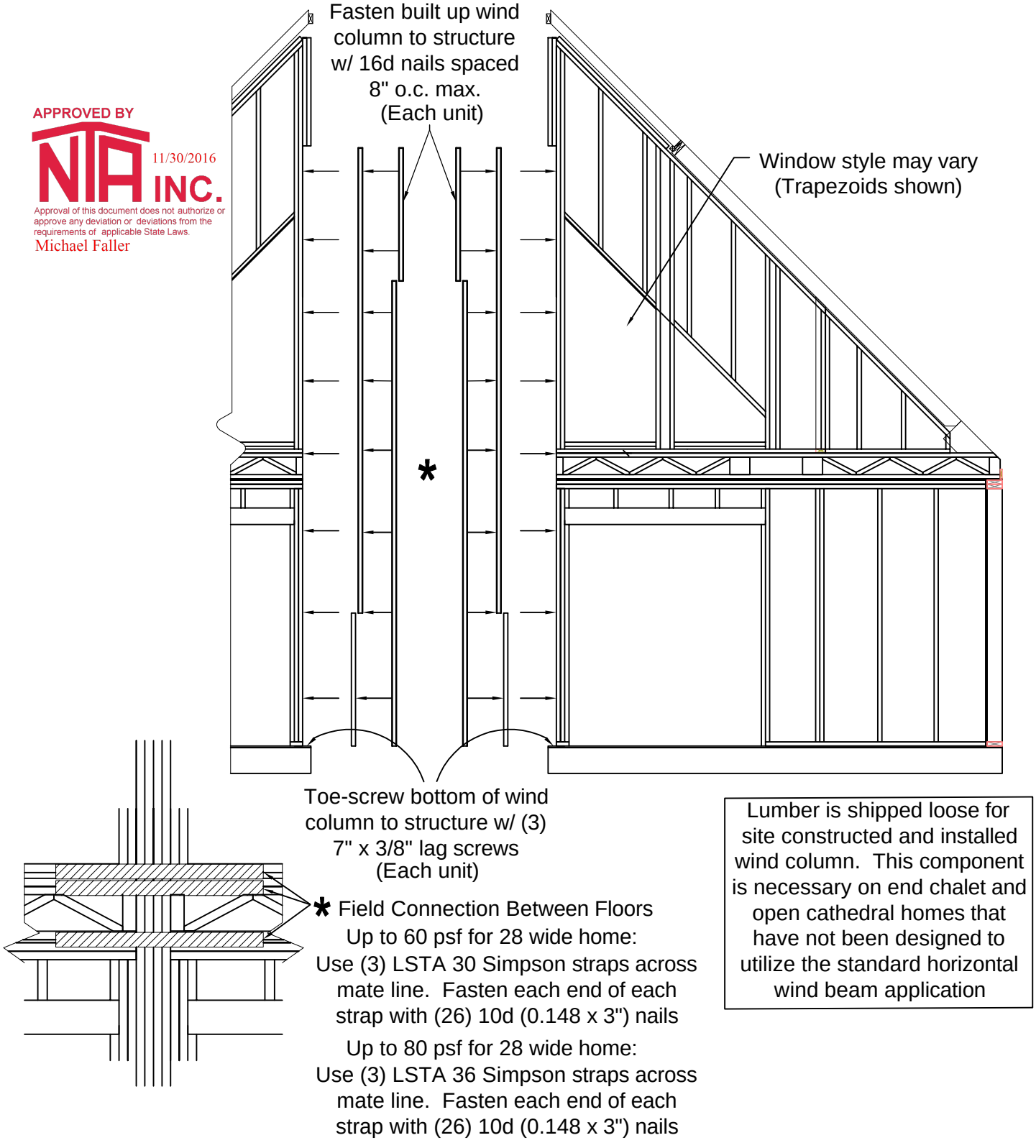


Fig. 6.9 - Typical Chalet Field Wind Beam

6.6 Alternate Wind Column Wall Construction (Where applicable)

Wind column end wall construction must be used when factory has constructed a Chalet which **does not** conform to Fig. 6.9. The wind wall column depicted in Fig. 6.10 below is only applicable when the knee-wall chalet has a full length bottom chord truss which rests on the front end wall of the chalet.



* Field Connection Between Floors

Up to 60 psf for 28 wide home:
Use (3) LSTA 30 Simpson straps across mate line. Fasten each end of each strap with (26) 10d (0.148 x 3") nails

Up to 80 psf for 28 wide home:
Use (3) LSTA 36 Simpson straps across mate line. Fasten each end of each strap with (26) 10d (0.148 x 3") nails

Lumber is shipped loose for site constructed and installed wind column. This component is necessary on end chalet and open cathedral homes that have not been designed to utilize the standard horizontal wind beam application

Fig. 6.10 - Typical Chalet Wind Wall

6.7 Open Vault

For the Cape Open Vault design (when available) as depicted below,there are multiple horizontal, lateral, and vertical connections. Generally these connections are calculated and need to be followed with accuracy to ensure that the proper structural stability is achieved on site. There are multiple steps that need to be achieved in sequence. There are also vital straps and connecting brackets that must match the calculated connections outlined in the design package for the home. Generally the calculated connections must be followed using Simpson brand straps and connectors or equivalent. Circled areas depicted on this page are critical structural site connections. **Reference the design package provided with the home for required strapping and fastening specifications.**

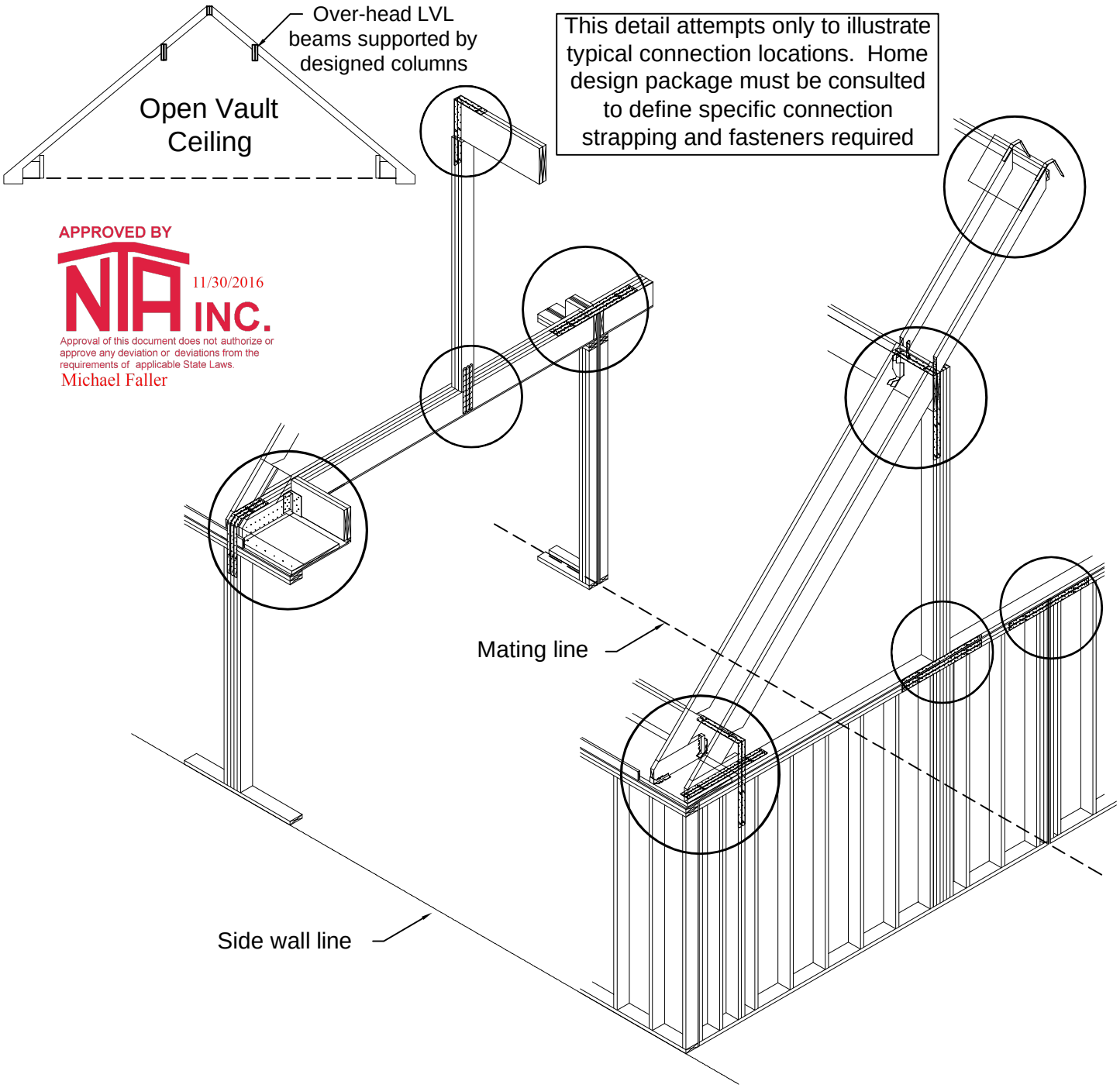


Fig. 6.11 - Typical Open Vault Field Connections

6.8 Typical Overhang Assembly

There are multiple types of dormers available. Triple peak, twin peak, panelized, hinged, ship loose,twin with egress, and doghouse to name a few. Regardless of dormer type, the drawing depicted below is to illustrate the typical ladder assemblies shipped with the home will need attached on site. Make sure dormer assemblies are laid out correctly and are attached to the main roof per the fastening requirements.

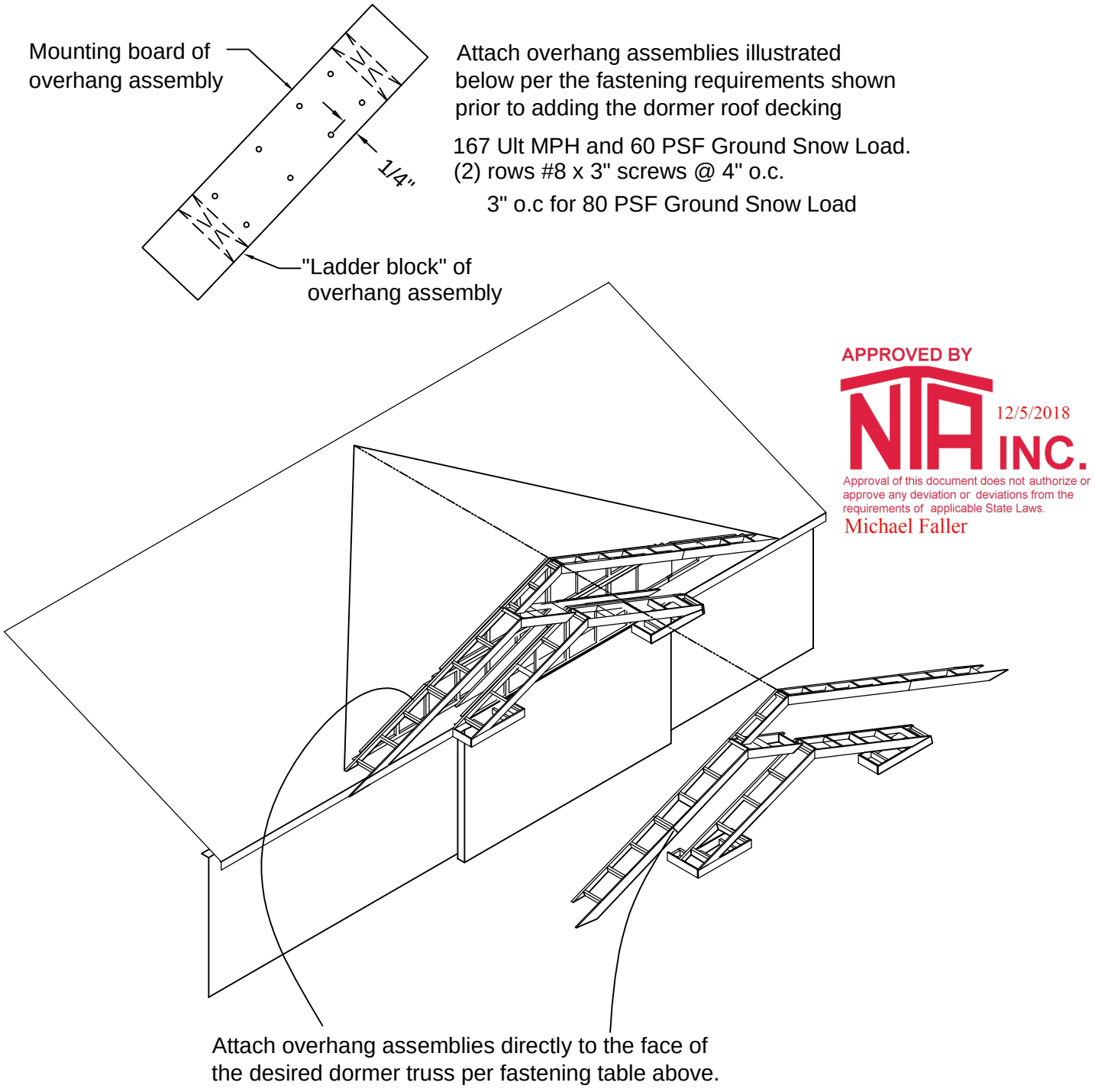
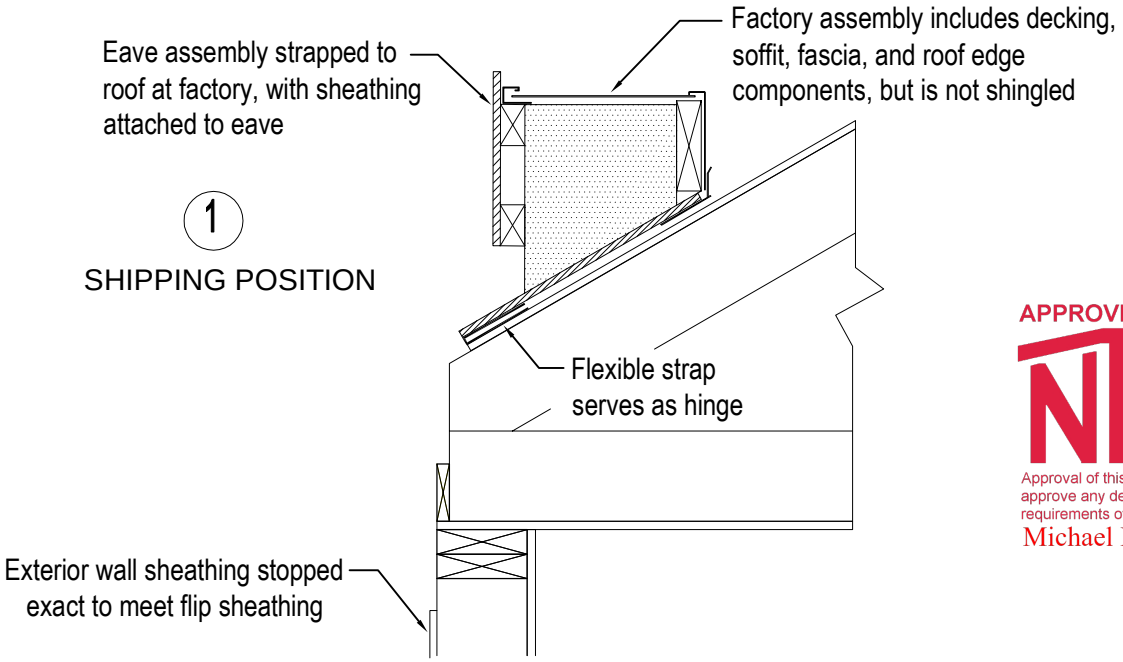


Fig. 6.12 -Typical Dormer Overhang Assemblies

6.9 Typical Flipped Eave

Some plants may offer a flipped eave option in order to limit shipping width or for other reasons. See Fig. 6.13 for typical flipped eave installation guidelines.



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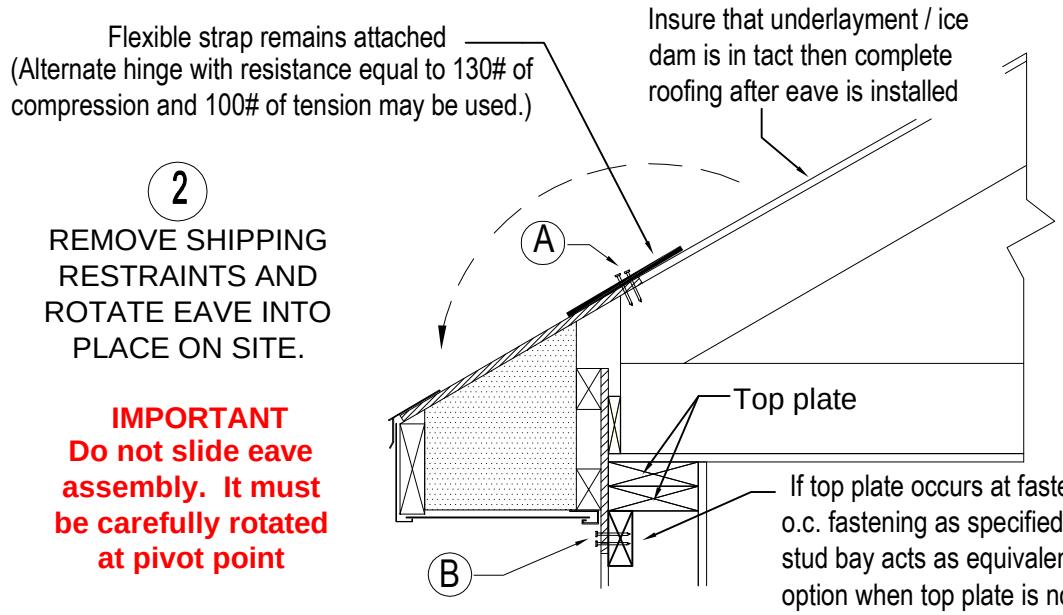


WIND SPEED (MPH)	CONNECTION ELEMENT	FASTENING REQUIREMENTS
150 Ult C	Ⓐ	(2) 0.131" Nails at each truss location (Not required with alternate listed hinge application)
	Ⓑ	(4) #8 x 3" Wood screws or (7) 0.131 Nails per stud or fasten along top plate or along alt. horizontal blocking using (3) #8 x 3" screw or 0.131 nail @ 3" o.c.

Fig. 6.13 - Typical Flipped Eaves

6.10 Typical Prow Roof Overhang (Where applicable)

Fig. 6.14 below depicts a typical prow roof overhang. This style overhang is designed to provide a significant overhang at the peak on the gable end of the home with a decreased taper along the rake . There are different applications and designs available. The prow roof overhang will typically be attached to the roof system when the home is delivered. There will be multiple fastening and connection requirements that must be achieved for proper finish of the prow roof erection and construction.
These fastening and connection details will be outlined in the design package provided with the home. It is imperative that these fastening instructions be followed on site for proper completion.

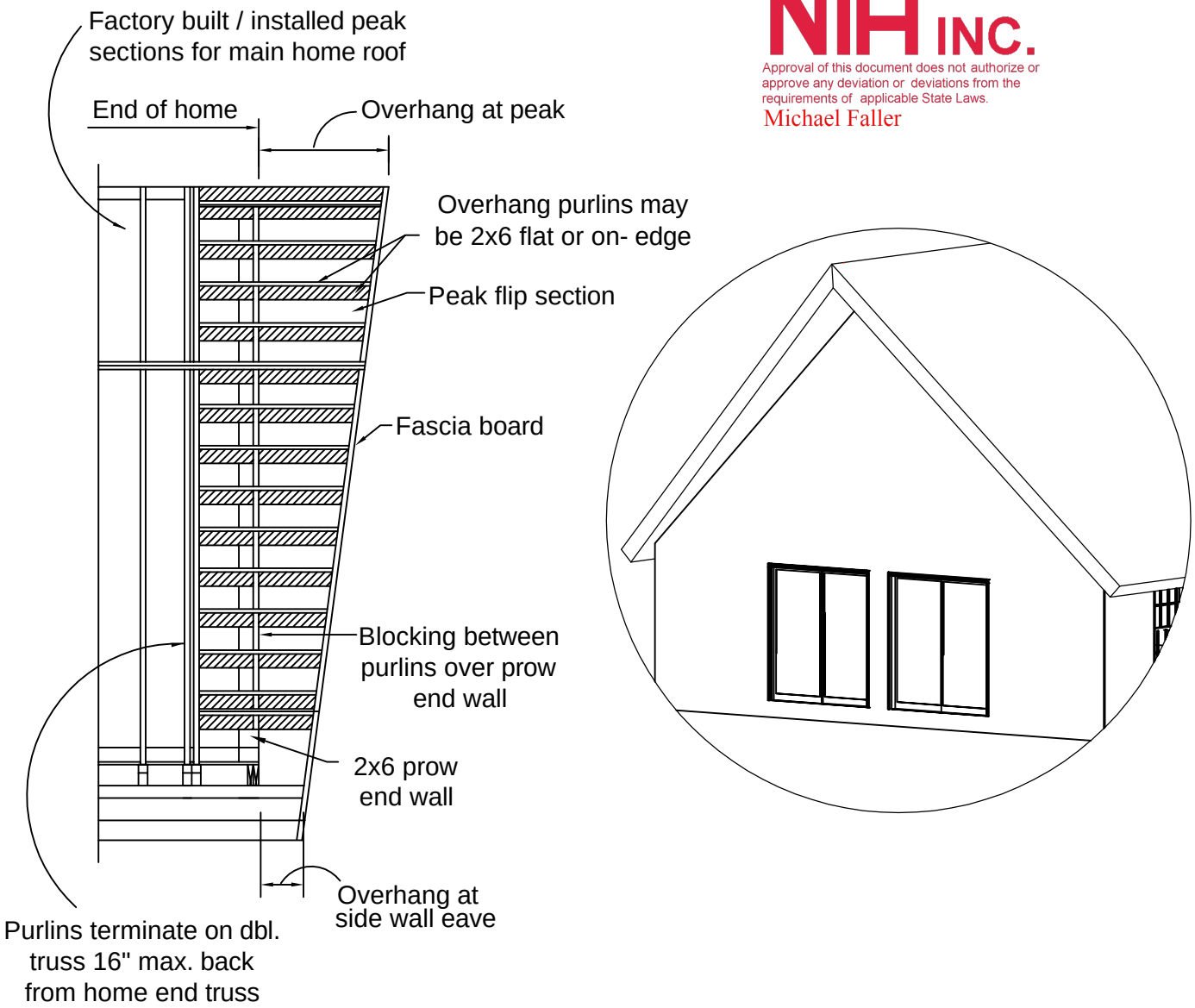
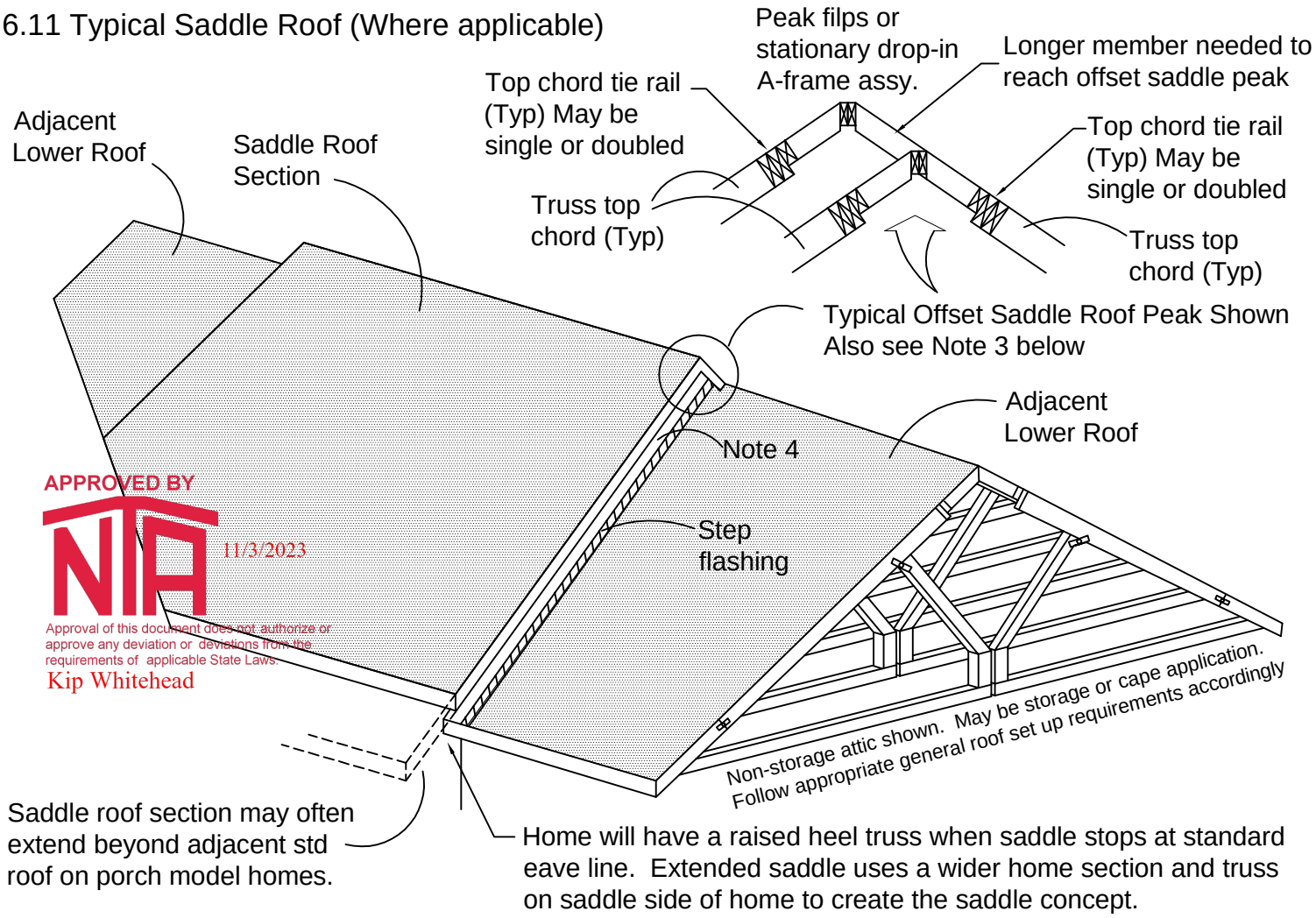


Fig. 6.14 - Typical Prow Roof Overhang

6.11 Typical Saddle Roof (Where applicable)



1. Homes having saddle roof sections are raised and installed in the same manner as all hinged roofs. Refer to installation procedures in this manual for all raising and fastening requirements based on the type of roof being installed. The above depicted illustration shows an "offset saddle" application. Saddle application may also be symetrical on each side of peak depending on home design.

2. It is recommended to raise the saddle section of the roof first. Then raise the two adjacent end roofs.

3. For an "offset saddle", the peak drop-ins, flips, or other peak section framing components are longer (from peak to main truss) on one side than the other. Install the saddle peak framing components first and fasten per standard installation requirements. It is important that peak section framing members are set to line up with the standard trusses on the home across the peak.

4. Insure that OSB sheathing covers the short verical section between the saddle roof and main roof both sides where the step flashing will be applied when shingling the lower roof decks.

5. Prepare the lower roof decks with drip edge, underlayment to cover all bare decking, and install any fascia as necessary. Shingle the lower roofs installing step flashing against the saddle separation surface and the lower roof deck.

6. Then prepare, shingle, and finish the saddle roof in like manner. Make sure all ridge vents and eave vents are installed and not bocked by decking or sheathing materials.

Fig. 6.15 - Typical Saddle Roof

Chapter 7 - Furnace and Duct Systems

7.1. Basic Heating System Types

Heating systems in modular homes exist in a wide variety of types and options. This chapter attempts only to describe, in general, the basic types of systems available and the requirements for on site completion that may be involved. It is very important to note that, due to the hinged roof construction in modular homes, the furnace and water heater combustion and exhaust vents will require additional items and inspection. A manual covering the maintenance and operating instructions will be found with your furnace or W/H. Use these manuals for installation instructions and to understand the site connections and inspections required.

IMPORTANT: Site installed furnaces must have an output BTU rating which is at least equal to the calculated furnace BTU rating for the home, and is not to exceed 140% of the calculated rating. Consult a heating professional to insure that the furnace selected for the home is of the proper size to efficiently heat your home.

Forced Air Heating: These systems are the most common and may be factory or site installed. Typically, in either case, the duct system has been factory provided unless the builder has ordered the home for a complete system to be installed on site by others. The system may be gas fired by natural gas, liquid petroleum, oil, or may be an electric forced air furnace. Homes with a factory installed forced air furnace will typically include a box for site installed AC coil and system. Factory makes no other provisions for AC.

Radiant Baseboard Heating: These systems are typically boiler driven by gas or oil when water circulating systems are used. Hot water baseboard systems often have factory provided heating units with the water lines stubbed through the floor and terminated below the floor for on site completion by the builder. The design and installation of the boiler system and completion plumbing are the responsibility of the builder with hot water systems.
Electric baseboard systems can be completely factory installed with junction box crossover connection when so ordered by the builder.

It is important to note that radiant heating systems present an increased vulnerability for excessive moisture conditions to develop in the home. It is the responsibility of the homeowner to provide whatever measures which are necessary to control these moisture conditions. Some homes are factory equipped with a whole house ventilation fan controlled by a timer wall switch, but this does not preempt the need for extra moisture control methods where radiant heating is present. Consult your modular homeowners manual for more in formation regarding Moisture Control.

7.2. Completing Circulating Air Duct Connections

The design package for you home may contain heating duct layout specific to your home. This may take the form of supplemental plans which simply show the overall duct layout in order to provide information about register and module heat duct cross-over locations. Cross-over connections for return air systems are also shown on these plans to insure that the installer is aware of all required connection points. All open-ended factory terminations must be identified and properly connected to complete the air duct systems.

7.3. Module to Module Heat Duct Cross-overs

The two most common methods of achieving heat duct connection between modules is either by factory installed crossover ductwork between transverse floor joists directly below floor decking or by providing connection duct material for on site connection of the main ducts beneath the floor joists after the home is set. Homes built for in-floor crossover are easily identified by steel reinforced openings in the mate line rim joists which will line up with eachother when the home is mated. See Fig. 7.1 which details this method. Refer also to chapter 4 Fig. 4.4 which illustrates the various duct crossover floor construction applications.

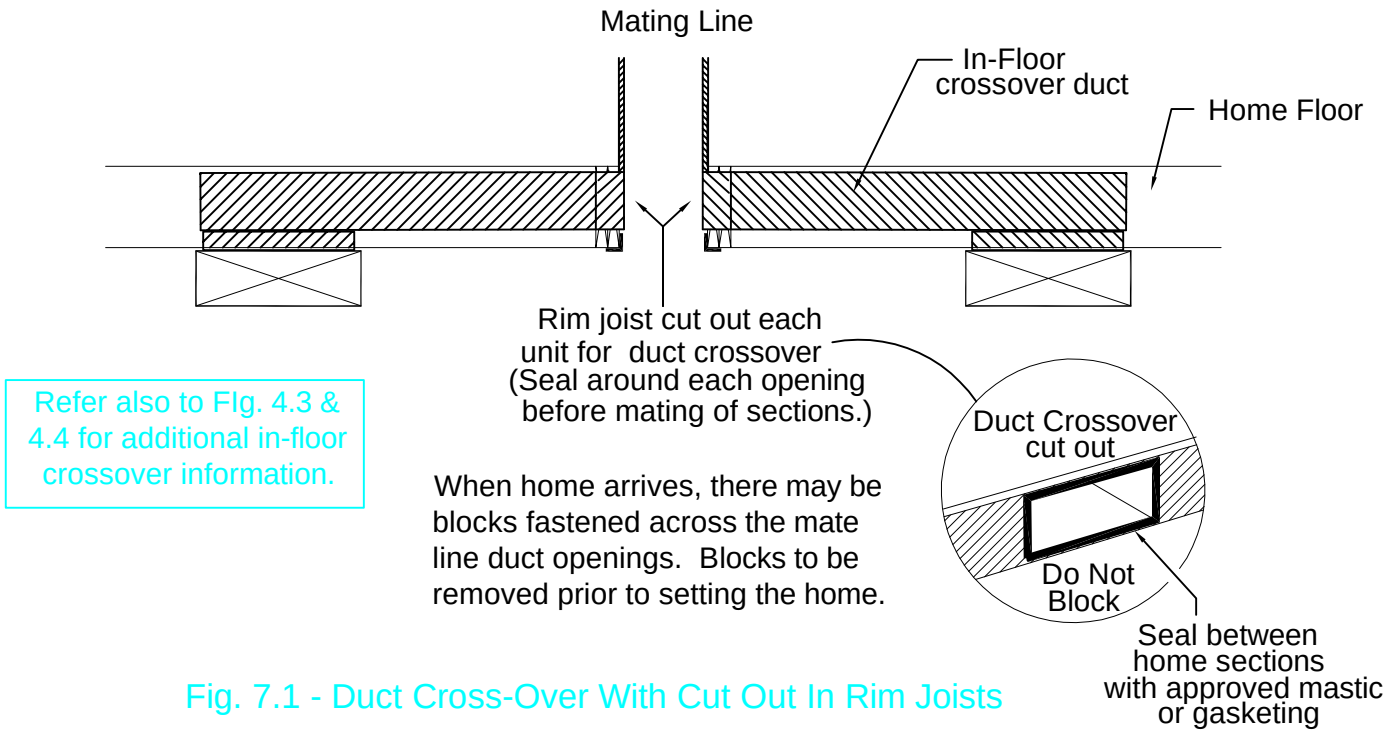
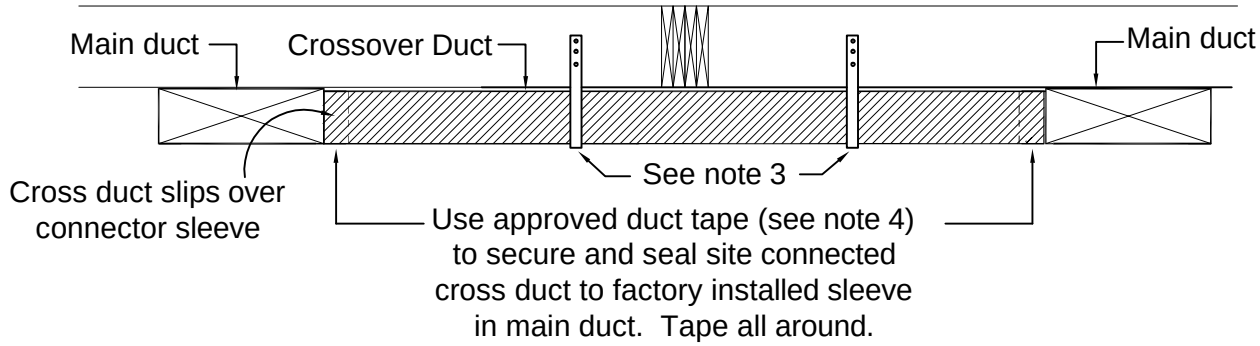


Fig. 7.1 - Duct Cross-Over With Cut Out In Rim Joists



1. Locate pre-assembled crossover ducts. These ducts have been factory assembled slightly over-length to allow for field fitting and may be trimmed at the ends for exact fit on site.

2. Position ends of crossover duct over factory installed collars on the sides of main duct trunks. Apply a generous bead of duct mastic on metal collar before slipping cross duct ends onto collar. Apply duct tape around joint to seal where ever it is possible to do so.

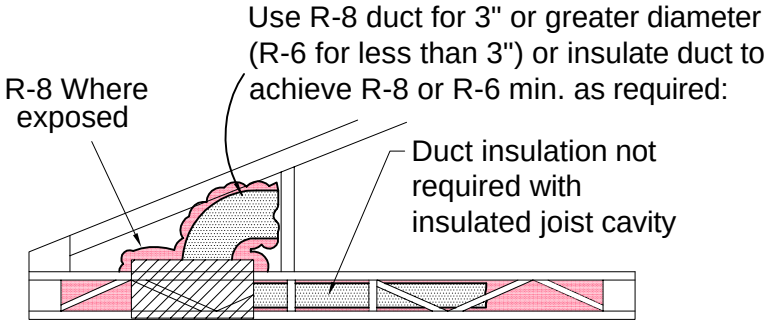
3.Crossover duct must be supported at increments no greater than 4 feet apart. Use supplied nylon strapping or equivalent around duct and fasten strap to sides of floor joists with appropriate fasteners. The strapping should be snug but not so tight a to cut into the foil sheathing of the ductboard.

4. All duct tape to be UL-181 foil tape listed for ductboard applications. Where ever tape is applied, it should be swiped with a flat tool to work out any air bubbles to achieve maximum contact.

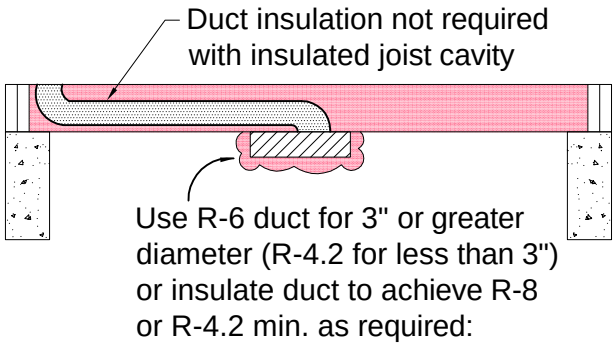
Fig. 7.2 - Site Installed Duct Cross-Over
(Applicable with off-frame modular only)

7.4. Duct Insulation Requirements

All supply and return air ductwork which is exposed to unconditioned attic spaces must be insulated to R-8 where 3" or greater diameter (R-6 if less than 3") minimum compliance. Such exposed duct, if not rated accordingly must be wrapped with insulation to achieve a minimum R-8 or R-6 compliance as required. This is a site item to be done by installer after supply and return air ducts are complete. Ducts located within the building thermal envelope need not be insulated. See Fig. 7.3 for example illustrations.



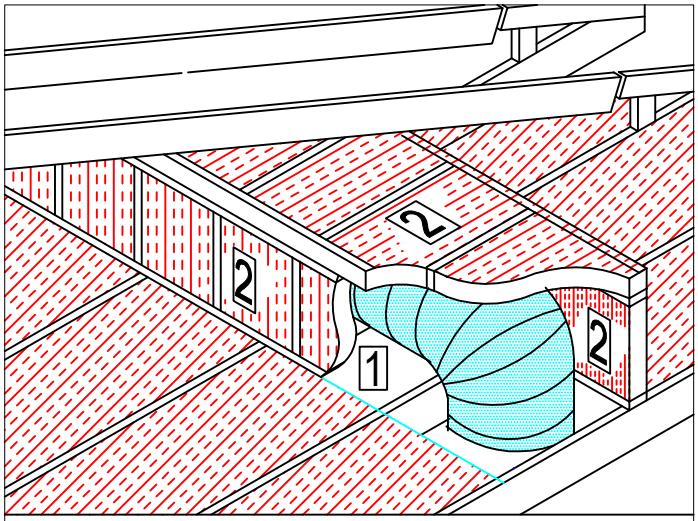
UNCONDITIONED ATTIC SPACE



UNCONDITONED SPACE OTHER THAN ATTIC

See Fig. 7.4 for method of isolating attic ductwork from the un-contitioned attic space of the home in order to alleviate on-site duct tightness tests.

Fig. 7.3 - Example Duct Insulation Applications



1) Remove any insulation located under return air duct.

2) Add framing and insulation to completely enclose the exposed duct work.

Where more recent and demanding energy codes are enforced, ducts which do not occur in the thermal envelope of the home are subject to on-site tightness testing. This testing requirement can be alleviated by insuring that all ductwork is contained within the building envelope. This detail illustrates a method to isolate the attic duct from the unconditioned attic space. **When this installation is used in conjunction with the conditioned crawlspace design as illustrated in Fig. 3.1, the ducts are considered to be in the thermal envelope and are exempt from the duct tightness test requirements. (Use on 2012 and later IRC Homes)**

Refer to furnace return air options in this chapter for alternate methods of eliminating return air ducts in unconditioned spaces of the home.

Fig. 7.4 - Method to Enclose Exposed Attic Duct into Home Thermal Envelope
(Considerd Mandatory for Homes Constructed For 2012 and Later IRC)

7.5. Heating Supply and Return Air Systems

On the pages that follow, basic heating and return air systems are described for various types of home construction including Ranch, Cape, and Two-Story homes. The basic features and requirements are applicable to all homes. The following considerations are common for all home styles:

1. The furnace and main portions of the supply and return duct systems are factory installed unless omissions are requested when the home is ordered. Due to hinged roof construction and multi-section hook-ups, certain elements of these factory installed systems must be completed on site. The on-stie installer is responsible to complete all loose end factory terminations in the floor or attic areas. The home should be accompanied by plans which aid in locating these elements. All flexible ducts are to be fully extended and trimmed (if necessary) to achieve runs free of sags and un-necessary turns.

2. Main duct cross-overs are usually factory- installed within the floor joist cavity area of the main floor and must be lined up and properly sealed against leakage before the home is fastened together. Some cross-over ducts are shipped loose and must be installed on site. Refer to Figure 7.1 and 7.2 for the common main duct cross-over applications.

3. Secondary duct cross-overs may be necessary especially in the case of ceiling return air systems. For homes which have additional sections, such as tags (bonus boxes), or other sections which require heat and return air, will need to have the flex ducts connected section to section to complete the air duct systems.

4. The flue and combustion air intake for factory installed furnace may be partially dis-assembled. Be aware that increased amounts of piping and fittings may be required for cape homes in order to route piping into knee-wall portions of roof when furnace is located beneath attic room area.

IMPORTANT NOTE :
Illustration shown here is typical. The furnace combustion intake and exhaust roof terminations must be checked for site completion and be in accordance with the manufacturer instructions for the furnace being used. (Always check specific Furnace Manufacturer Installation manual to confirm compliance.)

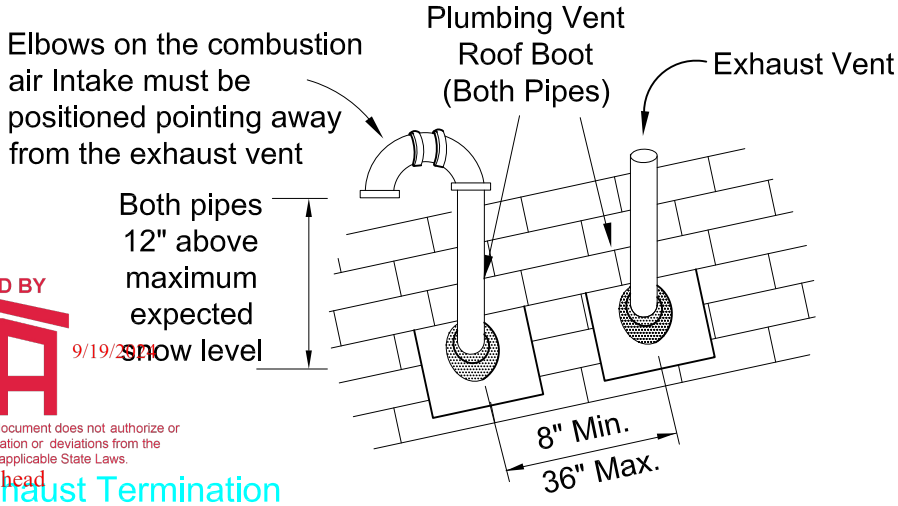


Fig. 7.5 - Furnace Intake & Exhaust Termination

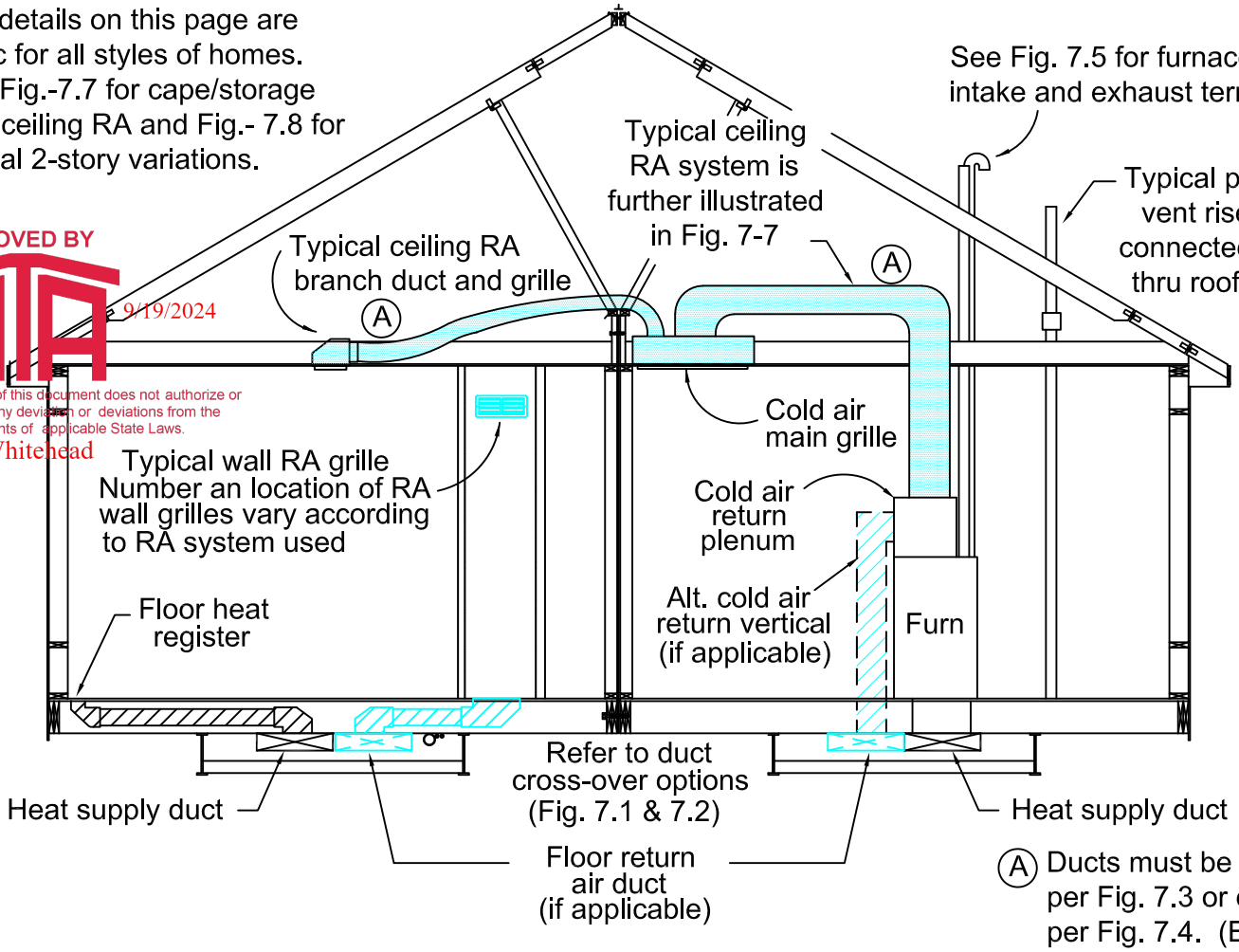
5. Site installed furnaces should only be installed by qualified personnel. All elements of the heating/cooling system must be installed according to the appliance manufacturer's instructions The furnace installed must be located so that exhaust and intakes can be installed in accordance with the manufacturer's instruction. Depending on how the home was ordered, the entire supply and return air systems may be supplied by a heating contractor on site.

6. Furnaces field installed in crawlspace or attic areas may require special considerations. If home main floor has been constructed with open web floor trusses, additional fire barrier measures may be required on the bottom side of the web joists or fire sprinklers may be required in these areas. Consult local codes for requirements. Also insure that there is adequate clearance in these areas in accordance with appliance manufacturer and local codes.

7. Basement foundations require site-installed insulation at the exterior rim joists and the basement wall in accordance with the thermal report included with the specific home design package.

8. Unless the home is installed on a "conditioned crawl space" (Fig. 3.1), the home floor will require floor insulation in accordance with thermal report included in home design package and must be vented in accordance with all local codes that apply.

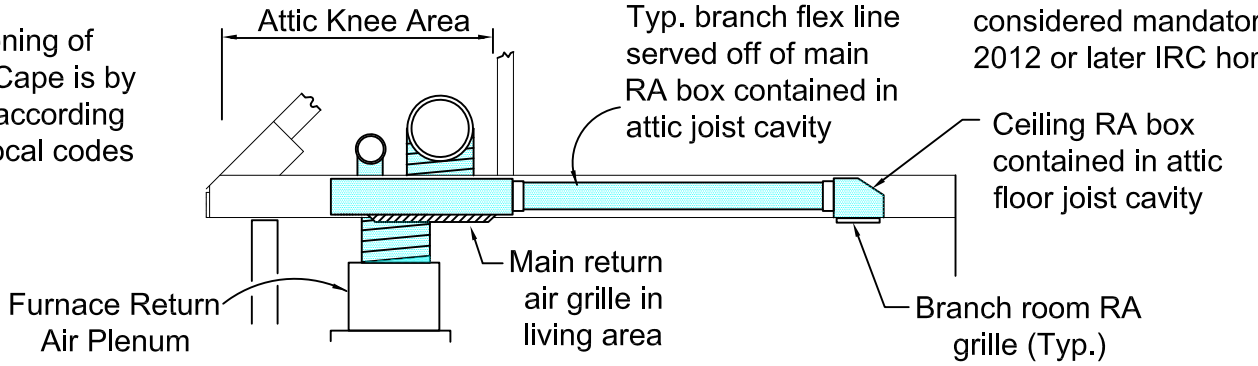
The details on this page are basic for all styles of homes. See Fig.-7.7 for cape/storage attic ceiling RA and Fig.- 7.8 for typical 2-story variations.



(A) Ducts must be insulated per Fig. 7.3 or enclosed per Fig. 7.4. (Enclosure eliminates site duct test). Duct enclosure method considered mandatory for 2012 or later IRC homes.

Fig. 7.6 - Typical Ranch Heat & Return Air Cross Section

Note: Conditioning of upper level of Cape is by others on site according to applicable local codes



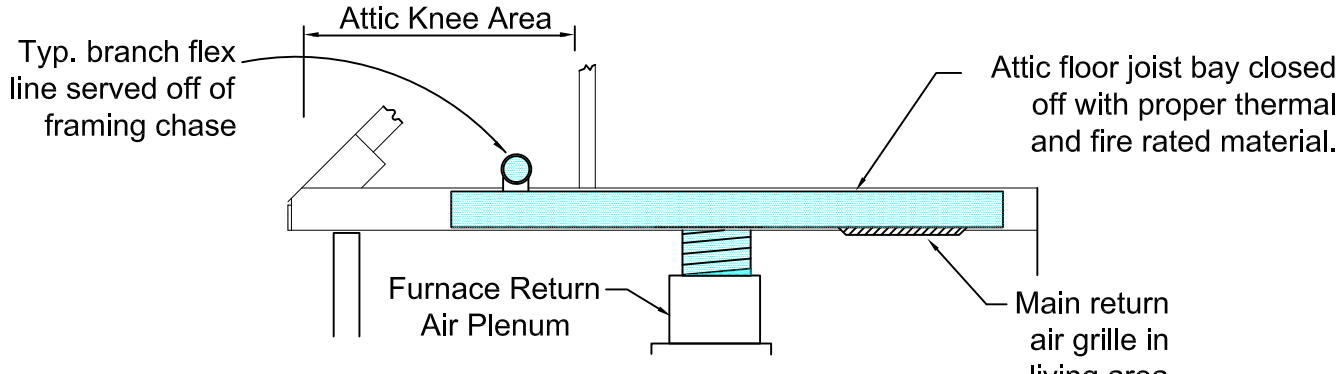
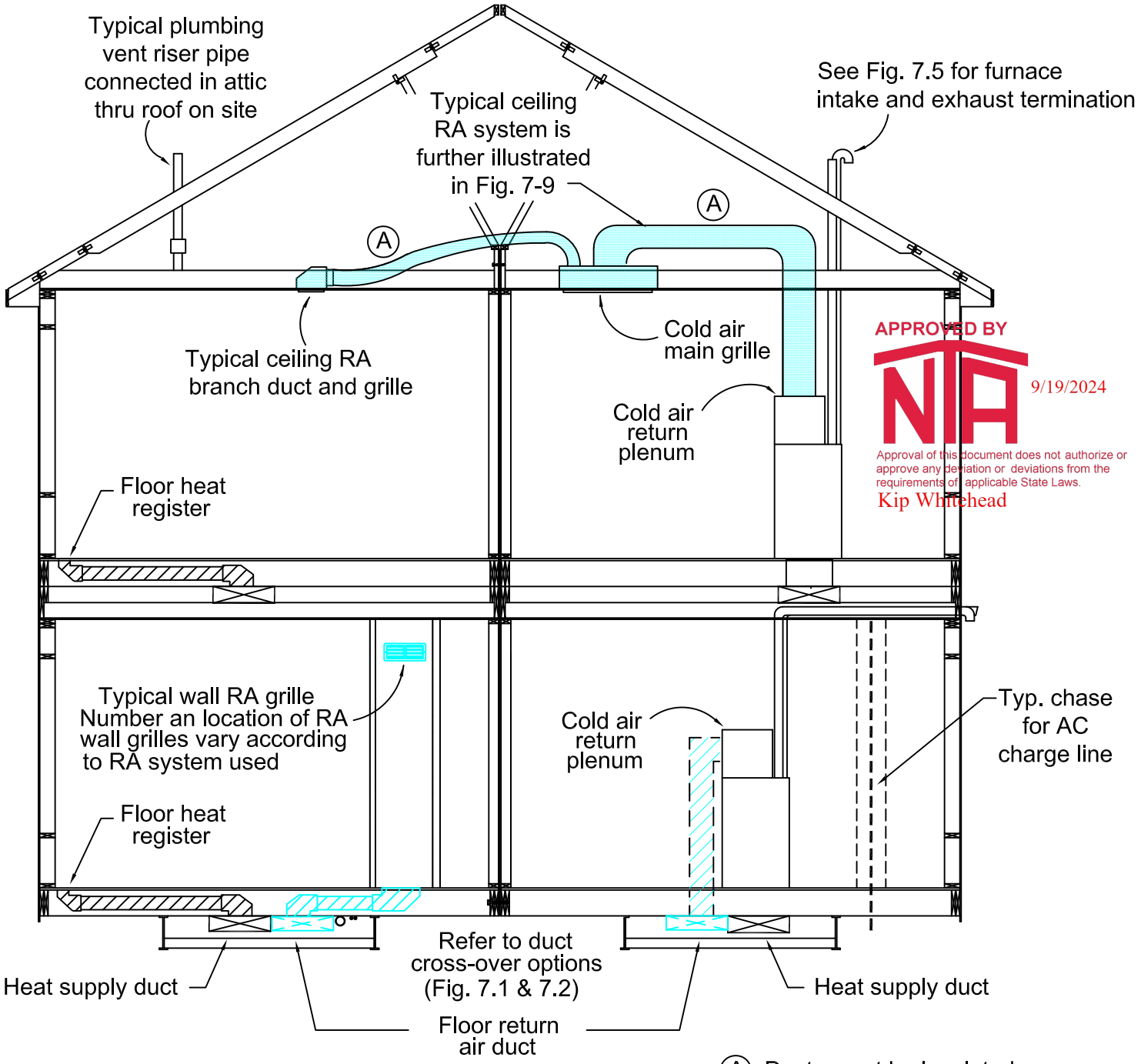


Fig. 7.7 - Typical Cape/Storage Ceiling Return Air Illustrations

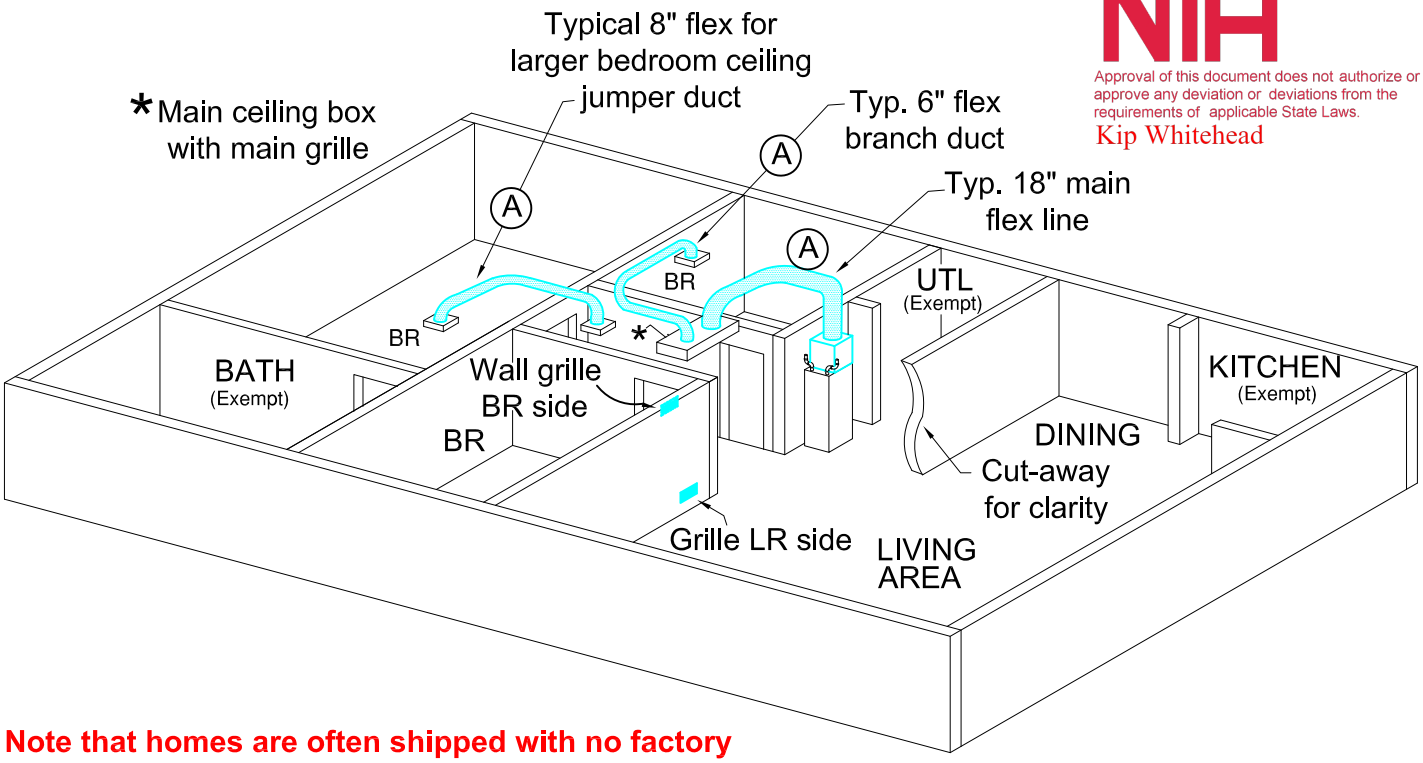


IMPORTANT NOTE :
The furnace combustion and exhaust vents must be checked for site completion of the roof terminations. (Refer to the furnace manufacturer instruction manual)

(A) Ducts must be insulated per Fig. 7.3 or enclosed per Fig. 7.4. (Enclosure eliminates site duct test).

Duct enclosure method considered mandatory for 2012 or later IRC homes.

Fig. 7.8 - Typical Two Story Heat & Return Air Cross Section

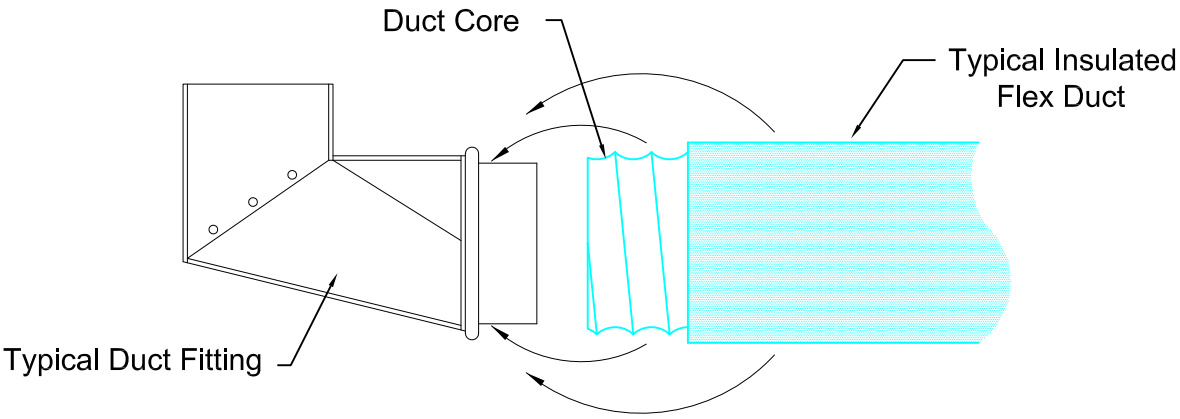


Note that homes are often shipped with no factory provided return air system or heating system depending on customer order preference. Where ceiling return air system is factory provided, consult home design package for return air diagram and insure that all necessary site connections are complete since homes typically cannot be shipped with all connections completed.

Ⓐ Ducts must be insulated per Fig. 7.3 or enclosed per Fig. 7.4. (Enclosure eliminates site duct test).

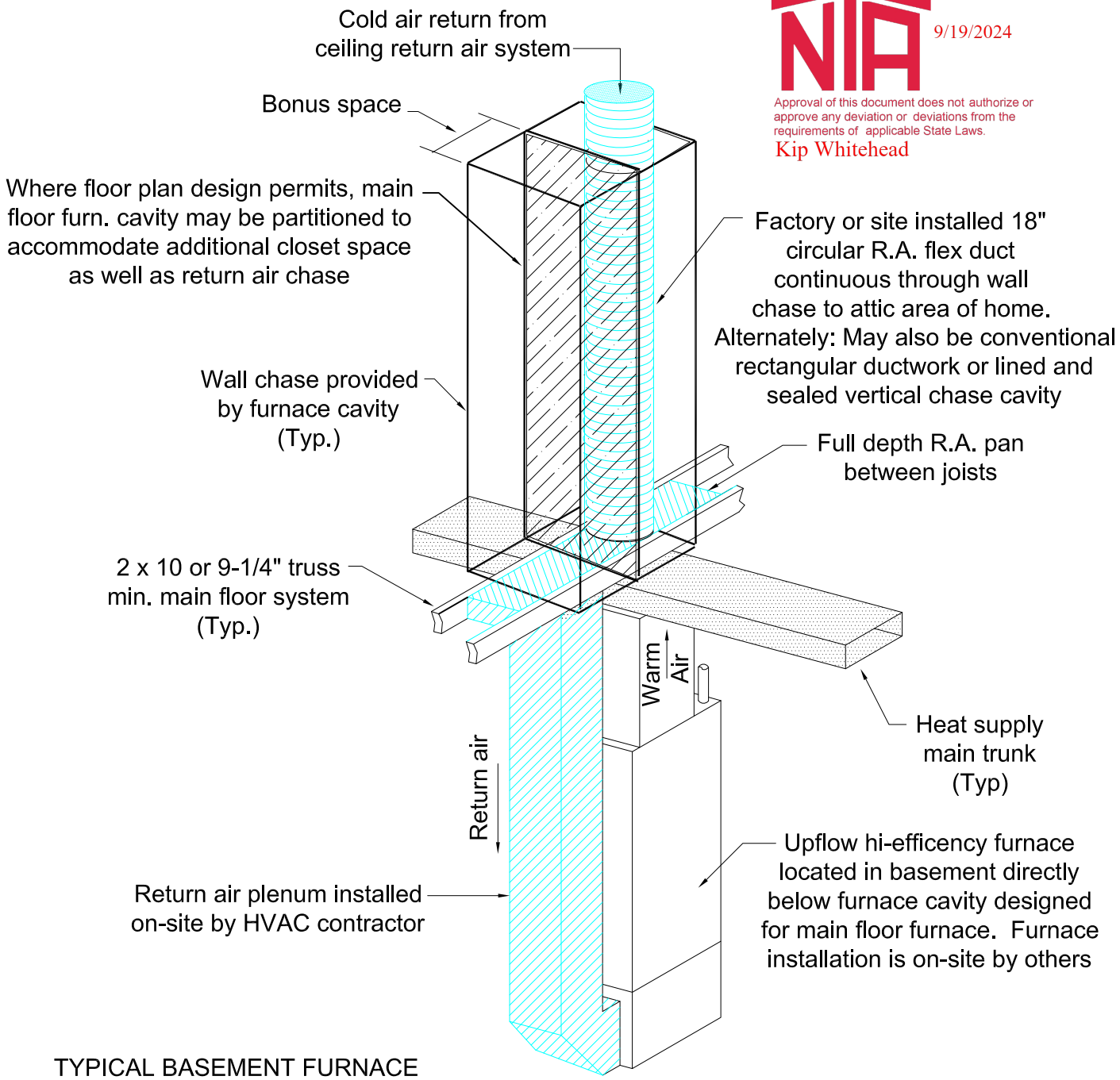
Duct enclosure method considered mandatory for 2012 or later IRC homes.

Fig. 7.9 - Typical Ceiling Return Air System Diagram



1. Pull duct core onto duct fitting 1" beyond bead on collar.
2. Wrap core with two wraps using foil tape
3. Secure with tie strap or camp over core and tape
4. Pull insulation jacket up onto boot and secure with two wraps of foil tape or tie strap or clamp

Fig. 7.10 - Connection of Flex Duct to Duct Fitting



TYPICAL BASEMENT FURNACE WHERE MAIN FLOOR FURNACE CAVITY IS USED AS WALL CASE FOR R.A. DUCT AND FURNACE IS LOCATED DIRECTLY BELOW STANDARD MAIN FLOOR FURNACE CAVITY

DOES NOT APPLY TO SITE-DESIGNED HEATING AND DUCT SYSTEMS

Fig. 7.11 - Typical Basement Furnace Conversion

Chapter 8 - Utilities and Appliances

8.1. Utility System Connection and Testing

The following will describe connections and testing procedures for plumbing and electrical utilities. The utility systems of the home were subjected to stringent testing before leaving the factory. However, there is no guarantee against issues occurring during transit which may compromise the these systems. It is therefore, both prudent and mandated by code to perform the test procedures described in this chapter on site.

NOTE: All utility crossovers must be connected before utility supply lines are connected on site. Only qualified Contractors/ Installers should install utility connections. Improper connections could result in health and life safety problems and/or damage the systems.

8.1.1 Electrical Connections

Trained professional electricians should make the following electrical connections. All connections should be performed in accordance with the state and local codes which apply. The home was designed in accordance with the National Electrical Code and it is recommended that connections be made in accordance with the same applicable NEC code. Contact the local building authority for applicable codes.

8.1.2 Circuit Connectors at Electrical Crossover

15 or 20 amp lighting or appliance circuits may be connected module to module using specifically designed crossover connectors provided at the cable connection points. The connectors must be installed in strict accordance with connector manufacturer's installation instructions. The crossover connection cables may be visible or enclosed behind removable access panels beneath the home near the mating line. Cables may be connected together beneath the home or through bored holes in the mating joists. If cables are exposed beneath the home joists, they must be protected from physical damage.

8.1.3 Junction Boxes at Electrical Crossover

Any size circuit may be connected at a properly sized junction box which may be mounted on the floor joist on the same home section which has the panel box. Locate the circuit cable on the opposite home section which needs to be joined in the junction box and replace the box cover. Electrical junction boxes must be accessible for inspection and service. If they are concealed behind finish construction such as a basement ceiling, there must be an access panel provided for the junction box.

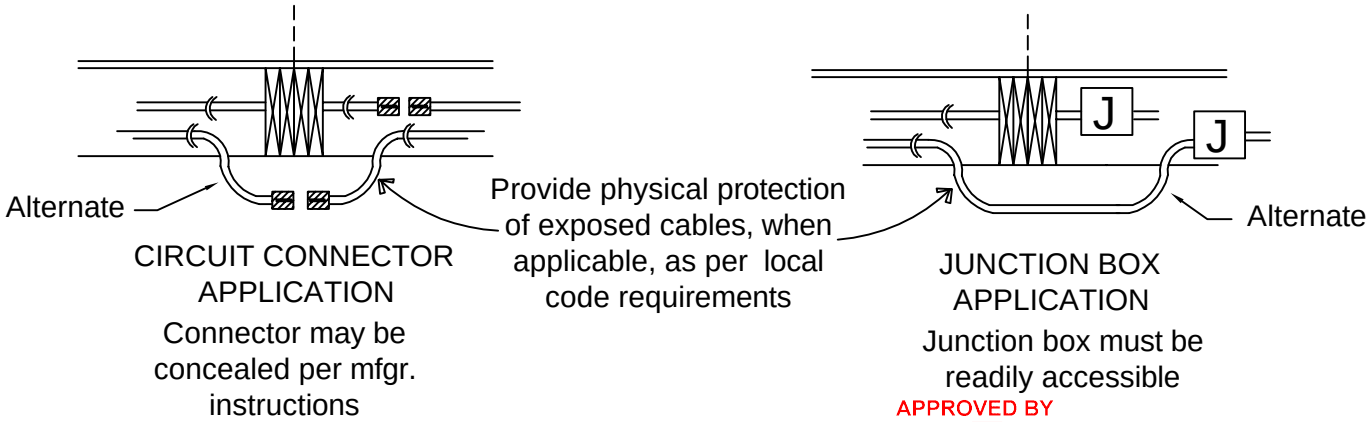


Fig. 8.1 - Typical Crossover Connector and Junction Box

APPROVED BY
NTA INC. 11/04/21
Approval of this document does not authorize or approve any deviation or deviations from the requirements of applicable State Laws.
Michael Faller

8.1.4 Shipped Loose Light Fixtures

Exterior lights, interior hanging fixtures, chandeliers and ceiling fans, are shipped loose to pervent damage during transit. A qualified electrician should install these fixtures before the electrical main has been turned on. Exterior lights must be installed using a "weather tight" assembly and a non-combustible flash ring.

Apply caulk or putty as necessary to form a water tight seal around the base of the fixture against the exterior wall.

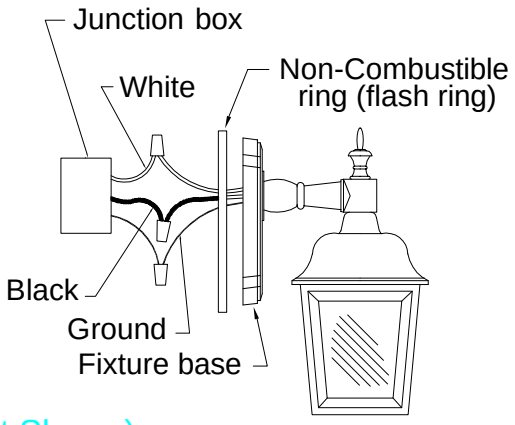
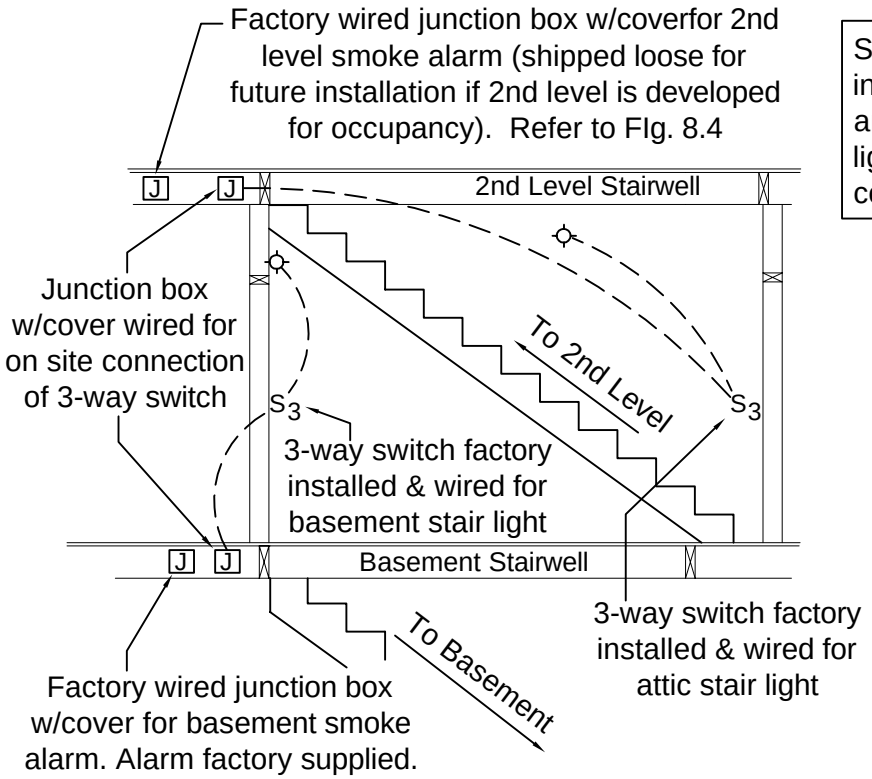
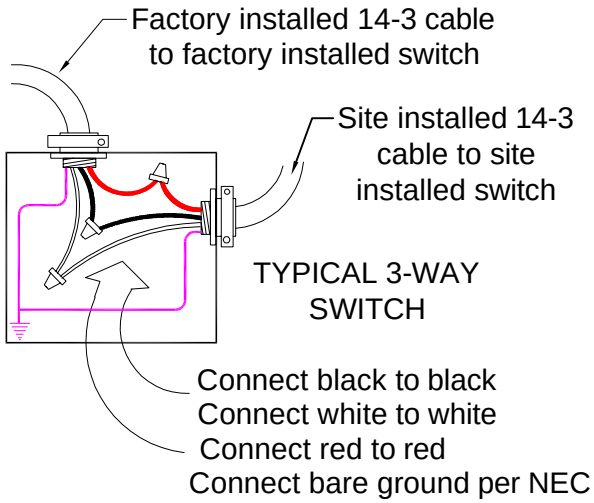


Fig. 8.2 - Shipped Loose Light Fixtures (Ext. Light Shown)

8.1.5 Field Installed 3-Way Switch and Smoke Alarm Provisioins

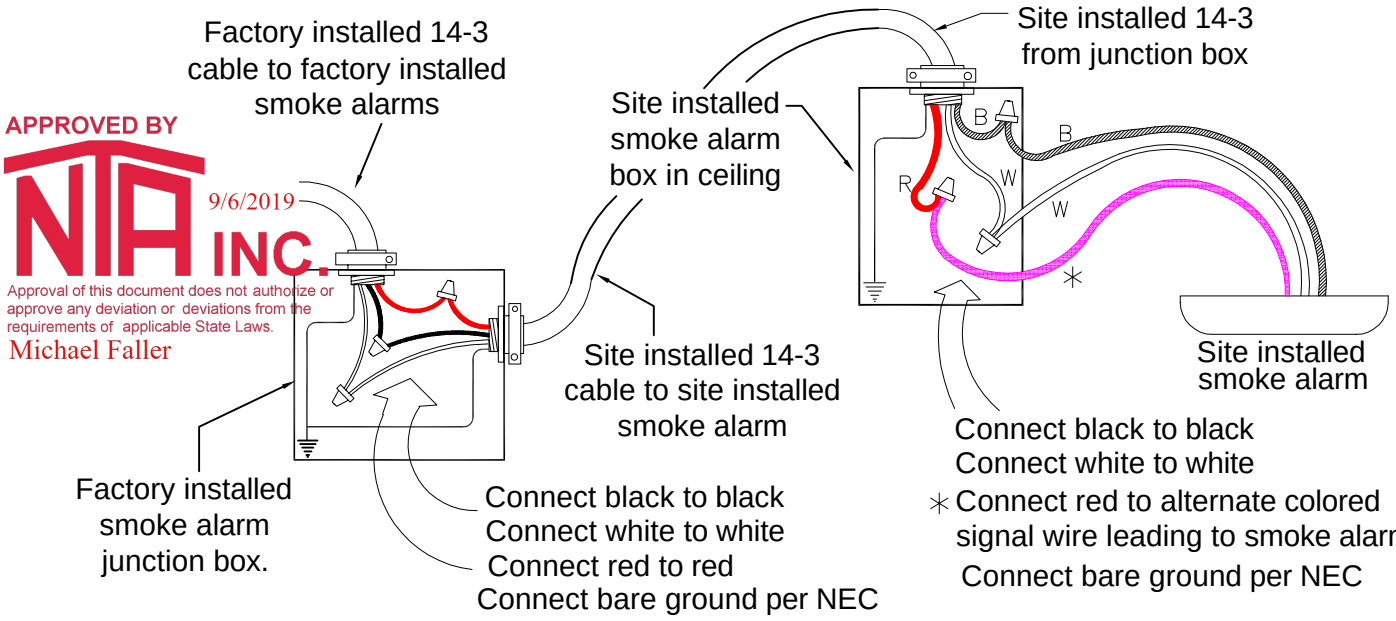


Stairway lighting fixtures may be factory or site installed. Stair lighting locations shown are typical and for illustration only. Number and location of lighting fixtures is discretionary provided that code compliant stairway illumination is achieved.



ALL ON-SITE WIRING TO BE PERFORMED BY QUALIFIED PERSONNEL ACCORDING TO NEC AND ALL LOCAL CODE REQUIREMENTS

Fig. 8.3 - Typical Stair Area Electrical Field Connections



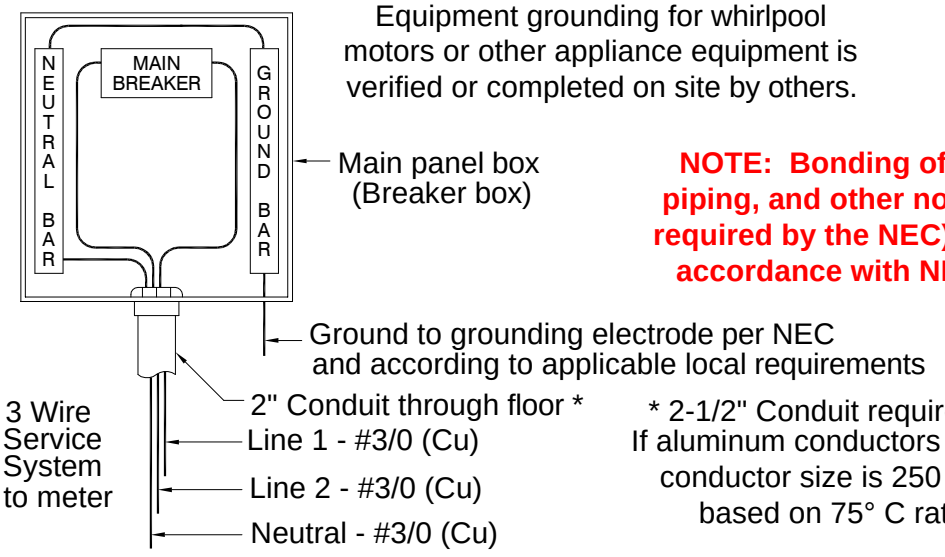
NOTE:
Factory wired smoke alarm junction box and shipped loose smoke alarm units occurs only with homes designed for basement stairwell and/or Cape model 2nd level stairwells only. Smoke alarm and wiring not provided for 2nd level on homes designed for attic storage.

IMPORTANT
Refer to smoke alarm installation instructions. Test to insure proper operation alarm. Activation of any one alarm in the home must also activate all other alarms in the home

Fig. 8.4 - Typical Smoke Alarm Connections

8.1.6 Electrical Service Entrance Connections

All connections previously discussed are to be completed, as well as, properly torqued buss and breaker lugs in the panel box verified before electrical service is connected and energized. A qualified electrician should connect the service entry in accordance with the NEC and all local ordinances that apply. A sufficient power supply must be available at the site. The amperage rating of the electrical distribution panel main disconnect is shown on the tag located outside the home, next to the service entrance and also on the distribution panel itself. See Fig. 8.5 for service entrance to the distribution panel.



NOTE: Bonding of Service, metal water piping, gas piping, and other non-current carrying metal parts (as required by the NEC) shall be by others on site in strict accordance with NEC and all local codes that apply.

Fig. 8.5 - Typical Electrical Service Entrance Connection

8.1.7 Electrical System Testing

A Grounding Continuity Test should be done before the power to the home is turned on. This test should be performed by a qualified electrician familiar with the testing protocol, equipment, and evaluation of test results. Check the continuity at each of the following locations:

1. Each receptacle, light, and fan fixture in the home.
2. Each directly connected appliance: Hard-wired and receptacle serving a chord connected appliance.

If there is a failure of ground continuity found, it must be investigated and corrected before the power supply is turned on. A simple operational test is to be performed after the main breaker is turned on. Install light bulbs at each light fixture, turn the circuit breakers on and follow these steps:

1. Use a circuit tester at each receptacle outlet to check for reverse polarity, open grounds, and shorts.
2. Check every light, fan, and receptacle that is controlled by a wall switch.
3. Turn all of the wall switches in the home off and test each smoke alarm according to the manufacturer's instructions. Any failures found during the operational checks must be investigated and corrected.

8.2 Plumbing Connections

Trained professional plumbers should make the following connections in accordance with state and local codes. The home was designed to conform to the International Plumbing Code, or state adopted code as indicated on the design package for the home and it is recommended that connections are completed in accordance with the same. Contact the local building authority to confirm applicable codes.

8.2.1 Water Line Crossover Connections

The water line crossovers are ready to be connected using the fittings provided. There may be holes provided through the perimeter joists for the crossover water lines to pass through. After the fittings have been tightened, insure that the lines are properly supported at intervals in accordance with piping manufacturer's instructions.

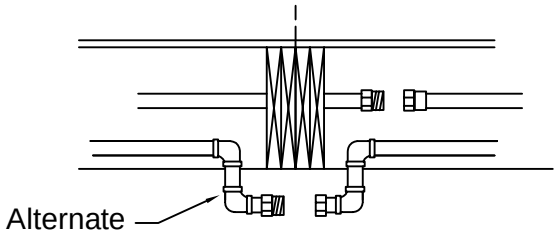


Fig. 8.6 - Typical Water Line Crossover Connection

8.2.2 Main Inlet Connection

Assure that water line crossover connections have been completed prior to connecting water main. The water system in the home is designed for a maximum inlet pressure of 80 p.s.i. If you are located in a region where the local water supply pressure exceeds 80 p.s.i. then a pressure reduction valve must be installed. The inlet for the installed water supply system is labeled. It is typically located directly off of the water heater. Connect the labeled inlet to the main for the local water supply source. Any water lines which are exposed to weather conditions must be insulated to protect from freezing.

8.2.3 Water Line Testing

The water system must be tested after all site connections are complete in order to rule out leaks that may have occurred during transit or set-up. The most common test is a 15-minute pressure test. Consult piping manufacturer's instructions for limitations on testing pressure used. All tests shall be carried out in accordance with the International Plumbing Code or as prescribed by local building authority.

8.2.4 Drain Line Connections (If home is equipped with factory installed drain system)

Drain piping and fittings to complete the drain system are to be provided and installed on site by others. Since specific site conditions are unknown, the drain line diagram provided with the home is often not ideal. The outlet location may be remote from the site main drain hook-up and, therefore may require significant additional piping and fittings to be provided in the field. Crossovers may need to be connected for two or more home drain outlets as well as vent lines to the roof. All drain lines must maintain a 1/4" per foot slope continuous to the site drain outlet. See specific drain diagram for notes and locations of the p[illegible] and vent lines. When the lines have all been connected, make sure that all pipes are supported at the correct intervals in accordance with codes that apply and piping manufacturer's instructions.

8.2.5 Vent Connections

The vents from each plumbing fixture are either terminated with a factory installed air admittance valve or have stacks extended into the attic. The vent system in the attic may be interconnected to reduce the number of of extensions through the roof. The 3" main vent, as it is referred to on the specific DWV plan, must extend through the roof to outside air. If other vent stacks extend through the roof, they must have a 3" minimum diameter where they extend through the roof to the outside. Refer to page 8-6 for pre-2015 IRC frost closure requirements and to Fig. 8-7 for frost closure requirements adopted with the 2015 IRC.

Where Radon vents are required, the home is equipped with a 3" diameter length of pipe secured within a wall which protrudes into the attic and through the floor beneath the home. This pipe is installed for convenience of access in the event of the site installation of an active Radon elimination system.

8.2.6 Drain, Waste, Vent (DWV) System Testing

The completed drain system must be tested on site in accordance with the International Plumbing Code or the applicable state and local codes that apply. Contact the local authority having jurisdiction for the required testing procedures. Note that more recent international codes do not permit the use of air pressure to test plastic based drain lines. Flood or smoke tests may be required. Any failures or leaks found during testing must be investigated and corrected.

8.2.7 Sewer/Septic Connections

When successful testing has been completed, connect the home drain outlet to the site building drain. The minimum sized pipe for the building drain is 3" and the minimum slope that must be maintained is 1/4" per foot. A qualified plumbing professional should make the final building drain connections.

8.3 Gas Line Connections

Only trained professional fuel gas or mechanical experts should make the following gas line connections. All connections must be performed in accordance with state and local codes. The home was designed to conform with the International Fuel Gas Code, or applicable state adopted code. Always contact the local building authority to confirm that the applicable codes in effect are observed.

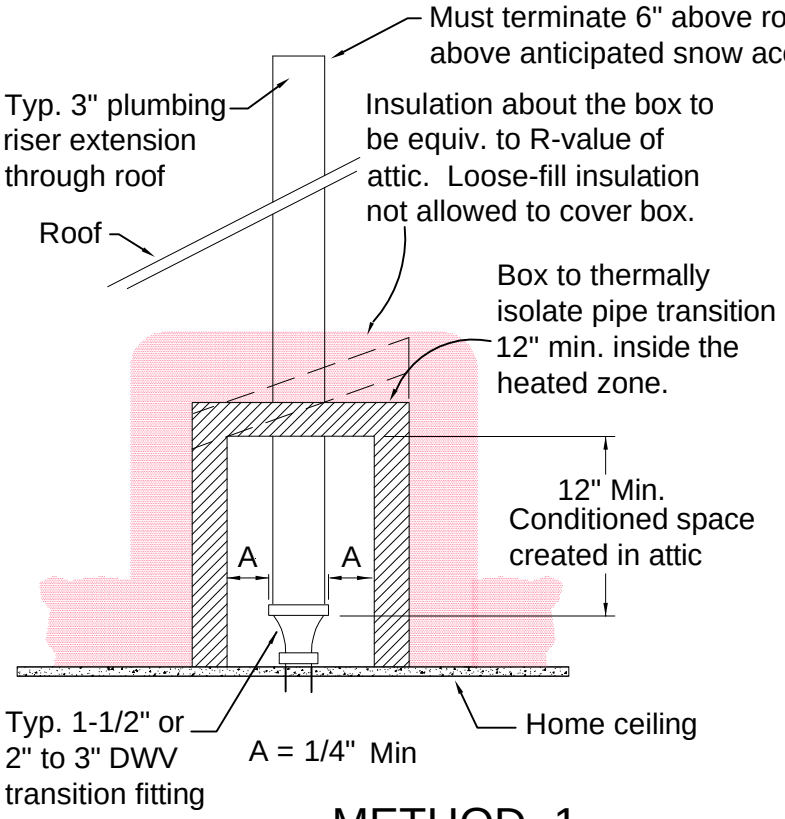
8.3.1 Gas Crossover Connections

When gas lines are factory installed, they are typically stubbed through the floor for under-floor completion on site. Crossover connections should be completed as illustrated in Fig. 8.8. The proper fittings and flex connectors have been shipped with the home. Fittings should be installed exactly as illustrated. The direction of flow from the main gas source to the home must be noted as it is critical to the connection assembly. Fittings are typically marked with direction of flow arrows. All connections must be readily accessible from under the home and are not to be concealed. (Note: Some gas piping systems are tested, listed and approved for connection concealment but are very limited in use for factory installations. Such systems are not addressed in this manual and, as such, must only be installed by qualified professionals using specialty fittings in strict accordance with piping manufacturer's listing and the approval of the LAHJ.)

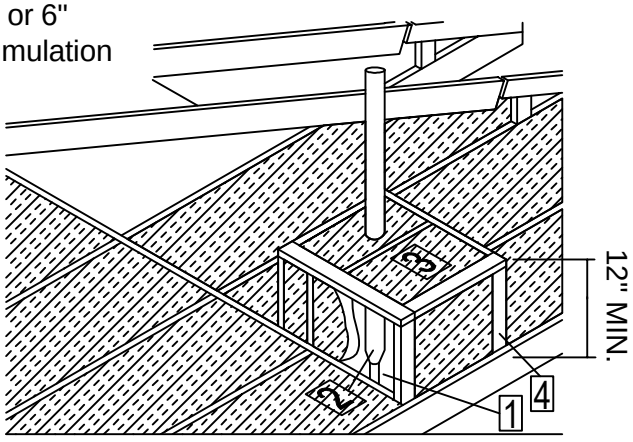
Commenary regarding paragraph 8.2.5 and Figure 8-7

Any home sited in localities which are classified as having winter temperatures 0 degrees F or below require that drain vents extended through the roof must transition to 3" diameter 12" below the decking and must terminate at least 6" above the finished roof or 6" above the anticipated local snow accumulation, whichever is greater. The drain vent frost closure requirements for pre-2015 IRC compliant homes require transition to 3" pipe diameter at least 12" below the decking line.

The drain vent frost closure requirements originating with the 2015 IRC are much more extreme than the codes previous to the 2015. The 3" vent pipe frost closure in homes built to be in compliance with the later codes under the described frost conditions must have the transition to the 3" pipe at least 12" ***inside the home thermal envelope***. Due to home shipment limitations, the hinged roof typically will not allow enclosing the piping transition in the attic at the factory. Please refer to Fig. 8-7 below for completion of the required thermal envelope in attic areas when 2015 IRC homes arrive with the 1-1/2" or 2" vent pipe stubbed into the attic area. Homes with 3" pipe vents enclosed in a home wall continuous into the attic require no transition.



METHOD -1



1. 1-1/2" or 2" pipe at ceiling line.
2. Transition just above ceiling line and 12" min within raised thermal envelope box.
3. Same R-value as surrounding attic.
4. Box const. may be of osb, ductboard, foamboard or other rigid material or may be framed and covered with similar type materials
5. Box may be site built or shipped loose.

As an alternate, 6" min. diameter R-8 insulated flex duct may serve as transition enclosure method. Duct to be zip-tied at top around pipe and taped to pipe.

Where surrounding insulation is not present, duct may be wrapped with extra FG insulation batt secured to achieve R-value as required.

METHOD -2

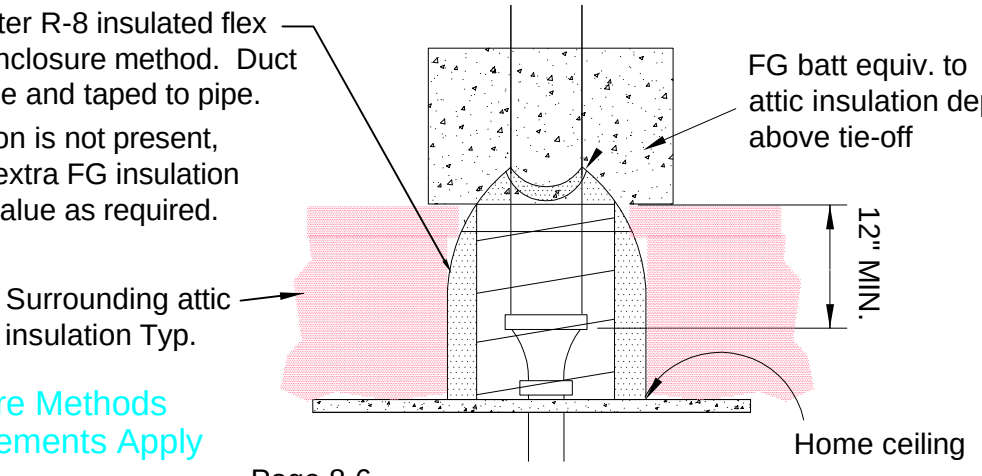
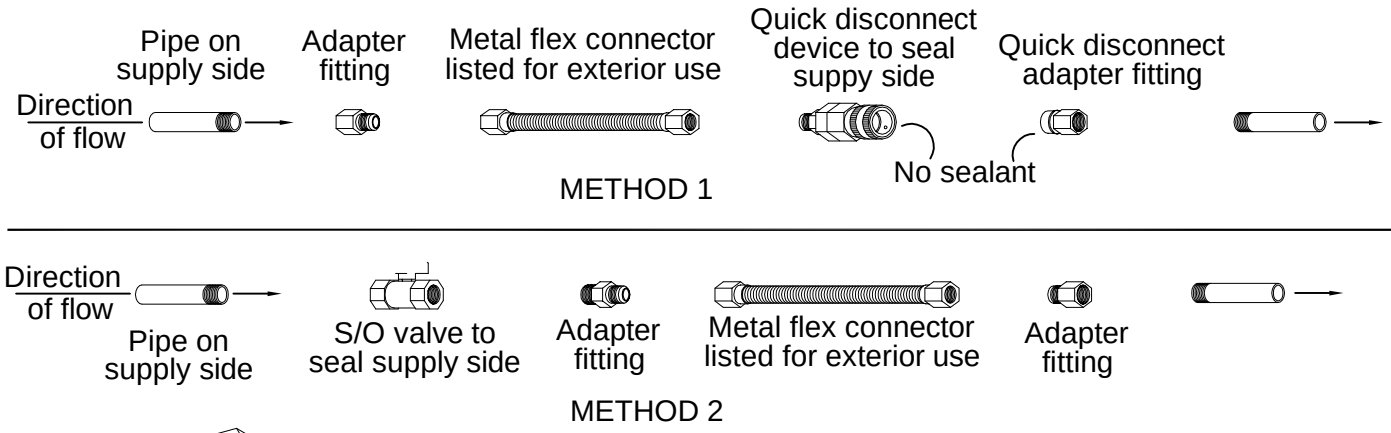


Fig. 8.7 - DWV Frost Closure Methods Where Code Requirements Apply



Quick disconnect fittings are designed to be used with no lubricants or sealant at the coupling. Sealant must be used only on the threaded portions of these fittings.

DO NOT USE TOOLS TO CONNECT OR DISCONNECT THE QUICK DISCONNECT COUPLING

Fig. 8.8 - Typical Black Pipe Gas Crossover Connection

8.3.2 Gas Line Testing

Before the gas piping system is put in service or concealed, it shall be tested to insure that it is gas tight. Testing shall be performed in accordance with the International Fuel Gas Code and/or any state and local gas codes in effect. Any failures or leaks found during testing shall be investigated and successfully corrected prior to putting the system into service.

NOTE: All the gas appliances in the home, including the heating system, are equipped for natural gas. If LP gas is to be used, then the appliances must e converted using proper Natural to LP conversion equipment. Follow the appliance manufacturer's installation instructions carefully. Conversions shall only be performed by a qualified fuel gas or mechanical professional. Do not try any appliance pilot light until it has been checked to insure that the vent is completely installed, and all connections and tests have ben properly completed.

8.4 Appliance Set-up

NOTE: The appliances in the home should all be set up in strict accordance with the requirements set forth in the installation instructions provided by their manufacturer. Such instructions are written to insure code compliance and proper installation techniques.

8.4.1 Clothes Dryer Vent

The clothes dryer must exhaust to the exterior of the home. If the dryer is close to an exterior wall, the exhaust vent may already be installed. If the dryer is at a more central location in the home, then the flexible duct that is supplied will need to be routed to the outside air. The exhaust cannot terminate in the crawlspace, basement, or anywhere inside the home structure. This would lead to moisture accumulation and damage to building materials. Also the termination of the dryer vent must be away from any flammable materials. The duct provided shall not be more than 8 feet in length before terminating to the outside. If a length greater than 8 feet is required to reach the outside air, then a transition flex duct up to 8 feet long may be used to tie into a rigid metal exhaust system to serve the dryer. (See Fig. 8.9).

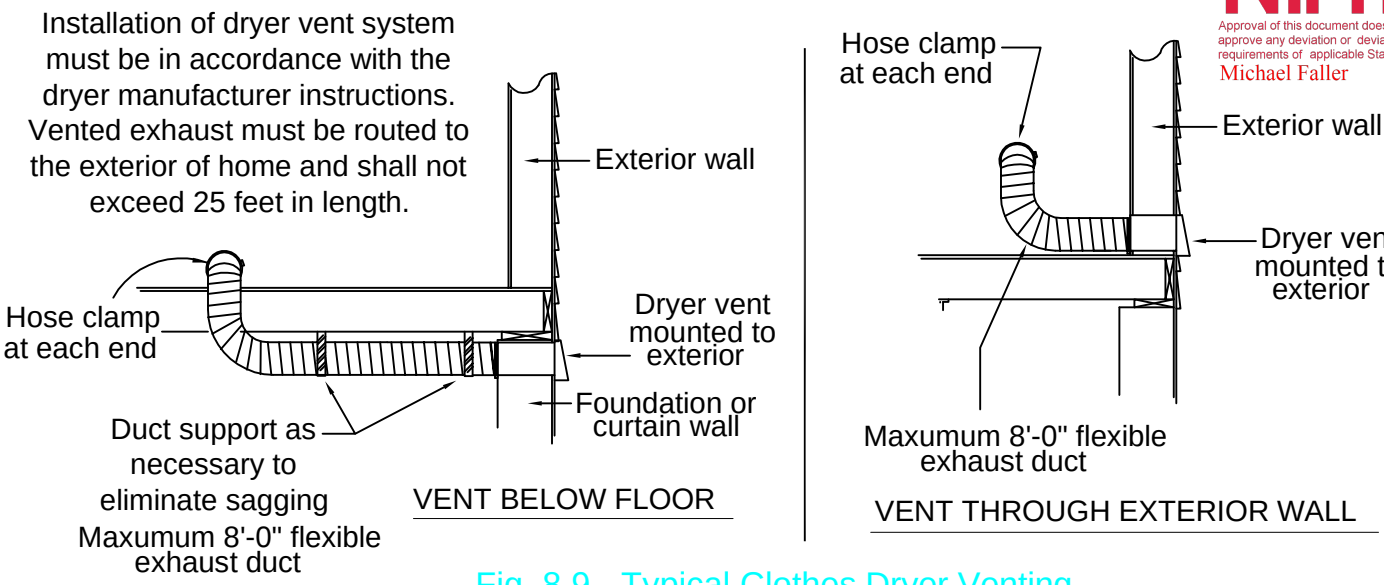
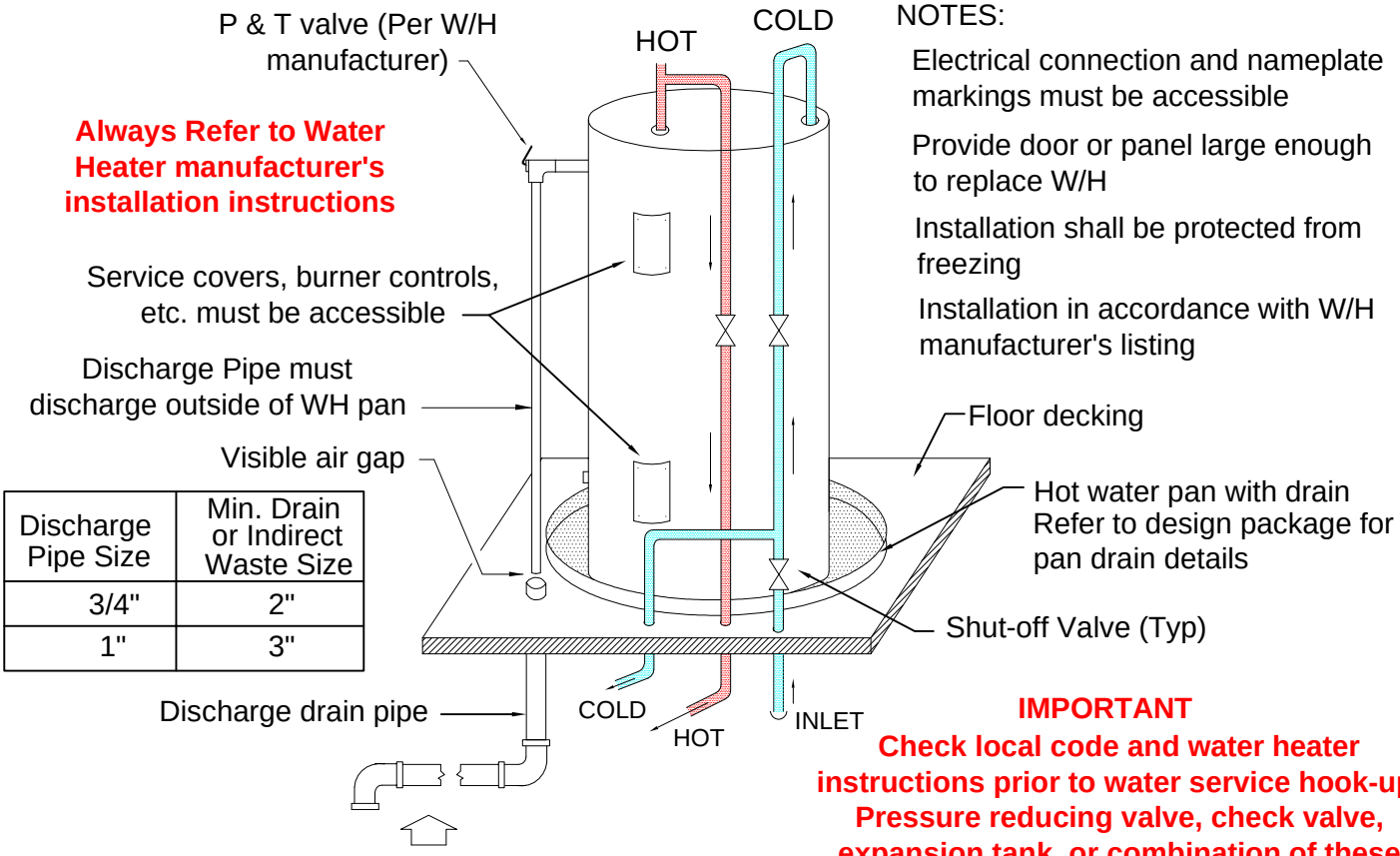


Fig. 8.9 - Typical Clothes Dryer Venting

8.4.2 Typical Water Heater

The water heater will arrive on site installed if it is on the main floor of the home. However, depending upon how the the home was ordered, the entire WH may be the responsibility of an on-site contractor.



Discharge Pipe Size	Min. Drain or Indirect Waste Size
3/4"	2"
1"	3"

NOTES:

Electrical connection and nameplate markings must be accessible

Provide door or panel large enough to replace W/H

Installation shall be protected from freezing

Installation in accordance with W/H manufacturer's listing

IMPORTANT

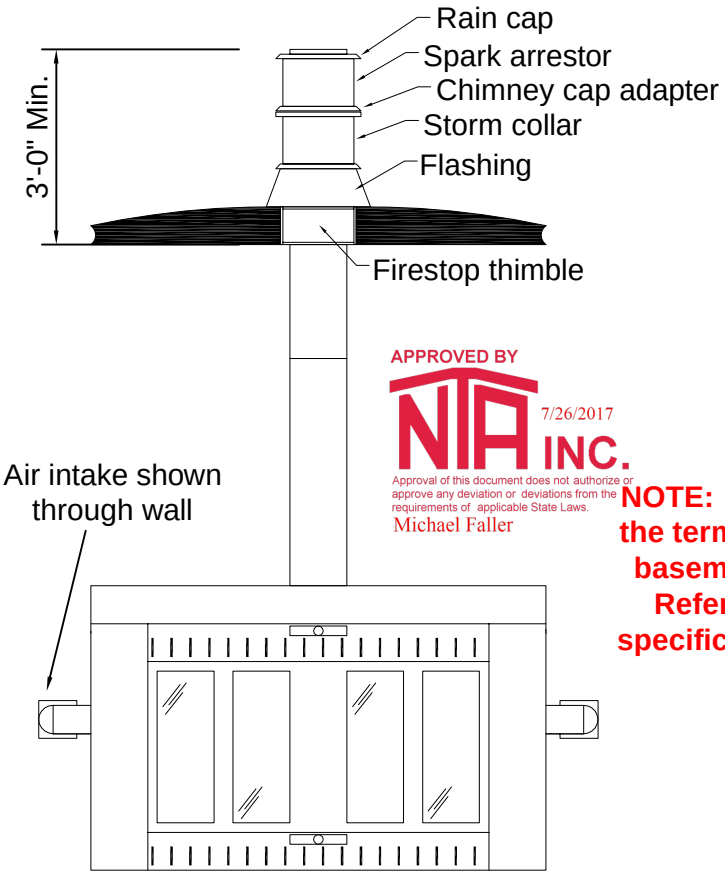
Check local code and water heater instructions prior to water service hook-up. Pressure reducing valve, check valve, expansion tank, or combination of these may be required to accommodate excessive water pressures generated by local water utility or by private well service

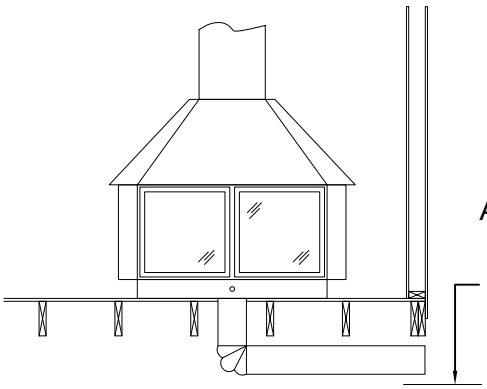
80 p.s.i. is generally accepted as the maximum operating pressure for residential water distribution systems.

Fig. 8.10 - Typical Water Heater Detail

8.4.3 Typical Fireplace Details

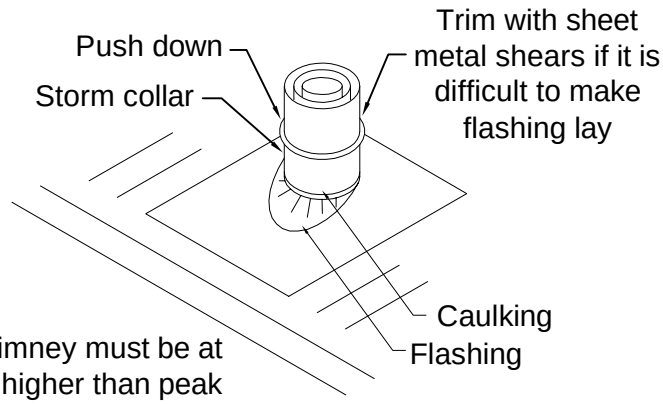
Factory installed fireplace chimneys may be extended through the roof at the factory. It is important to extend these stacks to assure sufficient draft for the proper operation and to comply with the fireplace manufacturer's requirements. Finished chimneys should be extended a minimum of 3 feet above the highest point where they penetrate the roof, and at least 2 feet higher than any other building element located within a horizontal distance of 10 feet. Refer to Fig. 8.11 for typical chimney and air intake details.

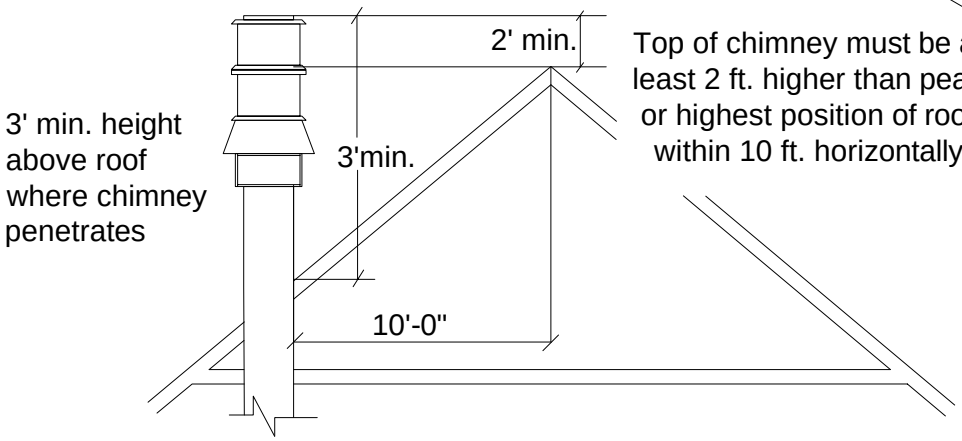




OVER BASEMENT OR CRAWLSPACE INSTALLATION

NOTE: Check termination of the fireplace fresh air. If the termination is below the floor into a crawlspace or basement, it MUST be extended to exterior of home. Refer to fireplace manufacturer's instructions for specific requirements for actual appliance being used.





Top of chimney must be at least 2 ft. higher than peak or highest position of roof within 10 ft. horizontally

NOTE: Always consult fireplace manufacturer's installation instructions to insure that proper requirements are met

Fig. 8.11 - Typical Fireplace Details

8.5 Mechanical Connections (Flues, Ventilation & A/C Considerations)

8.5.1 Flues

Flues for fireplaces or other wood burning, gas burning, or oil fired appliances may have been partially installed at the factory. Flues must be inspected on site to insure that they are properly installed in accordance with the appliance manufacturer's installation instructions before the appliance is put into service.

8.5.2 Oil Burning Furnaces

Homes equipped with oil fired furnaces must have the oil supply installed on-site (piping is not supplied). Follow furnace manufacturer's installation instructions carefully for set up.

8.5.3 Heat Pumps

If you plan to install a heat pump, then follow the manufacturer's installation guidelines carefully. The home manufacturer will not be responsible for the efficiency of the heat pump system installed by others.

8.5.4 Range Hood

If the range hood installed is the type to be vented to the exterior, the vent must be extended through the roof or wall to the outside air. Check to insure that this connection is complete (if not, must be completed on site). The vent must not terminate in the attic or anywhere inside the structure of the home due to the accumulation of vapors and moisture. Consult range hood manufacturer's instructions for proper venting.

8.5.5 Down Draft Cook Top

If home has a range with a down-draft exhaust system, then the exhaust must be ducted to the outside air. The exhaust duct must not terminate in the crawlspace, basement, or any anywhere inside the home structure. Follow range manufacturer's venting instructions carefully.

8.5.6 Bathroom Exhaust Fan

Bathroom exhaust fans have been attached to flexible duct that may need to be routed to the outside air on site where this was not possible at the factory. (Fig. 8.12) The duct shall not terminate inside the attic or anywhere inside the structure due to moisture accumulation. In some instances the exhaust may be factory complete to the eave soffit or could, likewise be so routed on site making sure that the exhaust air is ducted to discharge to the exterior of the home and does not empty into the soffit area. (Fig. 8.13)

Fig. 8.12 - Bath Exhaust Through Roof

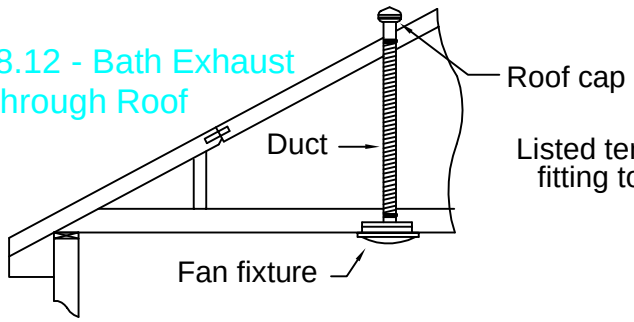
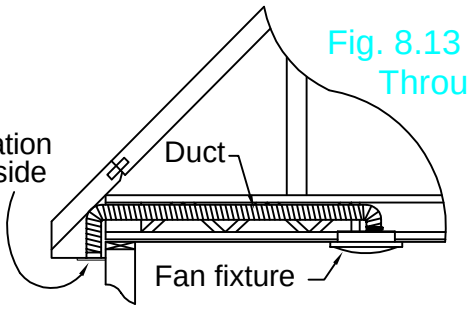


Fig. 8.13 - Bath Exhaust Through Soffit



8.5.7 Whole House Mechanical Ventilation System

Home may be equipped with a whole house mechanical ventilation system. Such systems are required by the International Residential Code, (beginning with the 2012 edition). The intent of this system is to provide a healthy and controlled exchange of fresh air inside the home.

This system occurs in the form of a fan placed somewhere in your home. Depending on the size of the home, there may be more than one fan. These fans are programmed to run continuously or, in some cases, may be on a timer programmed to run at a predetermined interval. Instructions are provided in your homeowners packet for any system that may have been installed at the factory.

(Whole House Mechanical Ventilation System - Continued)

In some cases, the whole house system may double as an exhaust fan for some other purpose as well. In these instances, a wall switch is provided that will speed up the fan when needed. The fan will return to normal operation when the switch is turned off.

In some cases, the whole house system may double as an exhaust fan for some other purpose as well. In these instances, a wall switch is provided that will speed up the fan when needed. The fan will return to normal operation when the switch is turned off.

As allowed by code, this is an exhaust fan only system. The negative pressure created by the fan pulls fresh air from passive sources such as bath fans, range hoods, doors and windows, etc. Some jurisdictions may require an additional supply air system to compliment the exhaust fan. Such supplement must be obtained and installed on-site by others. (Example: Panasonic "SelectCycler" switch-controlled damper kit available on line or at some DIY stores.) As this is not mandated by code and most jurisdictions do not require it, this is not a factory offered option.

These fans are designed to run on minimal power and are very quiet. Homes have been designed to high energy standards and these fans are an important part of making sure the home remains healthy.

PLEASE MAKE SURE FAN(S) ARE OPERATING PROPERLY

PLEASE DO NOT ATTEMPT TO IMPAIR THE OPERATION OF FAN(S). THIS WILL TAKE THE HOME OUT OF COMPLIANCE.

8.5.8 Air Conditioners

The air distribution system of the home (if present) has been designed to accommodate a central air conditioning system. However, any equipment that you install is not to exceed the air duct capacity listed on the home compliance certificate. The installation of window air conditioning units is not recommended.

Any field installed wiring beyond the junction box must include a fused disconnect located within sight of air condensing unit. The maximum fuse size is marked on the condenser data plate. All site work must comply with state and local codes for all mechanical and electrical work.

"A- Coil" air conditioning units must be compatible and listed for use with the furnace in the home. Follow air conditioner manufacturer's installation instructions.

8.5.9 Remote Units

If a remote, self contained, packaged air conditioner is to be connected to the heat supply duct, then an automatic damper must be installed between the home duct supply system and the heating appliance. The duct system leading from the remote unit to the home is to be secured and care taken to not allow the duct to touch the ground. Insulate the ducts with a suitable material having a minimum thermal rating of R-6 (for duct diameter of 3" or greater) and R-4.2 (where less than 3" diameter). Refer to Chapters 11 and 16 of IRC for additional information. Connect the duct that carries the air to the home directly to the main supply duct at a point where there is approximately the same number of supply registers on either side of the connection. Locate the return air duct in the center of the home. Direct all condensation run-off away from the home using a hose or as specified by the unit manufacturer's installation instructions.

Chapter 9 - Site Construction Features and Procedures

9.1. Site Built Garage or Similar Structures (Tags, Porches, Carports, etc.)

Attached structures must be installed to the manufacturer's instructions (if applicable), and to all local codes that apply. The site built structure is to be supported independently from the factory built home. All electrical materials and work are per the applicable NEC and all local codes that apply. See Fig. 9.1 for typical garage.

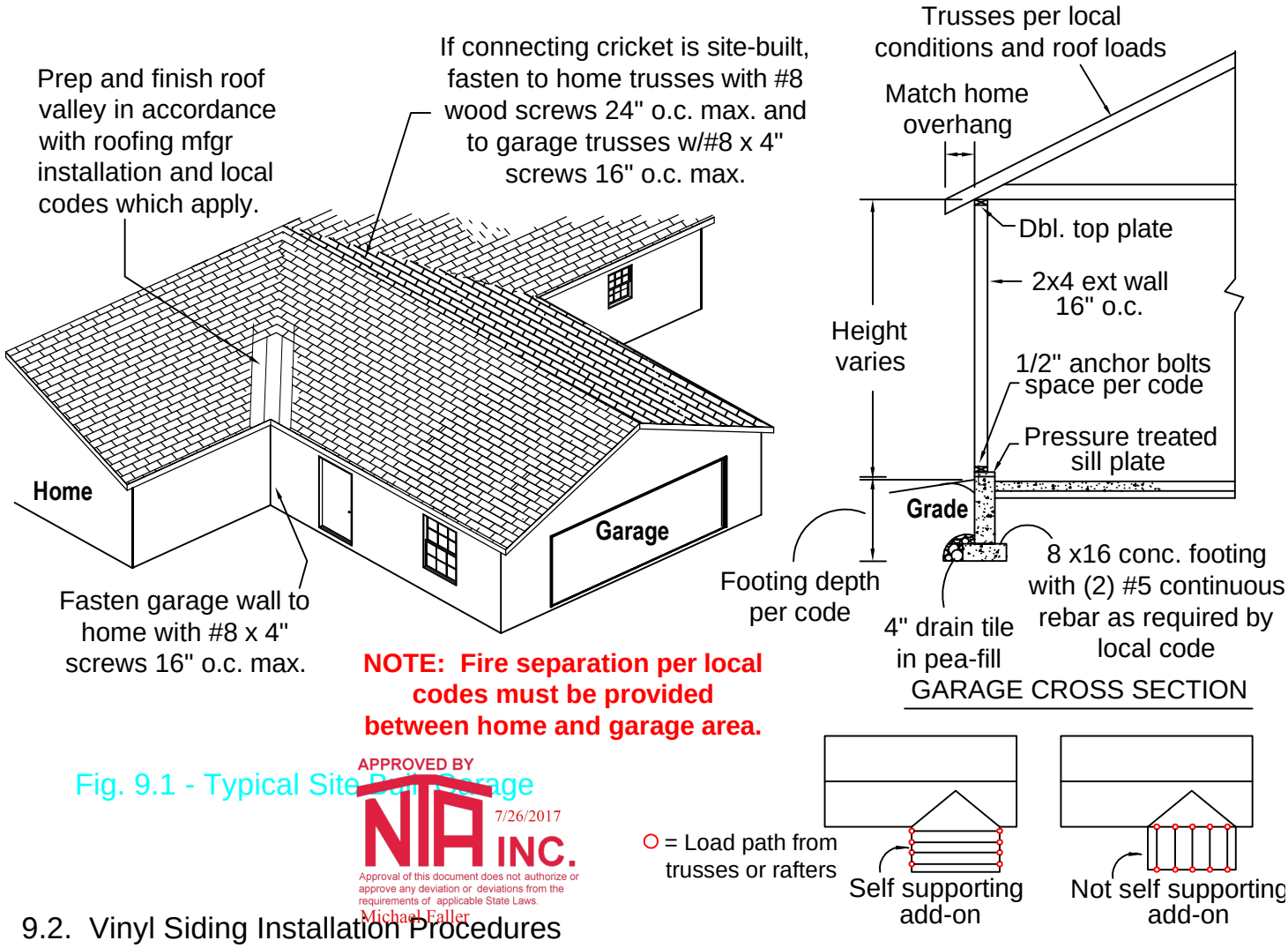


Fig. 9.1 - Typical Site Built Garage

9.2. Vinyl Siding Installation Procedures

The home will typically arrive to the site with the vinyl siding omitted on the end walls in order to accommodate mating and close up at the gable ends. Siding panels have been shipped loose with home for finish closure of the home ends.

1. The vertical joint between home sections is to be sealed for it's entire height by at least a 2" wide strip of duct tape or other sealant applied directly over the house wrap.

2. Siding panels should be attached using 7/16 x 1" x 16 gauge galvanized steel or aluminum staples. (6d galvanized or aluminum nails may also be used). Staples or nails are to be driven at the provided nailing slots which line up with the wall studs. Fasteners are not to be driven tight against the siding in order to permit lateral movement of the siding panels for expansion and contraction.

3. Snap the bottom course of siding into the starter strip and fasten to the studs insuring that the panel is completely engaged into the starter strip and is level. (Do not force vinyl siding panels. The panels should "hang" from the fasteners and not be forced out of shape.) There should be a 1/4" clearance between the ends of the panels where they terminate in a J-channel or corner post channel. The vertical butt joints, (pane to panel joints), should be overlapped 1". No fasteners should occur within 4" of a butt joint or accessory.

Vinyl Siding Installation Procedures (Continued)

4. Vertical butt joints in adjacent courses should be offset by at least 24". Joints in alternate courses should be aligned vertically.

5. Panels will need to be notched at headers and sills and cut for windows and doors. A single panel should extend without joints across the width of an opening. Cuts are to be made to allow for 1/4" clearance at the J-channels.

6. In order to prevent leakage, window and door corners need to be flashed in accordance with IRC guidelines and/or window or door manufacturer installation instructions before finish siding is installed. Such flashing is required by code and failure to flash these areas may result in moisture damage to the structure and formation of mold.

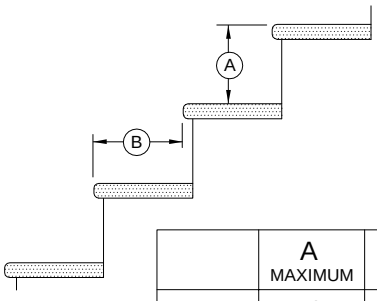
7. All house wrap seams and connections to windows and doors must be sealed per manufacturer's installation instructions. Apply an appropriately rated exterior caulking around, light blocks, water faucets, or other small penetrations.

NOTE: Always refer to siding manufacturer's instructions for the siding product being used to determine the proper installation requirements.

9.3 Typical Stair Construction

Although the more recent IRC codes specify a more stringent stair geometry, many states have amended their local code requirements to maintain the previously observed CABO stair requirements for rise and run of stairways. Refer to Fig. 9.2 for stair information pertaining to either code requirement. Check state and local codes to determine the appropriate stair geometry to be used.

NOTE: Stairwell enclosure must be insulated when adjacent to unconditioned areas



	A MAXIMUM	B MINIMUM
IRC	7-3/4"	10"
CABO	8-1/4"	9"

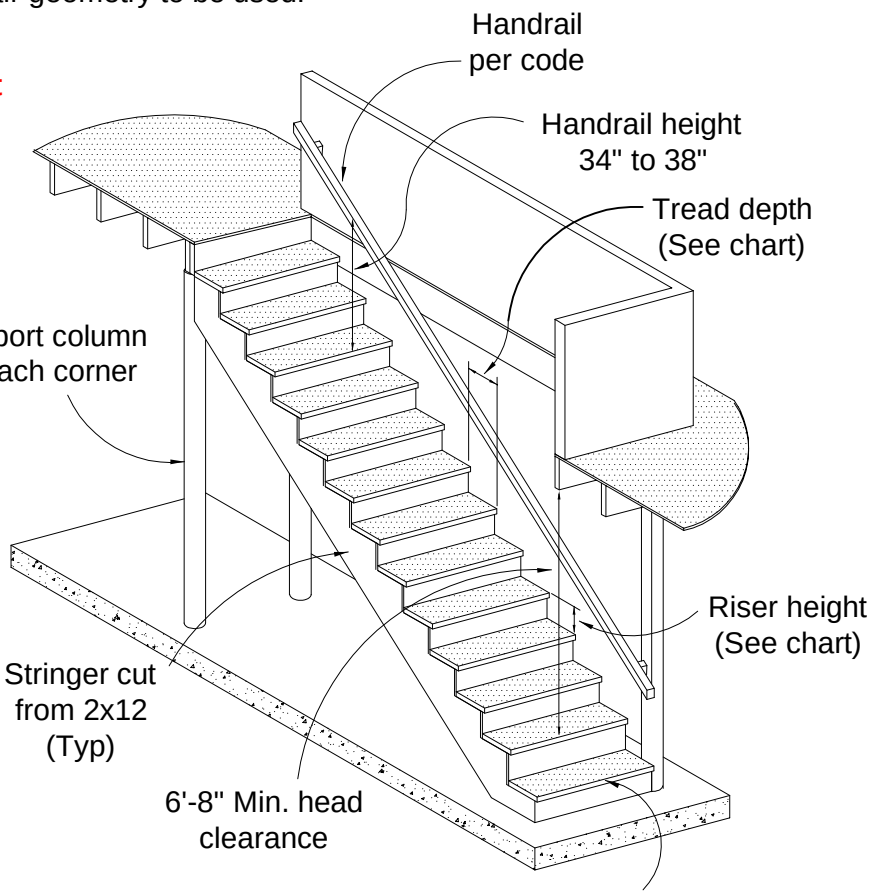


Fig. 9.2 - Typical IRC/CABO Stair Rise & Run

9.4 Fire Separation

Duplex or other multi-family dwellings require fire separation by a one-hour or two-hour fire rated partition assembly as required by local codes. Attached garage wall areas between home and garage are also subject to fire separation treatments. Note that these assemblies must provide protection continuous through the attic area of the home as well as the partitions. These measures must be completed in the field after the roof is raised and installed in place by a qualified installer/builder. See Fig. 9.3.1 & Fig. 9.3.2 for typical (2) 1-hour fire wall separation details. Always confirm proper fire separation measures with LAHJ.

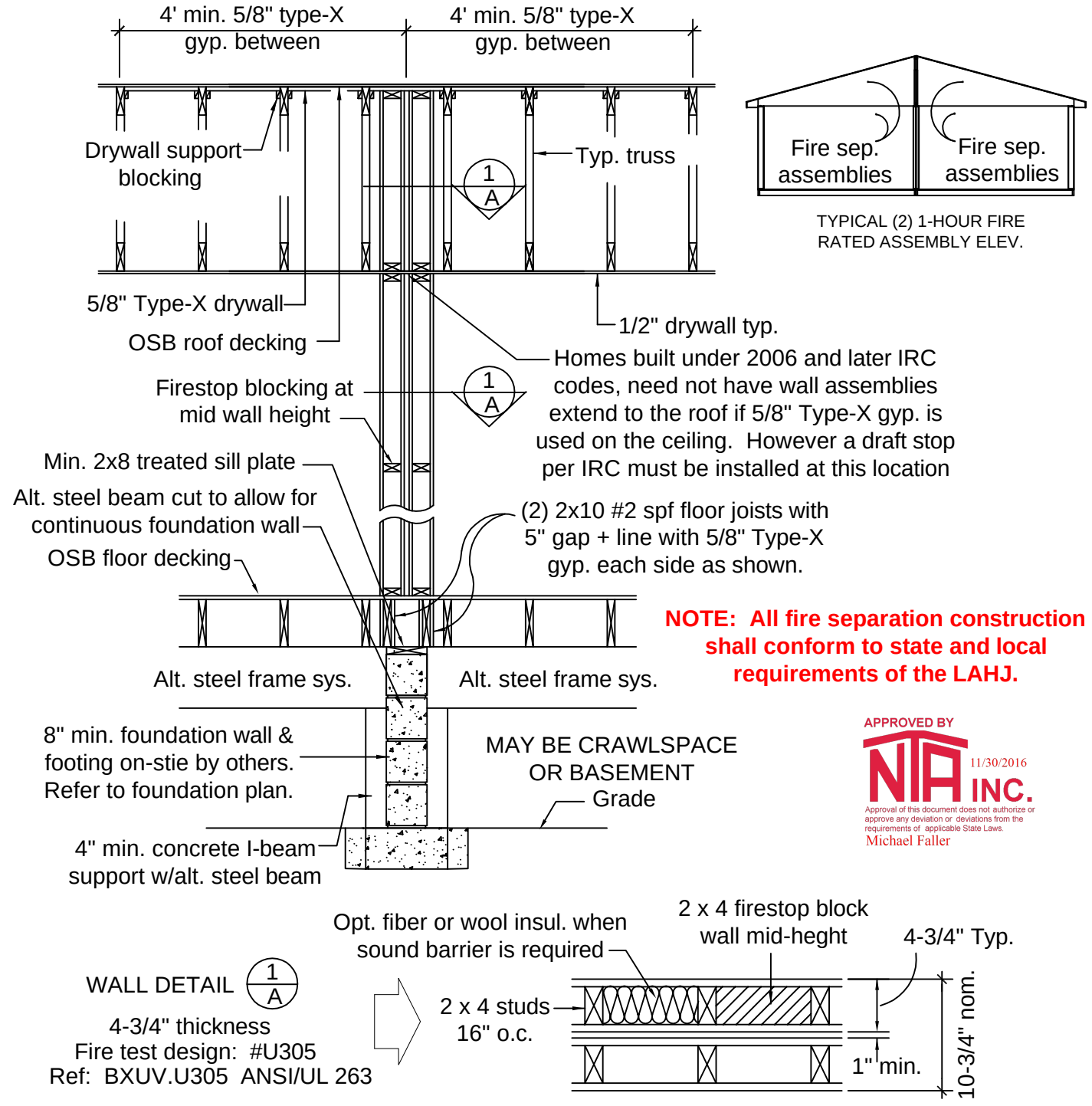
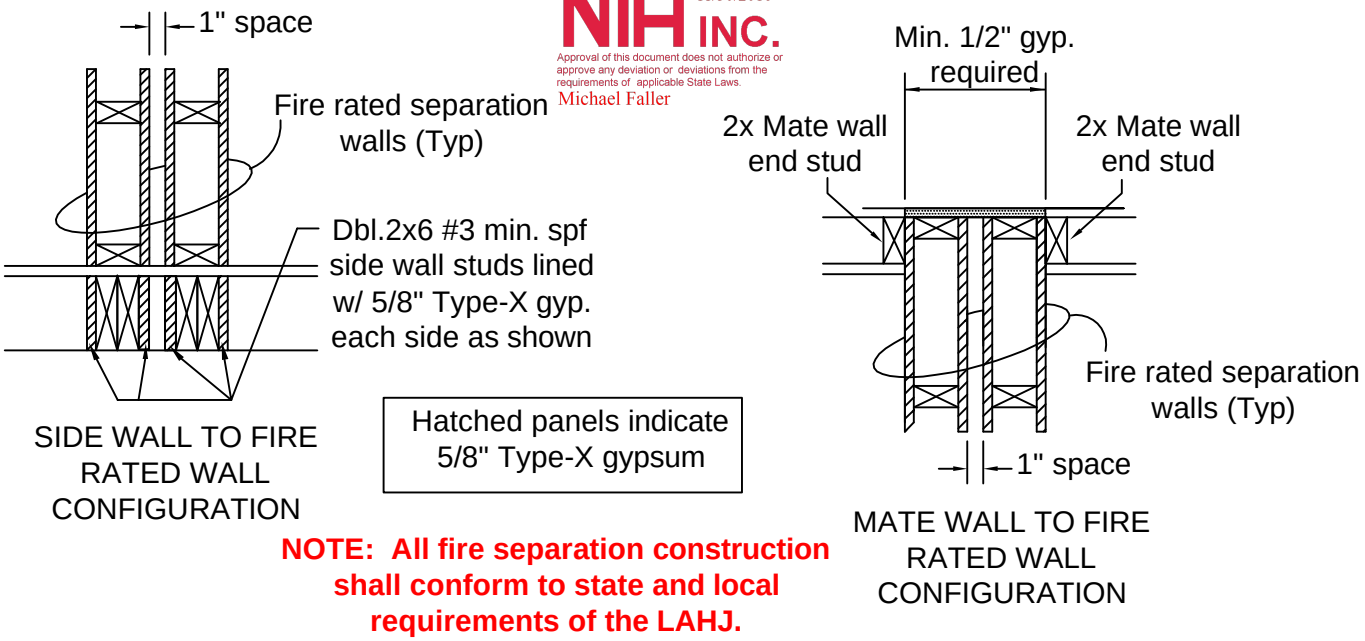


Fig. 9.3.1 - Typical (2) 1-Hour Fire Resistance Rated Wall Details



NOTE: All fire separation construction shall conform to state and local requirements of the LAHJ.

The construction and materials used for fire resistance rated walls shall conform to the following requirements:

1. Nail Heads - May be exposed or covered with joint compound.

2. Joints - Exposed or covered with fiber tape and joint compound, except for tapered rounded edge wallboard joints are to be covered with fiber tape and joint compound. As an alternate, nominal 3/32" thick gypsum veneer plaster may be applied to the entire surface of classified veneer baseboard with joints reinforced.

3. Gypsum Wallboard - 5/8" thick (Type-X) wallboard paper or vinyl surfaced with wallboard nailed 7" o.c. max. with 6d cement coated nails 1-7/8" long (0.0915" shank dia.) and 1/8" dia. heads. When used in widths of other than 48", the wallboard is to be installed horizontally. Type "W" drywall screws 1-7/8" long min. may be used in place of specified nails.

4. Electrical receptacle and switch boxes are allowable in the 1-hour fire walls provided that the boxes are metal or are other 1-hour fire rated boxes of other material as prescribed by their listing. When electrical boxes are present, 100 sq. in. of box area is allowed within 100 sq. ft. of wall area.

Fig. 9.3.2 - Typical (2) 1-Hour Fire Resistance Rated Wall Details (Continued)

9.5 Fire Protection of Floor Assemblies (Applicable where adopted codes dictate)

Under the requirements set forth in the 2012 IRC and later IRC code cycles, floor systems meeting certain structural conditions require special on-site fire protective measures as specified in the code. Some states have optioned to selectively enforce these provisions at their discretion even though the main body of the 2012 IRC code has not been formally adopted. For this reason, it is important to check with the local code authority where the home is being sited to determine if these special floor protective measures are applicable.

As a convenience to the installer, the following elements of the code are presented to clarify the conditions that would trigger compliance with the floor fire protective measures, as well as an explanation of the required procedures to insure compliance.

Refer to IRC code section R302 regarding Fire Protection of Floors for the specific code text relating to the requirements for installation of the gypsum board protective membrane to the underside of the home floor system. The following information is intended to summarize the requirements:

Fire Protection of Floor Assemblies (Continued)

Where any of the following four conditions exist, the prescribed protective 1/2" gypsum wall board membrane covering the underside of the home floor system Would Not be required:

1. Floor assemblies located directly over a space protected by an automatic fire sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent fire sprinkler systems.

2. Floor assemblies located directly over a crawlspace NOT intended for storage or which does NOT contain a fuel fired appliance.

3. Even when the floor is determined to be subject to the fire protective membrane, defined portions of floor assemblies which are subject to the protective membrane can be exempted when complying with the following (See also Fig. 9.4):

   a. The aggregate area of the unprotected portions shall not exceed 80 square feet provided that fire blocking in accordance with the IRC Section 302 is installed along the perimeter of the unprotected portion in order to isolate it from the remainder of the floor assembly which is subject to protection.

4. Wood floor assemblies using dimensional lumber or structural composite lumber equal to or greater than 2x10 nominal dimension or other approved floor assemblies demonstrating equivalent fire performance are exempt from the membrane requirement. For instance: If the home floor is framed completely with solid lumber floor joists of at least 2x10 nominal, then the protective membrane is not required. However if the floor system is constructed with web floor trusses of any dimension, or if solid lumber joists are less than nominal 2x10 lumber, the floor fire protection measures do apply unless the assembly is exempted by the conditions stated in items 1, 2, or 3 above. Refer to Fig. 9.4 for illustrations.

PLEASE NOTE: Fire protective membrane is not required for nominal 2 x10 open or web joists provided that the joist is certified with a fire-rated approval which exempts it from panel protective measures. Also consult your local official for approval and acceptance.

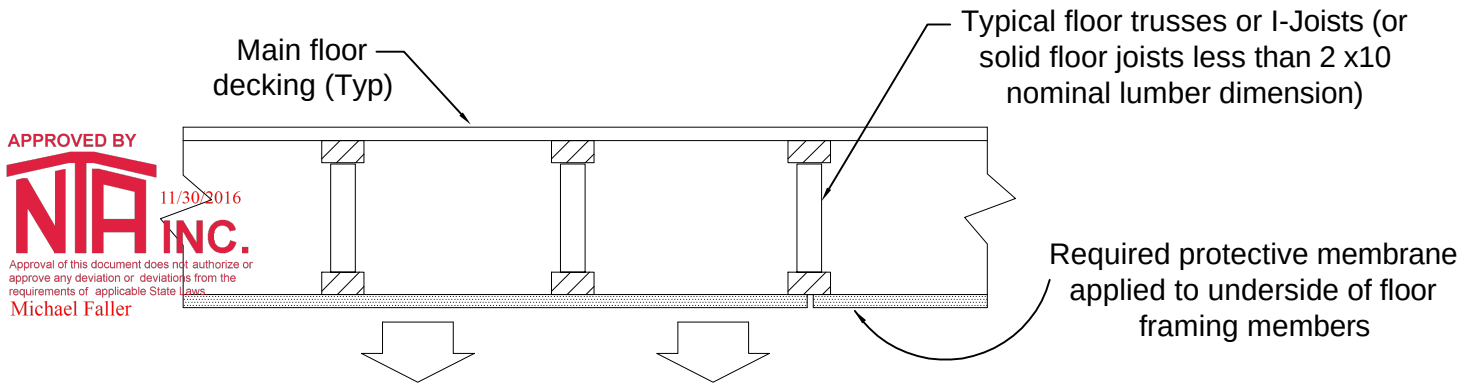
As set forth in the code requirements, various materials may be used to construct the fire protective membrane if condtions are such that the membrane is required to be installed. Where 1/2" gypsumpanels, 5/8" wood structural panels, or equivalent materials are required to be applied as a protective membrane to the underside of the floor framing members, the fastening requirements of the material manufacturer's specifications must be followed. Check with state or local officials to determine what materials are considered 'equivalent" where gypsum or structural wood products are not used as the membrane material.

Other Membrane Installation Considerations

In additon to the prescribed floor protection, when such measures are required, attention must be given to penetrations through the required protective membrane. Where plumbing pipes, electrical cables, conduits, support columns or other elements cause voids in the membrane, isolating blocking as described in them 3(a) at such penetrations is to be installed. All such blocking is provided and installed on-site by others as required. The bottom side of stairs (and walls surrounding) concealed in basements are also subject to protection on the concealed side of the stairs and surrounding walls.

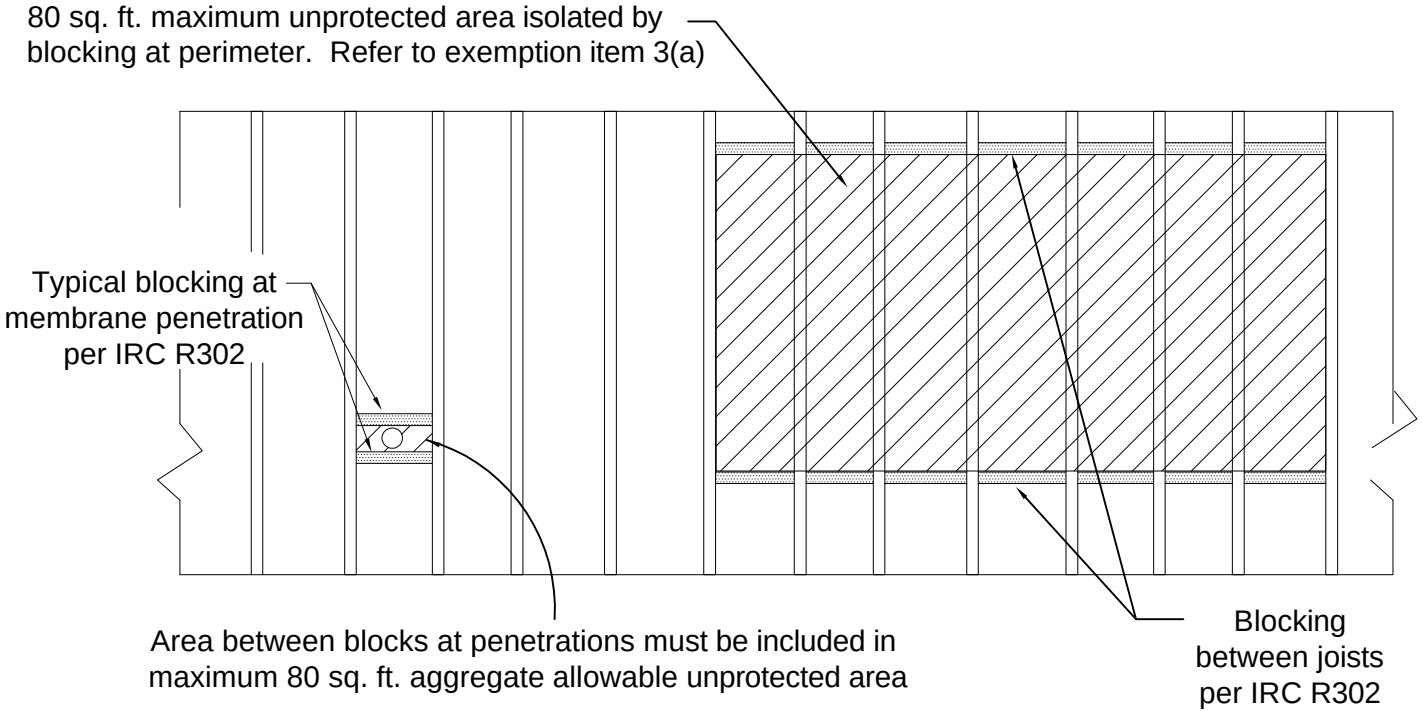
Builder / Installer Responsibility for Floor Fire Protection

Please be aware that the stated floor fire protection measures described are informational only ands are not part of the factory construction of your home regardless of the floor joist system installed in the home. The homeowner/installer must evaluate the constructed floor system of the home as well as the site conditions present, in order to determine the proper measures for code compliant fire protection of the home floor system. All materials required are provided and installed on site by others and shall meet the approval of the local authority having jurisdiction and must be in compliance with all codes that apply.



BASEMENT SPACE W/O APPROVED FIRE SPRINKLER PROTECTION OR CRAWLSPACE INTENDED FOR STORAGE AND/OR CONTAINING FUEL FIRED APPLIANCE

NOTE: Fire protective membrane is not required for nominal 2 x10 open or web joists provided that the joist is certified with a fire-rated approval which exempts it from panel protective measures. Also consult your local official for approval and acceptance.



TYPICAL BLOCKING AT PERIMETER OF ALLOWABLE UNPROTECTED AREA

Fig. 9.4 - Typical Fire Protective Membrane Measures for Floor Assemblies (When applicable)

9.6 Window Fall-Protection Requirements

Under the requirements set forth in the 2006 IRC and later IRC code cycles, operable windows, having the lowest part of the clear opening located less than 24" off the finished floor, must have fall prevention devices installed where the lowest part of the clear opening occurs 72" or more above finished grade or surface below. Such devices may be sash limiting stops which will not allow a 4" diameter sphere to pass through or may be listed guard rails. Any device used must be listed to comply with ASTM F2006 or F2090. These devices, if required, are provided and installed on site by others.

9.7 Floor Insulation Responsibility

The insulation requirements for any given home are indicated in the thermal report included with the home design package. Refer to the thermal report to determine whether the floor system or foundation walls must be insulated. Please note that a "conditioned crawlspace" is treated differently than a conventional cold ventilated crawlspace. (See Chapter 3 for more information). **The perimeter band of floor must always be insulated regardless main floor insulation requirements. It is the responsibility of the builder/installer to insure that all insulation requirements below the warm side of the home floor are properly insulated, on-site at the time of set up, in accordance with the thermal report and all local codes that apply.**

On-Site Insulation Support: In general, insulation which occurs in the floor area must be supported in such a manner that the insulation makes full contact with the bottom surface of the floor decking in the floor joist cavities where the insulation is to be installed. There may be various approved methods to implement this requirement, but most common is the use of tension support wires often referred to as "tiger teeth". These support wires are to be installed no more than 18" apart and no greater than 6" from the ends of the insulation run in the joist cavity. The support wires are sharp at each end and slightly longer than the width of the joist cavity. These are installed simply by pushing up firmly to the batt insulation. The ends of the wire then penetrate the joists and are automatically locked in place by the ends of the wires.

A Note About Factory Installed Insulation: In some instances a home may arrive with the floor partially or fully insulated with netting beneath the factory insulated area. This application is limited to some facilities in order to accommodate shipment of the home with the floor insulation in place and also allow for site installation of the required insulation support wires if they are not present.

> **Exception:** Where a permanent air barrier is installed to the bottom of the floor joists, the insulation in the floor joist cavities may rest upon the air barrier rather than making positive contact with the bottom of the main floor decking. Even when air barrier is used, the perimeter band joist area of the home floor must be fully insulated.

9.8 Door Adjustments

Movement of the home during transit and set-up typically causes interior and/or exterior doors to become slightly out of adjustment resulting in uneven clearance conditions in door openings. **It is the responsibility of the builder/installer to inspect the operation of all doors after set-up and prior to occupancy and to make adjustments as needed to insure proper operation of all of the doors in the home.**

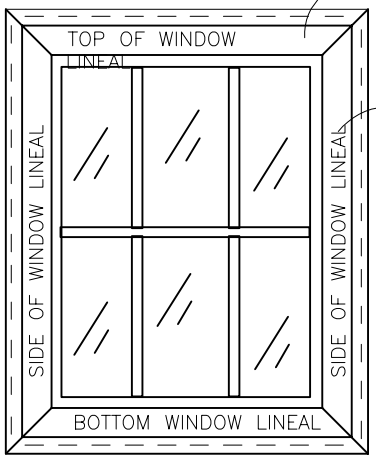
9.9 Optional Window Awning Feature (Where Applicable)

Some marketing locations may offer a decorative exterior shed-type window awning feature that requires some on-site assembly and mounting to the exterior wall of the home at selected window locations. This typically consists of (2) Corbel brace members, a horizontal support beam, and a factory constructed roof framing section. Refer to (Figure 9.5) for assembly and mounting details.

Factory installed window lineal trims are reinforced with a lumber insert to provide rigidity where Corbel braces and roof rail are positioned against them and fastened on the windows which are targeted for the awning installation. No additional flashings or trims are required, but any fastener or other penetrations exposed to the elements are to be sealed by an exterior rated caulk or other sealant.

All necessary fasteners and other materials are included in the shipped loose package for site installations. The roofing materials are provided for site installation of the roofing onto the assembled and mounted window awning. Roofing to be installed in accordance with applicable roofing manufacturer's installation instructions.

Fig. 9.5 - Typical Site-Installed Window Awning (When applicable)



TYPICAL WINDOW TRIM DETAIL SHOWING LINEAL POSITIONING ABOUT WINDOW(S). (SINGLE WINDOW APPL. SHOWN. MAY BE MULTIPLE WINDOWS.

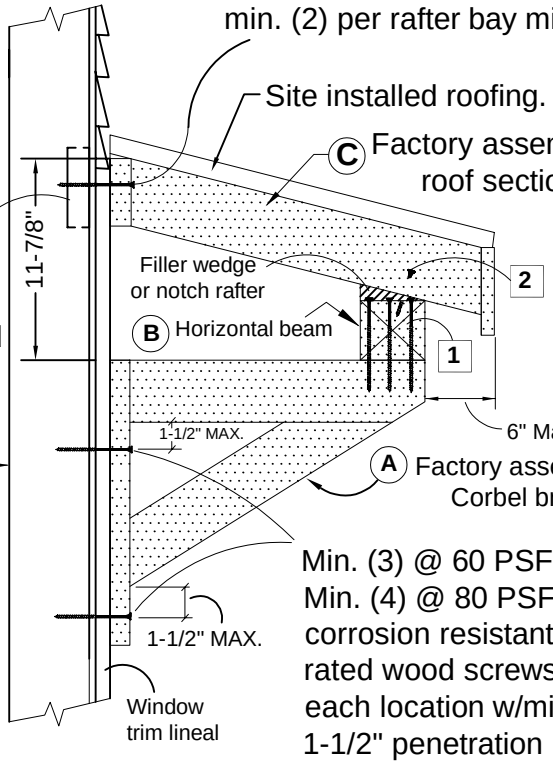
Horizontal roof rail of awning roof sectin mounts against surface of top window lineal. Mounting fasteners penetrate lineals and must achieve 1-1/2" min. penetratioin into ext. wall framing.

Awning Corbel braces mount against surface of window side lineals. Mounting fasteners penetrate lineals and must achieve 1-1/2" min. penetration into ext. wall framing studs.

Where common wall studs do not occur for awning roof rail fastening, factory has provided backing framing along length of roof rail for site securement.

Factory wall construction incorporates wall studding at both of the awning corbel locations for site securement of the corbels to the home.

Min. #8 corrosion resistant exterior rated wood screws of sufficient length to penetrate wall framing members by 1-1/2" min. (2) per rafter bay min.



Min. (3) @ 60 PSF or Min. (4) @ 80 PSF #10 corrosion resistant ext. rated wood screws at each location w/min 1-1/2" penetration

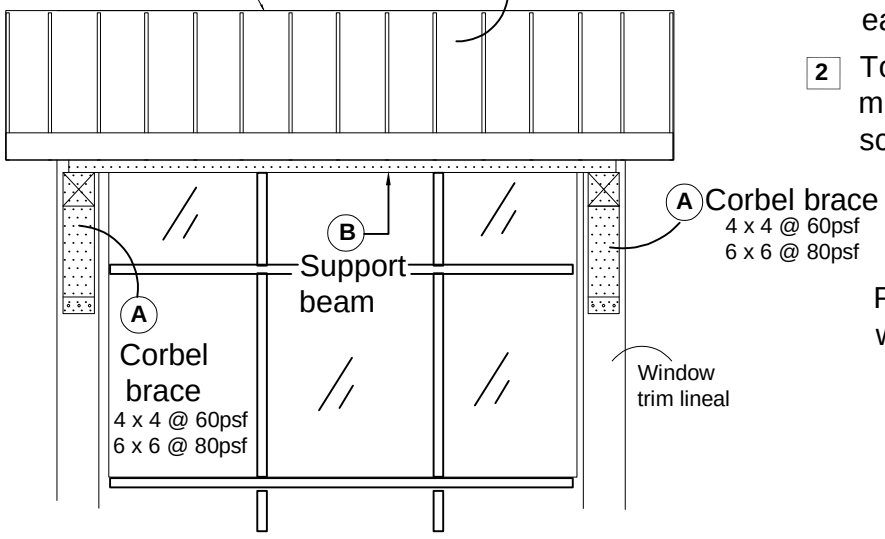
APPROVED BY NTA 9/19/2024

Approval of this document does not authorize or approve any deviation or deviations from the requirements of applicable State Laws.

Kip Whitehead

Factory assembled roof section C

Roofing shipped loose for on site installation in accordance with roofing mfgr. instructions.



INDICATED FASTENER CONNECTIONS:

1 Use (3) #10 min. corrosion resistant ext. rated wood screws of sufficient length, to secure beam ends to each corbel w/1-1/2 min. penetration into corbel.

2 Toe-screw each rafter to horizontal beam using (2) min. #10 corrosion resistant ext. rated wood screws, (1) each side of each rafter.

SITE ASSEMBLY OF AWNING

Position onto window lineals so that top roof rail will be flush to top edge of top window lineal.

A - Place Corbel braces at indicated locations centered on side window lineals and fasten as specified.

B - Center and fasten support beam to corbel braces as specified.

C - Position roof section top rail to top window lineal and fasten through top window lineal to exterior wall as specified. Fasten each rafter to support beam as specified.

NOTE: All window flashing measures and exterior siding installations for side wall applications are completed at the factory. For end wall window locations, insure that any site installed side and top window lineals are reinforced with 1x lumber for rigidity at awning fastening points. Site roofing of window awning shall be in accordance with roofing mfgr. installation instructions.

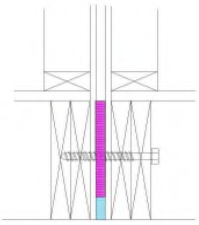
10.1 Pre-installation Checks

□ Permit has been obtained and any special requirements have been communicated to plant of manufacture.
□ Utility planning, hook-ups and notifications.
□ Ground snow load, wind speed, seismic load and thermal requirement are within limitations noted on prints.
□ Site has been graded to permit water to drain from under the home.
□ Access to the site for the home and the crane (if applicable) has been checked.
□ Soil condition checked and the bearing capacity of the minimum required on the print.
□ Data plate location beneath kitchen sink or per home design plans.

10.2 Installation Checks

□ Perimeter foundation wall dimensions have been checked for proper fit and square.
□ Shingle close - up and ridge cap per applicable details.
□ Ground vapor barrier has been installed on homes with a crawlspace.
□ Home to foundation connections are per prints and applicable wind load.
□ Ridge vent roof ventilation is installed per specifications.
□ Hinged roof is properly raised and completed and king posts fastened per specifications.
□ Footing placement and design per specifications and applicable ground snow load.
□ Interconnection of the halves at roof, floor and walls are per specifications.
□ Return air duct connection from main grill(s) to furnace has been completed.

Refer to Fig. 5.2 & Fig. 5.3 for floor gap shim and Fig. 5.12.1 for attic floor gap shim.



□ Gaps between home sections properly shimmed. (See detail on this page)
□ Furnace, water heater and fireplace fresh air intake and exhaust air have been completed per specifications.
□ Dryer vent exhausts to outside of home.
□ Crawlspace stem walls or floor system have been properly insulated per print package.
□ Rim joist insulation at the perimeter of the home is completed per specifications.
□ Electrical crossover(s) and bonding strap(s) connected, checked for more than one.
□ AC - condensation drains out of the home or into drain system.
□ Drain lines connected, sloped and supported.
□ Entire plumbing vent system at hinged roof is completed.
□ Heating and return air duct cross over are installed properly.
□ Water line cross over connected and tested (insulated when applicable).
□ Ensure that water heater has been filled with water prior to ignition or before electric power is activated to the water heater.
□ Confirm that all tub and shower anti-scald mixing valves are set to ensure water delivery temps no greater than 120° F as required.
□ Insulation and infiltration checklist completed as required.

10.3 Final Installation Checks

Inspect and evaluate the home for complete and proper setup. A final walk through inspection should be made to ensure that all items have been completed. Review of the following “checklist” items is important:

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Michael Faller

□ Test gas lines.
□ Test water lines.
□ Test drain lines.
□ Test electrical.
□ Floors are level.
□ Test all appliances and make sure they work properly.
□ Evaluate windows, doors and drawers for proper operation.
□ Interior details. Inspect for, and correct, all interior finishing details, such as loose molding, carpet seams, etc. The retailer’s representative should inspect the home with the homeowner.
□ Vent pipes, flashing and stack heads. All stack head or vent pipe flashings are properly attached and sealed.
□ Roofing. All shingles are properly attached, none are loose or missing and all holes are filled.
□ Trees and Bushes. Remove any obstacles that can cause damage to the house such as low hanging trees or bushes that can scrape the house during high winds or heavy snow.
□ Exhaust fan operates and has proper air flow. Check all exhaust fans for proper operation and air flow.
□ Ground cover. Repair any cuts or tears in the ground cover or vapor barrier with tape.
□ Exterior siding and trim. There are no gaps, voids and all fasteners and seams are sealed and secured.
□ Window fall prevention guards by others where sill of operable windows is less than 24" from floor and more than 72" from grade per IRC as required.
□ State required site installation documents completed. (where applicable)

R-Anell Homes®

Modular Home Installation Manual

A copy of this manual must remain with the home for reference by the homeowner.

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Kip Whitehead

Seal of Approval

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