

# Chapter 8 - Roof Framing

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## Timing & Prerequisites

- This phase of the project cannot begin until all wall framing has been completed and all walls have been plumbed.
- The House/Project Lead will work with the Construction Superintendent to coordinate these volunteer activities.
- The roof sheathing may be done by a contractor on a house by house basis.

<b>Components</b>		
<b>Trusses</b>	Rakes	Sheathing
Sub-Fascia	Cornice Returns	Cat Walks
Common Trusses	Gable Trusses	

<b>Materials Needed</b>	
<b>Trusses &amp; Rakes</b>	<b>Miscellaneous</b>
Trusses – Main Roof & Porch Roof 2x4s (Rake, Bracing, Cat Walks) 2x6s (Rake, Bracing) 1x6s (Porch Rake) 1/2" OSB (Gable) 1 3/4" Roofing Nails 8d Common Nails 10d Common Nails 16d Common Nails Hurricane Clips N10 Hanger Nails Tyvek 1' cap nails	Bathtub
<b>Cornice Returns</b>	<b>Sheathing</b>
2x8 or 3/4" OSBs 1x8s or 3/4" OSB (Porch) 2 1/2" Wood Screws 16d Common Nails	1/2" OSB 8d Common Nails H-Clips
<b>Sub-Fascia</b>	
2x6s 16d Common Nails	

# Roof Truss Installation Planning

## Things to Consider

- The installation instructions in the engineering documents which accompany the roof trusses must be read and understood before installing the trusses. Contact the HFHMO Construction Superintendent with questions.

## Review Roof Truss Engineering Documents

The Engineering Documents identify the specifications for building and installing the roof trusses. These documents contain nailing patterns and bracing requirements.

Review these documents before installing the trusses and install the trusses per specifications. If there are questions or concerns, discuss them with Construction Superintendent.

## Planning for Roof Trusses Preparation

### Critical Issues

- The roof trusses are fragile until they are installed. Be careful not to bend them.
- The truss tails will overhang the house walls by 12 ½” creating a 13” eave once the 2x6 sub-fascia and 1” Styrofoam are installed.
- The roof trusses have a 16” energy heel to allow room for the attic insulation.
- Review the individual truss sheets for specific bracing notes and requirements.

### Safety Issues

- Fully assembled gable trusses are very heavy. Many hands will be needed to move them.
- The trusses are built with very sharp metal plates. When handling them, cut-resistant gloves are required.

### Things to consider/decide

- Will a crane be used to set the trusses?
  - Is there enough manpower to load the trusses by hand?
  - Two-story houses will always require a crane
- If a crane will be used, where will it be set up?
  - Are there power lines?
  - Is there access from the street/alley?
  - Is there level ground?
- Will the gable-end trusses be fully or partially prepped before lifting into place?
  - Is there enough level ground to fully prepped the gable-end trusses?

## **Planning preparation of trusses for setting**

1. If a crane will be used, determine the place where the crane will be setup. The crane operator will assist with spotting the setup location. The spot must:
  - a. Be fairly level
  - b. Be near the building
  - c. Have access path free of overhead power lines
  - d. Have room for the boom to swing without tree limbs
2. Determine the best place for delivering the trusses. The spot must:
  - a. Have access for the delivery truck.
  - b. Be free of overhead power lines.
  - c. Be level and dry.
  - d. If a crane will be used, be accessible by the crane. If trusses are not delivered in a location accessible to the crane, the trusses will need to be moved by hand to the correct location.
3. Determine the best place for building the trusses.
  - a. A dry and level place.
  - b. Near the storage area.
4. Determine the best place for storing the trusses.
  - c. A place from which the crane can load and lift them.
  - d. A dry and level place.
  - e. A place without overhead power lines.

## **Organize and Store Trusses**

### **1. Setup the work areas for delivery of the trusses**

- Remove trash from the area.
- If the area has low spots, setup blocking needed under the trusses to hold them flat.

### **2. Count trusses delivered**

Before breaking the ties on the stack of trusses, mark one end of the trusses with a color marker or paint so you can keep them properly oriented later.

Separate the trusses into groups as identified on the truss plan. Each truss will be labeled with its identifier from the truss plan.

Ensure the correct number of each has been received. Notify the Construction Superintendent immediately if trusses are missing.

### **3. Orient the trusses**

Review the truss documentation to determine the direction which the trusses are to sit on the house. Ensure the trusses are stored with the correct orientation.

### **4. Check the length of the trusses**

Measure the trusses in each group to ensure the correct lengths for each section have been received. Notify the Construction Superintendent immediately if lengths are wrong.

- Set up a flat area for building the trusses. This will likely be the same area where they were delivered.
- Set up a flat area for storage of the trusses. Once the trusses are prepped, they must be placed on blocking to keep them level.

## **Gable Truss Preparation**

Before the gable end trusses can be installed on the house, they must have the following added to them:

- Nailers
- Stiffeners
- OSB sheathing
- Rakes
- The nailers and stiffeners must be installed before the OSB sheathing to allow the nails to extend through the truss into the brace below.

For safety reasons, the following items may also be added before lifting in place:

- Cornice return framing
- Cornice return aluminum cover
- Styrofoam insulation
- Frieze board, Z-flashing and J-channel
- Gable F-channel
- Soffits
- Fascia
- Gable J-Channel
- Gable Vent
- Siding

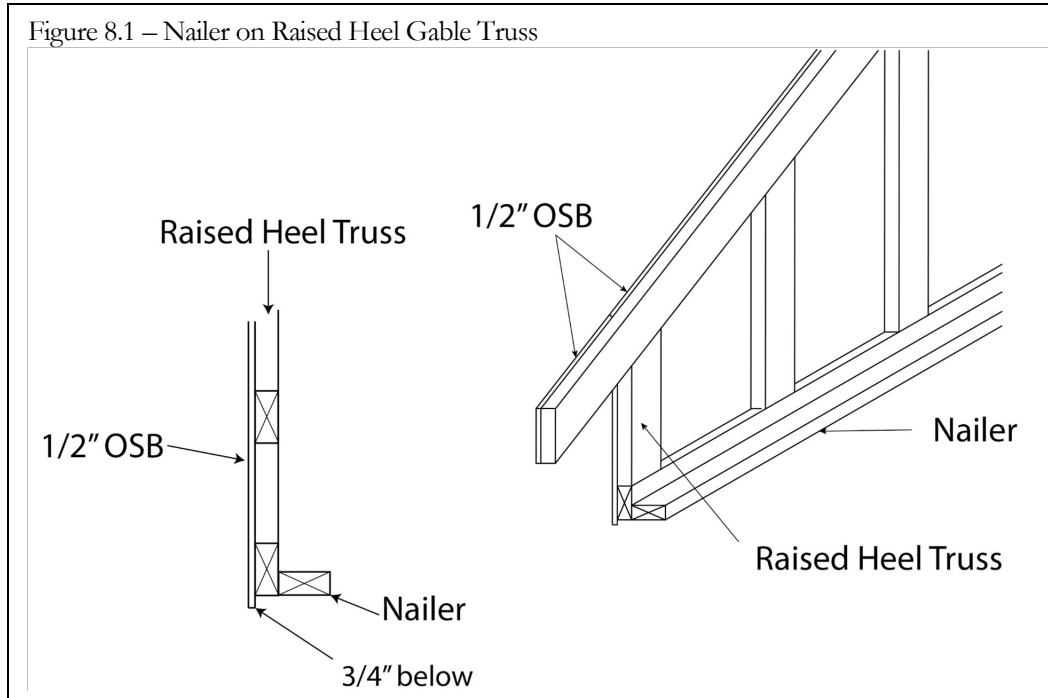
### **Determine the Side to Prep**

Reference the Engineering Documents and verify that the side of the truss which is being prepped is the side of the truss which will be facing out when it is installed.

### **Bottom Edge Nailer**

Along the bottom inside edge of the gable end trusses, install a 2x4 nailer. This nailer will assist in securing the truss when it is being installed. (See Figure 8.1).

- Cut 2x4s for nailers to be installed across the bottom of the trusses to a length equal to the length of the bottom horizontal member the trusses.
- Position the 2x4s on end, under the truss; flush with the heels and flush to the bottom.
- Nail through the trusses into the nailer with 16d common nails; 1 every 12”.

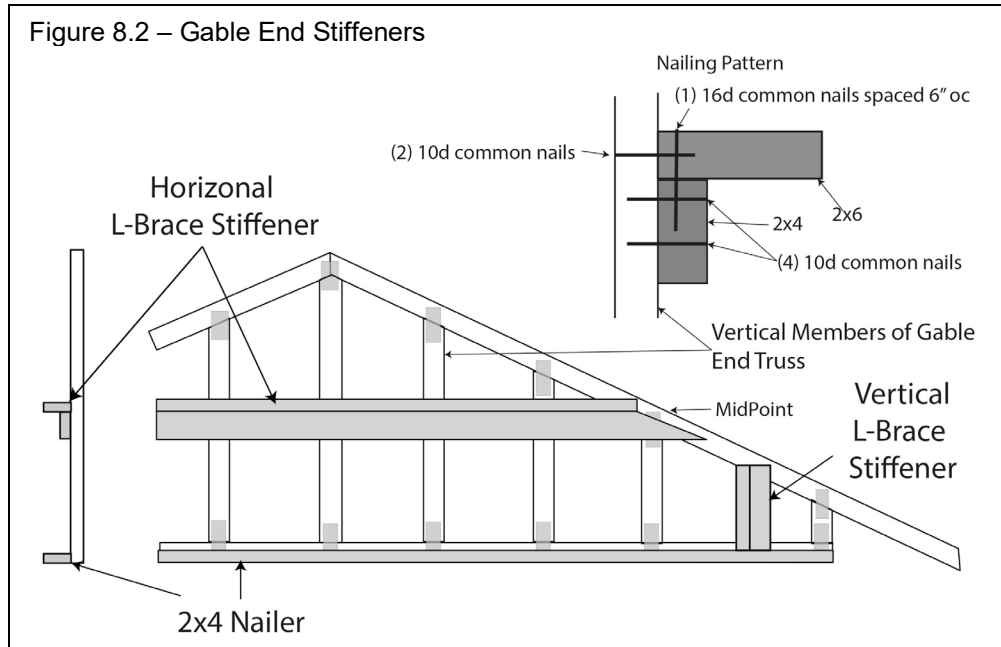


### Gable End Truss Stiffeners (L-Brace)

The Engineer Documents may require L-Brace stiffeners to be added to the gable end trusses. (See figure 8.2).

- If the gable end truss height is less than 4' 8 1/4", no stiffeners are required.
- If the gable end truss height is 4' 8 1/4" or more, install an horizontal L-brace stiffener at mid height and two (2) vertical L-brace stiffeners up the 2<sup>nd</sup> vertical stud from each end of the truss.
- If the gable end truss height is more than 14', two (2) horizontal L-brace stiffeners will be required; one at the 1/3 point and one at the 2/3 point. Additionally, install two (2) vertical L-brace stiffeners up the 2<sup>nd</sup> vertical stud from each end of the truss.
- Construct the L-brace stiffeners. (See figure 8.2)
  - Turn the truss over with the inside facing up.
  - Mark the midpoint of the center vertical member.
  - Construct the horizontal L-brace from one (1) 2x4 and one (1) 2x6 cut to fit across the midpoint of the truss.
  - Construct the vertical L-brace from two (2) 2x4s cut to fit up the vertical stud; from the nailer to the top diagonal gable member.
  - Position the pieces in an "L" formation and attach them together with 16d common nails; 1 nail every 6".

Figure 8.2 – Gable End Stiffeners



- Install the Horizontal L-brace Stiffener. (See figure 8.2).
  - Position the L-brace stiffener at the mid-point of the truss and attach it to each vertical member with 10d common nails; 4 nails through the vertical 2x4 of the stiffener into each vertical member of the truss.
  - Then turn the truss over with the outside facing up.
    - Insert two (2) 10d common nails through the vertical members of the truss into the horizontal 2x6 of the stiffener.
- Install the Vertical L-brace Stiffeners. (See figure 8.2).
  - Attach the vertical L-brace stiffeners on the inside of the 2<sup>nd</sup> vertical stud from each end of the truss with 10d common nails; 1 nail every 6”.

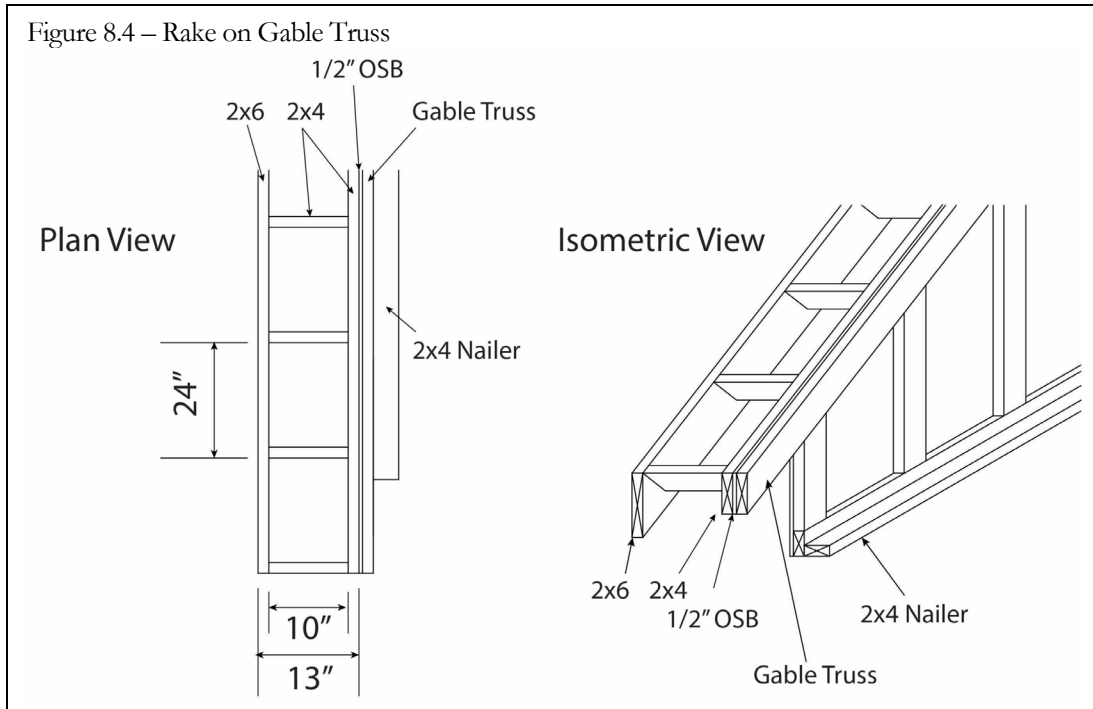
### Gable End Truss Sheathing

- Cut and nail 1/2” OSB to the trusses extending from 3/4” below the bottom member; to the top edge of the diagonal members; and out to the outside edges of the vertical raised heel members.
- Use 1 3/4” roofing nails, every 6” along the bottom edge of the OSB; every 16” along the top edge; and every 12” along the studs in the field.
- Add 1/2” OSB to the tails of the trusses to provide a spacer for the rake. Use 1 3/4” roofing nails.
- If the OSB extends above the top edges of the trusses, cut it off flush with the top of the truss.

### Rakes

If the house elevation shows an overhang on the gable end, build and install a rake on the gable end truss to create the overhang. (See Figure 8.4).





- For each side of the gable truss, cut 2x4s to fit along the diagonal members. These will be the back sides of the rakes. You may need more than one piece of 2x4 to cover the entire member.
- Cut 2x6s to fit over the 2x4s. These will be the front sides of the rakes. If more than one piece of 2x6 is required to cover a side, stagger the joints from the joints in the 2x4 below.
- If two or more pieces of 2x6 are needed to form the sides of the rake, cut a cleat to join the 2x6s.
- Plumb cut the 2x4s and 2x6s at the peak and at the tail of the trusses.
- Layout the rakes.
  - Mark the 2x6 with layout marks for the cross blocks.
  - Place one block at the bottom of the rake.
  - Place one block every 24" up the rake. Mark the block perpendicular to the edge of the rake.
  - Place one block at the top of the rake.
  - Transfer the marks to the 2x4s.
- Cut 10" 2x4 cross blocks for each mark on the rake.
 

\*Note\* If the rake will extend over a porch gable which will not be covered with 1" Styrofoam insulation, the rake will be a 12" rake. Cut the cross blocks to 9".

- Nail the blocking to the front 2x6 and the back 2x4 with 16d common nails; 2 nails at each end of the cross blocking.
- Position the rake on the gable truss with the 2x4 face on the truss and attach the rake to the diagonal member of the truss using 16d nails. Toe-nail through the 2x4 rake and OSB into the diagonal member; 1 nail beside each side of each cross block and 1 nail midway between each cross block.
- Toe-nail the top ends of the two rakes together using 16d common nails.

## Cornice Returns

The lower corners of the gable end rakes should be blocked out with triangular pieces of lumber and covered with aluminum fascia. (See Figures 8.5 & 8.6). The cornice return:

- Is installed in the area below the sub-fascia; covering the ends of the eaves
  - Is flush with the 2x6 of the gable rake
  - Is even with the bottom of the 2x6 sub-fascia on the eaves
  - The inside edge will be even with the OSB sheathing on the perpendicular wall. This should bring that edge in line with the inside edge of the siding corner which will be installed later.
- Cut cornice returns from pieces 2x6.
    - Cut to fit from the truss tail to the truss heel; minus 1/2" for the OSB sheathing.
    - Cut the top edge using the roof angle.

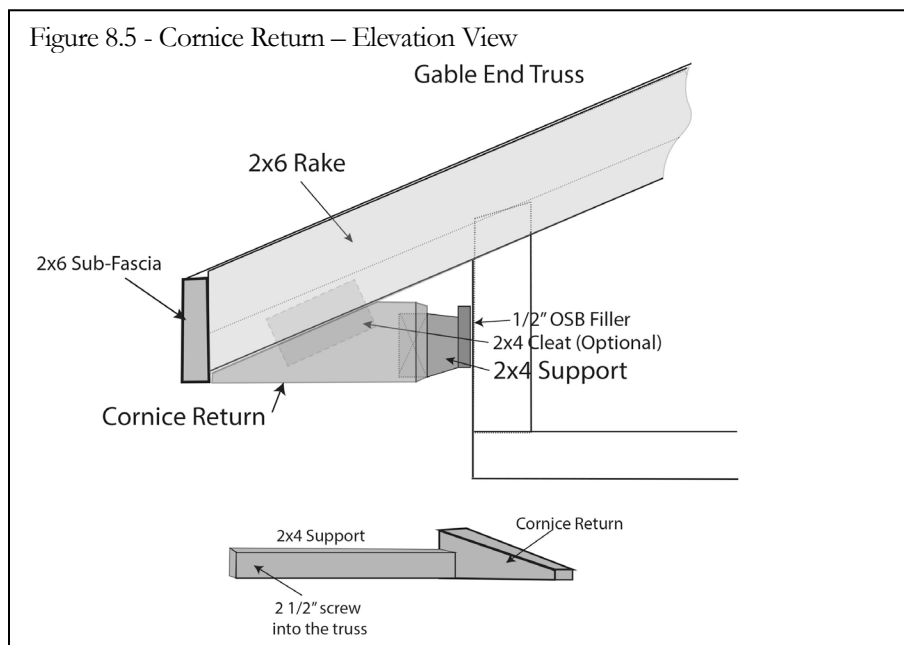
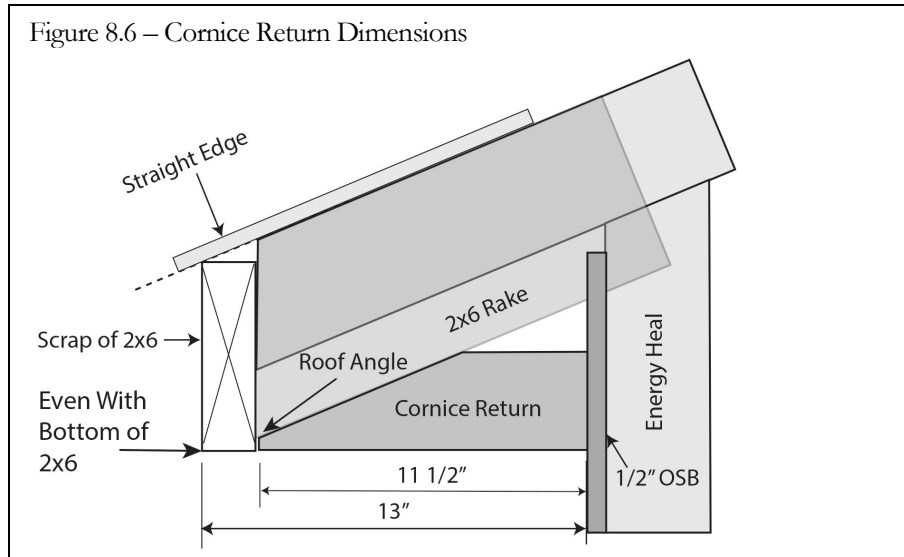


Figure 8.6 – Cornice Return Dimensions



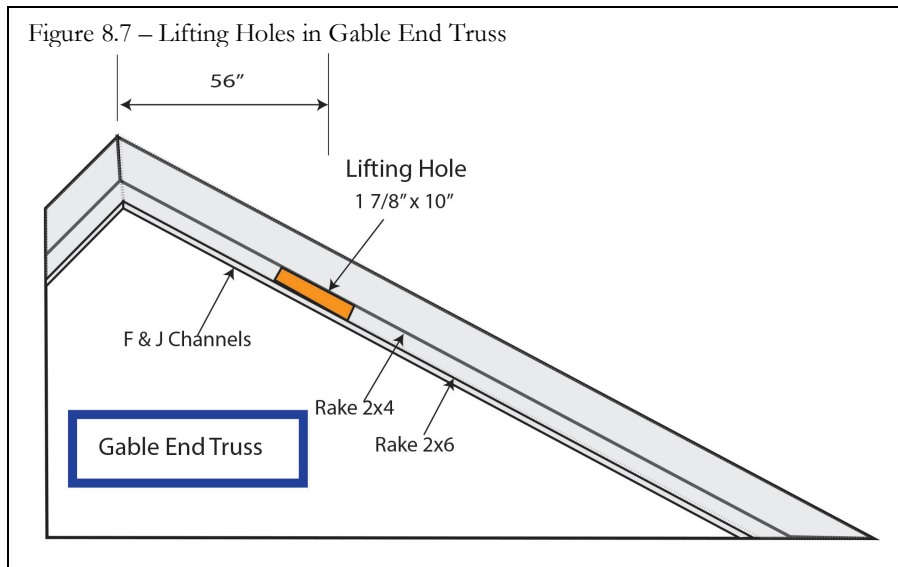
- Cut cornice return support pieces from either 2x4 or 2x6 for each cornice return. The support blocks will extend from the back of the cornice returns to the walls. Screw the support blocks to the cornice returns with 2 1/2" wood screws through the front of the cornice return. (See Figure 8.5).
- Attach the cornice return with the attached support block to the rake. Either:
  - Cut a small piece of 2x4 for a cleat. Attach the cleat to the back of the cornice return before installing it. Hold the cornice return in place and insert a 2 1/2" wood screw through the rake into the cleat.
  - Or drill a 1/8" hole through the bottom of the cornice return 1" from the short end. Drive a 8d common nail up through the hole into the bottom of the rake.
- Attach the support block to the vertical energy heel of the gable truss.
  - Place a small scrap of 1/2" OSB (approximately 1 1/2" x 5") between the support block and the vertical energy heel of the gable truss.
  - Insert a 2 1/2" screw through the support block; the OSB scrap; and into the side of the gable truss.

### Cornice Return Covers

- If possible, install the aluminum cornice return covers before lifting the trusses into place. This will eliminate working at heights in difficult positions. (See Chapter 16- Siding; Wrap Cornice Returns with Aluminum).

### Lifting Holes

- Cut two (2) 1 7/8" x 10" rectangular holes in the OSB sheathing just below the 2x4 of the rake attached to the gable end truss; 1 on each side of the truss; 56" from the center of the truss. (See figure 8.7). If the truss has been prepped with F-Channel and soffit, the holes will be just above the F-Channel.



### Position the truss for lifting

- With lots of hands, move the truss to a place where it can be accessed by the crane. Ensure it is not in the setup area for the crane.

## Porch Gable Truss Preparation

### Critical Issues

- The roof trusses are fragile until they are installed. Be careful not to bend them.
- The porch trusses with the 2x6 sub-fascia installed will overhang the porch beams by 12"; unless the trusses are built to continue the house roof out over the porch. No Styrofoam insulation is installed on the beams.

### Safety Issues

- Fully assembled gable trusses are very heavy. Many hands will be needed to move them.
- The trusses are built with very sharp metal plates. When handling them, cut-resistant gloves are required.

Prepare the gable end trusses for porch roofs similarly to the gable end trusses for the house roof. (See "Gable Truss Preparation" above).

Exceptions are:

- If the rake will extend out from a porch gable which will not be covered with Styrofoam insulation, the rake will be built 12" wide. Cut the cross blocks to 9".
- These will not be raised-heel trusses.
- No Stiffeners will be required.
- These trusses will be installed without a crane.

- Cornice returns and aluminum fascia will be added later. The extra weight would make installation of the trusses harder and the aluminum might get damaged. These items can be easily added later.

## **Gable End Trusses without a Rake**

### **1. Install Nailers**

- Repeat steps “Determine the Side to Prep” & “Install the Nailer” of “Gable Truss Preparation”.

### **2. Sheet Porch Gable Truss**

- Repeat “Sheet Roof Gable Trusses” of “Prepare Roof Gable Trusses”.

### **3. Cut and Assemble Porch Siding Pocket (See Figure 8.8).**

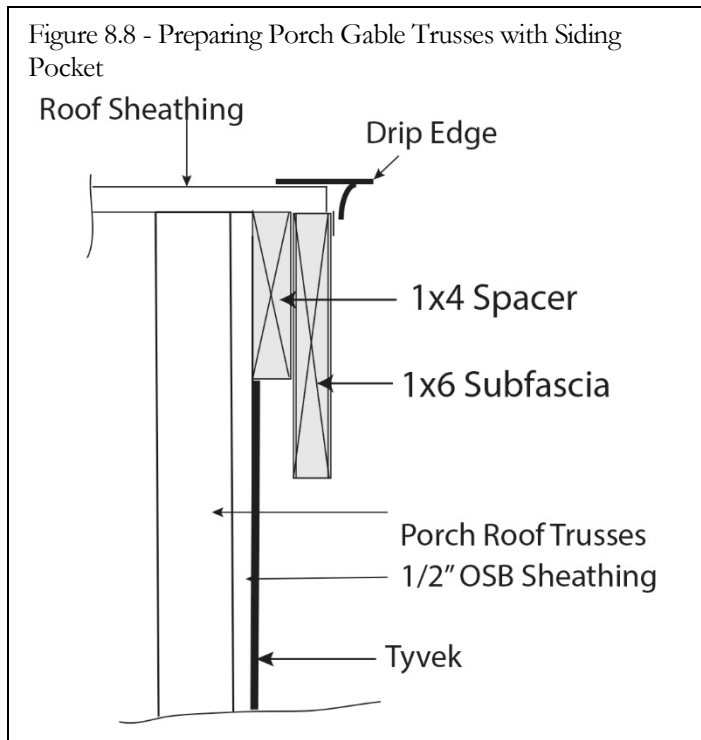
- Lay 1x4s along the diagonal members of the gable truss for spacers. Ensure they cover the entire diagonal member of the truss. Plumb cut the 1x4s at the peak and at the tails.
- Position the 1x4 spacers alongside of the diagonal truss; holding the top edge flush with the top of the diagonal members of the gable truss. Attach the spacers using 8d common nails; one (1) nail every 12”.

### **4. Cover the OSB with Tyvek**

- Install a layer of Tyvek over the OSB. Install rows of Tyvek starting at the bottom moving up to the top of the truss. Each row overlaps the previous row by 6”. Attach the Tyvek with 1” cap nails; three (3) rows with the nails 16” apart.

### **5. Attach Sub-fascia Boards**

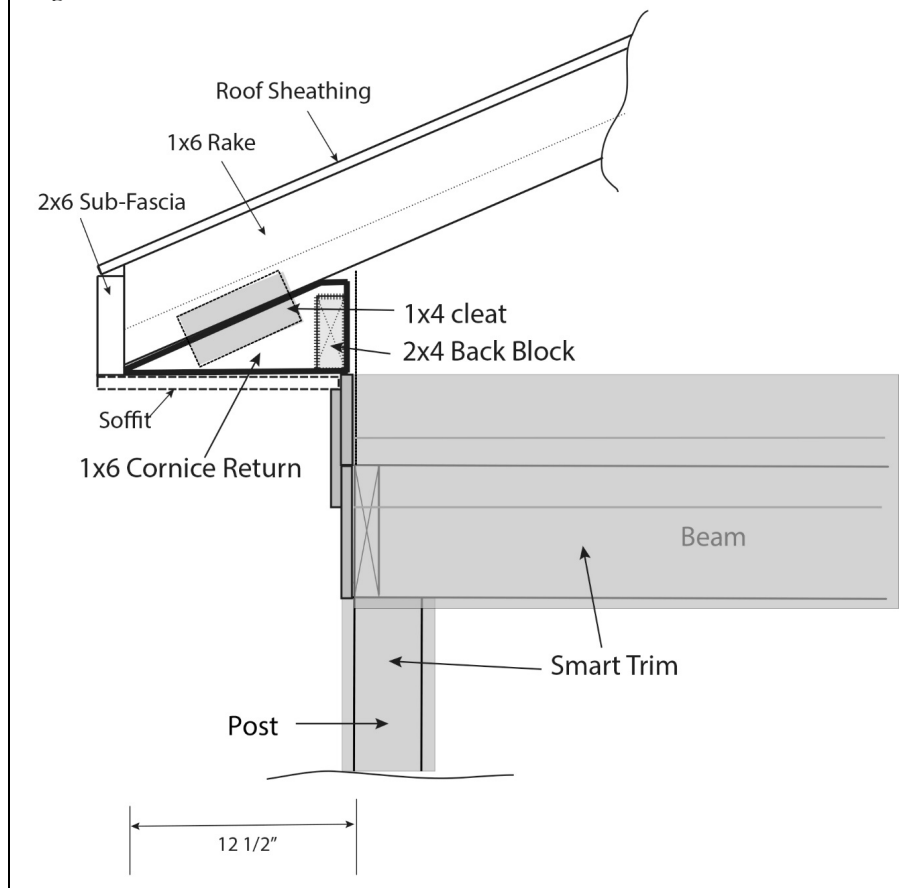
- Cut 1x6s for the sub-fascia boards which will fit over the 1x4 spacers forming a pocket for the siding.
- Plumb cut the 1x6s at the peak and at the tails.
- Position the sub-fascia board over the 1x4 spacers with the top of the board flush with the spacers.
- Nail the sub-fascia to the spacers with 16d common nails; 2 nails every 12”.



6. **Build Porch Cornice Returns.** (See Figure 8.9)

- Cut cornice returns from a 1x6 at a length equal to the distance from the backside of the sub-fascia to the front side of the post below the cornice return. Cut the top edge to match the roof angle.
- Cut a short 2x4 back block and attach it to the bottom corner of the cornice return with 2 1/2" exterior screws.
- Cut a small 1x4 cleat and attach it to the diagonal edge of the cornice return with 1 1/2" screws.
- Install the cornice return with 2 1/2" exterior screws through the 2x4 block into the porch post and 1 1/2" exterior screws through the 1x6 sub-fascia.

Figure 8.9 – Porch Cornice Return



## Roof Trusses Layout

### **Critical Issues**

- The roof trusses will either run from front to back or from side to side.
- The trusses should be stacked over the wall studs. Every other truss should be positioned over a wall stud.

#### **1. Identify the Side of the House to be Used to Align the Trusses**

Select the longest and straightest wall for aligning the trusses. Any variance in the positioning of the trusses will be most obvious on this side so it is the best choice.

#### **2. Re-Check Alignment of the Walls**

All exterior walls must be re-checked for straightness before setting the trusses. Refer to String Exterior Walls in the “Walls” chapter.

#### **3. Mark Locations for the Gable Trusses**

- The gable trusses will sit on the end walls with the OSB on the trusses aligning directly above the OSB on the wall. On each of the end walls, measure back 5" from the outside edge of the end wall's top plate and draw a line for positioning the gable trusses. The front edge of the nailer will be aligned to this line.

#### 4. **Mark Locations of the Common Trusses on the Top Plate**

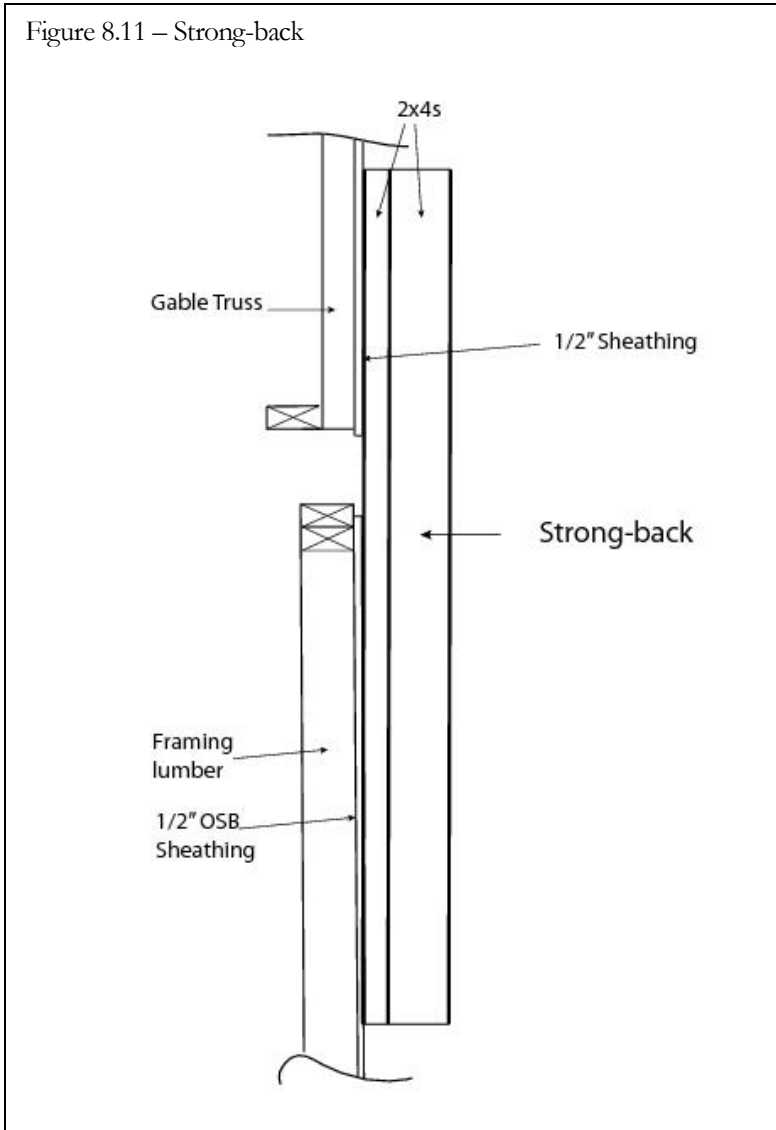
- Using a speed square, draw lines on the top plate for installing the trusses. Drawing two (2) lines 1 ½" apart, one for each side of the trusses will eliminate confusion for the installers.
- Start at the same end of the house from which the studs were laid out. Lay out the trusses at 24" OC from the outside of the top plate of the end wall. The two lines for the first truss will be marked at 23 ¼" and 24 ¾" from the outside edge of the end wall's top plate. Continue down the side of the house adding 24"s to these measurements for each truss. Every other truss should be aligned with a wall stud below.
- Transfer these same marks to the opposite wall.

#### 5. **Mark Roof Trusses**

- While the trusses are still stacked up, identify the side of the trusses which will be installed on the alignment side. Mark that side with spray paint.



Figure 8.11 – Strong-back



### Temporary Strong-Back Bracing

On each wall on which a gable end truss will be installed, install one or more strong-backs. These will support the gable end truss when it is placed on the wall until the internal bracing is in place. (See Figure 8.11)

- Cut two (2) 2x4 to a length of 7' to 8'. Assemble them into a "T".
  - Place the strong-back on the external wall of the house in line with the framing lumber in the walls. Extend the strong-back up 2' above the wall and nail it into the framing lumber of the house with four (4) 16d common nails.
- ❖ If the gable end trusses have been prepped before installation, the strong-backs will need to be installed on the inside of the walls.



Before continuing, stop and complete the “Truss Pre-Installation Checklist” found in Procore/Inspections.








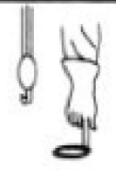
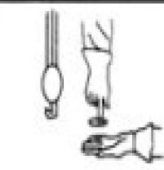




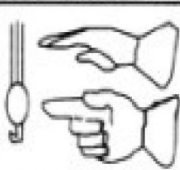

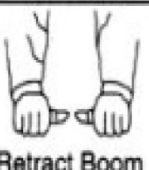

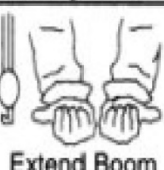


## Crane Day

### Setting up for the crane

#### *Safety Issues*

- Setup the control zone
  - Rope off the area under the crane boom and around the house.
- Post signage
  - Place “Crane Above” signage at the front and back of the yard.
- Check equipment
  - Check the slings and tag lines for cuts and snags.
- Limit the number of volunteers on site to only those needed to set the trusses.
- Assign Crane Signaler and Crane Riggers
  - Pick one volunteer whose only assignment will be to communicate with the Crane operator. This volunteer must be familiar with crane usage, proper loading and load movement.
- Assign one or more Crane Riggers. The Riggers will be responsible for properly securing the load. One of the Riggers must also man the tag line and ensure the load remains stable.
- Ensure the proper slings and tag lines are available.
- Review crane signals with Crane Operator to ensure you both understand the signals to be used.

## Crane Hand Signals

 Main Hoist	 Auxiliary Hoist	 Hoist Load	 Hoist Load Slowly	 Stop
 Raise Boom	 Raise Boom & Lower Load	 Lower Load	 Lower Load Slowly	 Emergency Stop
 Lower Boom	 Lower Boom & Raise Load	 Swing Boom	 Swing Boom Slowly	 Travel (mobile eqpt)
 Retract Boom 2 hands	 Retract Boom 1 hand	 Extend Boom 2 hands	 Extend Boom 1 hand	 Dog Everything

Hoist Load – Used to raise the trusses off the ground. The load goes straight up.

Raise Boom – Used to raise the trusses above the second floor walls. The load will rise up but will also move closer to the crane.

Extend Boom – Used to move the trusses over the second floor walls. The load will move out but will also lift up.

Raise Boom and Lower Load – Used to make fine adjustments to the placement of the trusses. The load will move closer to the crane but will not raise up.

Lower Boom and Raise Load – Used to make fine adjustments to the placement of the trusses. The load will move further away from the crane but will not lower down.

Swing Boom – Used to move the truss left or right when placing the truss.

Lower Load – Used to lower the truss onto the walls.

Stop – Used to stop moving the truss and hold in place.

### **Place the Bathtub in the House**

For a two-story house, it is much easier to get the bathtub unit into the house before the roof is installed. Using the crane, lift the tub into place. The crane operator has 2 large straps that will cradle the tub for lifting. Wrap the straps around the tub, place one end through the loop of the other end and hook on to the ball. Raise the tub and set it into place. (See Figure 8.12).

### **Set Roof Sheathing**

For a two-story house, it is much easier to get the roof sheathing for the upper roof into the house before the trusses are installed. Split the stack of OSB roof sheathing into a pile for any lower roofs and a pile for the upper roof. Be sure to build the piles on scraps of 2x4, placed so the lifting straps can wrap around the pile at each end. Wrap the pile of OSB with the two (2) straps. Feed one end of each strap through the loop on the other end; then hook it to the ball. Using the crane, lift the upper roof stack of OSB onto the second-floor deck and set it perpendicular to the floor joists to distribute the weight. The stack must be set on scrap 2x4s to allow the straps to be removed. Do not place the OSB in an area that will need to be accessed to set the trusses.

### **Lifting the Trusses**

Pass the ends of the strap through the holes or opening at the top of the truss, just below the diagonal member, and then hook both loops on the ball.

Figure 8.12 – Bathtub hooked to crane

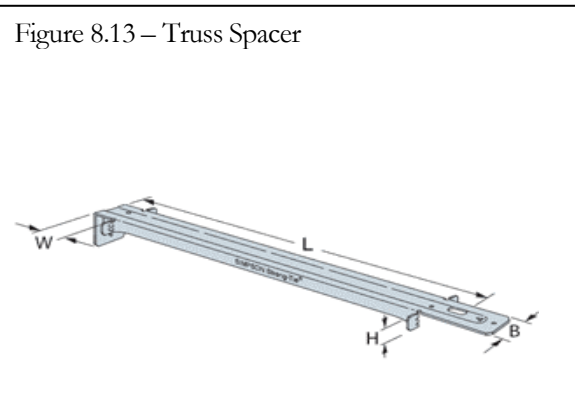


# Truss Setting

## Preparation

### 1. Stage Truss Setting Materials

- a) Place a supply of materials which will be needed to set the truss in a place where they can be quickly accessed. Placing the materials in the center of the house should keep them out of the work areas. Items to be staged are:
  - a. Truss Spacers Restraint (TRBR)
  - b. (4) 40" 2x4 blocks for first and last truss bay spacers
  - c. (2) 14' 2x4s and (2) 12" 2x4 nailing blocks for gable truss supports
  - d. Enough 2x4s for the cat walks.
- b) Gable End Truss Supports  
Stage a 14' 2x4 and a 12" block of 2x4 for each gable truss. These will provide a diagonal support to the floor for the gable trusses.
- c) Truss Spacer Restraint (TRBR) (See Figure 8.13)  
Stage two (2) truss spacers for each truss bay, except the first and last bays.
- d) Short 2x4 Truss Spacers  
Stage four (4) 40" 2x4 blocks. These blocks will be used to anchor the first and last common to the gable end trusses.



### 2. Possible Truss Setting Assignments

- a. **(Truss Nailers)** Assign two (2) volunteers to align the trusses and nail them to the top plate. Each volunteer will work from a 7' platform ladder positioned just inside the exterior walls. If exterior scaffolding is in place, the Truss Nailers may work from the scaffolding. The Truss Nailers must wear cut resistant gloves.
- b. **(Gable Nailers)** Assign two (2) volunteers to nail the overhanging OSB on the gable truss to the top plate. Each volunteer will work from either a shorter straight ladder (1<sup>st</sup> floor) or a longer extension ladder (2<sup>nd</sup> floor) positioned against the wall on which the gable end truss will sit.
- c. **(Bracers)** Assign two (2) volunteers to attach the truss spacers to the tops of the trusses; approximately 5' from the tails. Each volunteer will

work from a 10' platform ladder positioned 4' to 6' inside the exterior wall.

- d. **(Support)** Assign one or two volunteers to provide the Bracers and Nailers with materials.
- e. **(Rigger)** Assign one (1) volunteer to hook up the trusses to the crane and tie on the tag line. The Rigger must wear cut resistant gloves.
- f. **(Movers)** Assign one or two volunteers to position the trusses for the Rigger. The Movers must wear cut resistant gloves.
- g. **(Tag Line)** Assign one (1) volunteer to manage the tag line.
- h. **(Signaler)** Assign one (1) volunteer to communicate with the crane operator.

### Lift and Set the Trusses

#### *Safety Issues*

- Communicate to the volunteers on site where the control zone has been set up and to stay out of it.

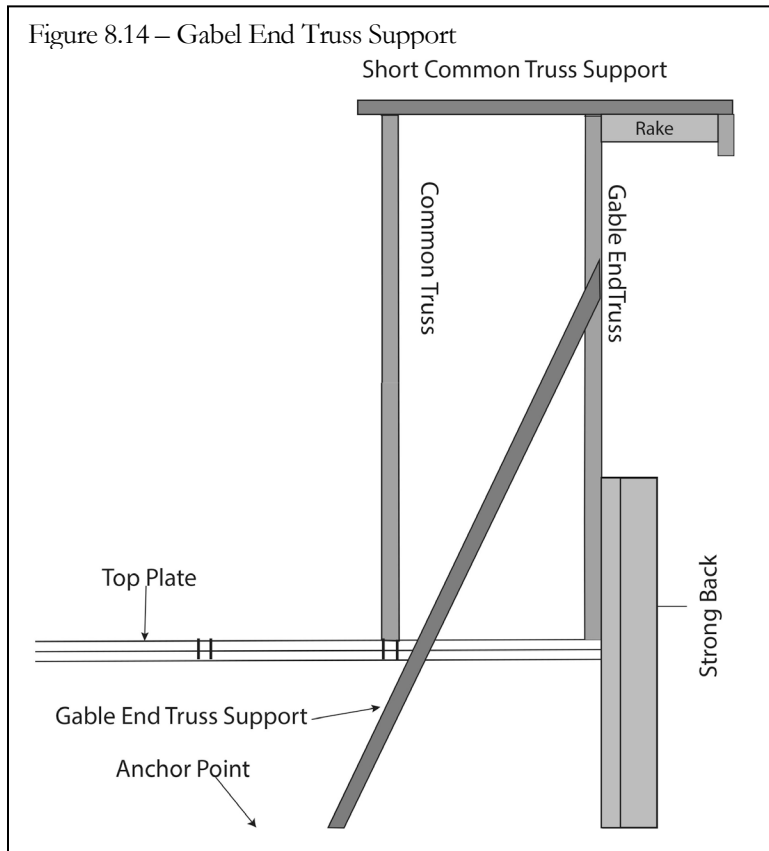
#### 1. Set First Gable End Truss

- a. Start with the gable end truss which is the furthest from the crane.
- b. The crane will lift the first gable end truss onto the top plate of the starting wall.
- c. The "Truss Nailers" will slide the heel of the truss to align with the outside edge of the top plate on the alignment side of the house (as identified above) and against the strong-back braces. The OSB on the truss should be flush with the exterior wall OSB.
- d. The truss must sit down snugly on the top plate. If the truss is bowed up, ensure the OSB on the truss is clear of the OSB on the wall.
- e. When the truss is in place, from the outside the Gable Nailers will toe-nail 16d common nails down through the OSB and bottom member of the truss into the top plate; 1 nail every 16".
- f. The "Gable Nailers" will also nail the OSB overhanging the gable truss to the top plate of the wall with 8d common nails; 1 every 8".
- g. Once the truss is anchored down from the outside, the Truss Nailers will nail it to the wall with 16d common nails down through the nailer into the top plate.

#### 2. Install "Gable End Truss Supports"

- a. The "Bracers" will attach diagonal 14' 2x4 supports to the truss; one every 8' to 10' across the entire truss. Attach them about  $\frac{3}{4}$  of the way up the vertical members with 16d common nails through the support into the vertical member. The supports will extend down to nailing blocks on the floor.

- b. The “Bracers” will install the short 2x4 nailing blocks on the deck positioned above the framing lumber below the deck. Attach the blocks with 16d common nails; 2-3 nails per block.
- c. While the “Truss Nailers”, using a 4’ level, hold the truss plumb, the Bracers will attach the diagonal support to the nailing block with 16d common nails through the side of the support into the nailing block.
- d. Make sure the angle of the brace is very steep so it does not interfere with setting the next truss. (See Figure 8.14).



### 1. Set Common Trusses

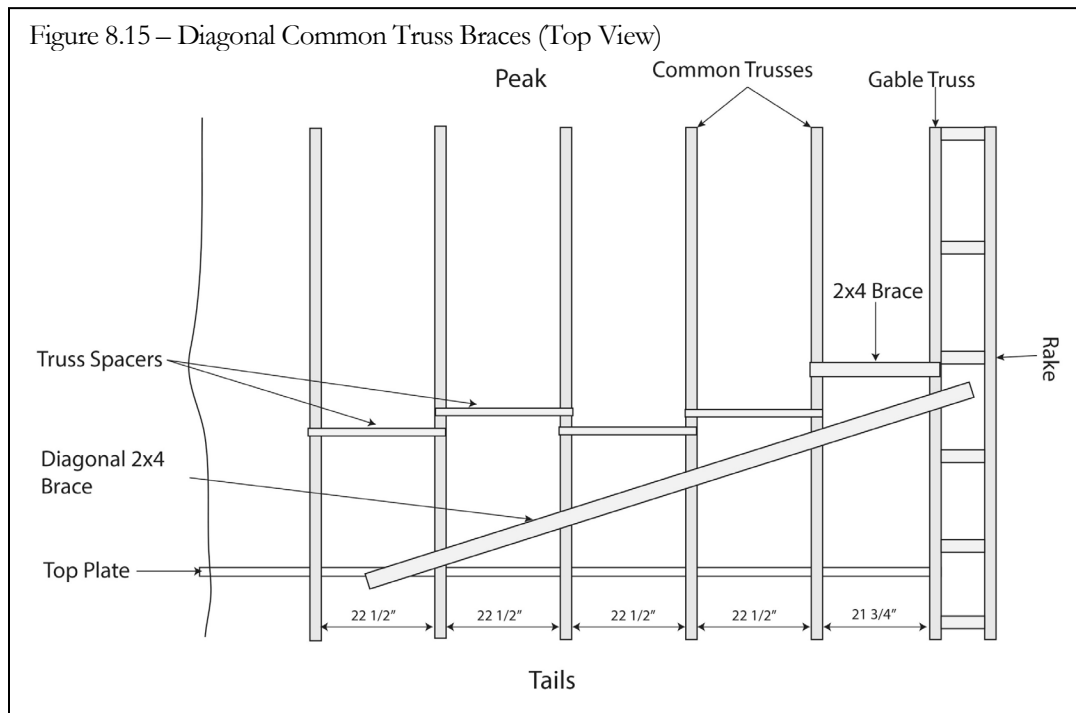
- a. The crane will lift the trusses onto the top plates of the side walls.
- b. The Truss Nailers will slide the heel of the truss to align with the outside edge of the top plate of the alignment wall.
- c. The truss must sit down snugly on the top plates. If the truss is bowed up, ensure the truss is clear of the center walls.
- d. Place the truss between the layout lines and aligned with the top plate.
- e. Temporary spacer blocks positioned on the top plates, between the truss and the previously installed truss will support the truss while it is being nailed and will prevent splitting out the sides. Toe-nail the truss

into the top plate with 16d common nails, 1 nail on each side of the truss.

- f. The Spacers will install the Truss spacers. Install one (1) spacer on each end of the truss; about 4' to 5' up from the tails. Attach the Truss Spacer to the top of the current truss and the previously installed truss with 1 3/4" roofing nails; 1 nail through the hole in each end of the spacer.
  - a. Attach the Truss Spacer to the previously installed truss first. Ensure the trusses are spaced 24" o.c.
  - b. The Truss Spacers will not fit in the first and last bays. A short 40" 2x4 block will be installed on each end of these trusses; anchoring them back to the gable end trusses. Plumb both the common truss and the gable end truss and attached the 2x4 brace with 16d common nails; 1 nail in each end.

## 2. Install Diagonal Common Truss Braces

The Bracers will position a 14' 2x4 diagonally across the gable end truss and the next four (4) common trusses. They will attach the diagonal brace to each truss with a 16d common nail. (See Figure 8.15).



## 3. Store 2x4s for Catwalks

After half of the common trusses have been set, store inside of the trusses two (2) sets of 14' long 2x4s; one set on each side of the house. Load the 2x4s into an area of the trusses approximately 7' from the exterior walls;



resting on the horizontal members. Load into each side enough 2x4s to cover a distance 1 ½ times the length of the house. These are the catwalk boards and will be installed after the trusses are set and plumbed. (See “Install Cat Walks” below).

#### 4. Set Last Gable Truss

Set the last gable truss using the same procedure as used to set the first gable truss. Also, add “Diagonal Common Truss Supports” to this end, as before.

### Shed Porch Trusses

- Snap a chalk line on the house even with the tops of the porch beams.
- Nail a 2x4 ledger board on to the OSB above the chalk line with 16d common nails every 16”. Nail into the studs behind the OSB.
- Mark the location of the trusses on the front beam. They should be 24” o.c. from one end. Follow the same procedure as “Layout the Roof trusses” above.
- Mark the ledger board with marks which match the beam.
- Set the porch gable end trusses
  - Set the porch gable end truss on top of the porch beam.
  - Flush the OSB on the truss with the OSB on the side of the house. The OSB on the truss should hang over the beam with the truss sitting on the beam.
  - Nail down through the horizontal member of the truss into the beam with 16d common nails; 1 nail every 16”.
- Set the intermediate porch trusses
  - Set the trusses spanning between the ledger board and the front beam.
  - Position the trusses on the marks and toe-nail the truss into the top plate of the porch beams with 16d common nails; 2 nails on each side.
  - Toe-nail the truss into the ledger with 16d common nails; 2 nails on each side.

# Sub-fascia

## Install Sub-fascia Boards on Tails

### Critical Issues

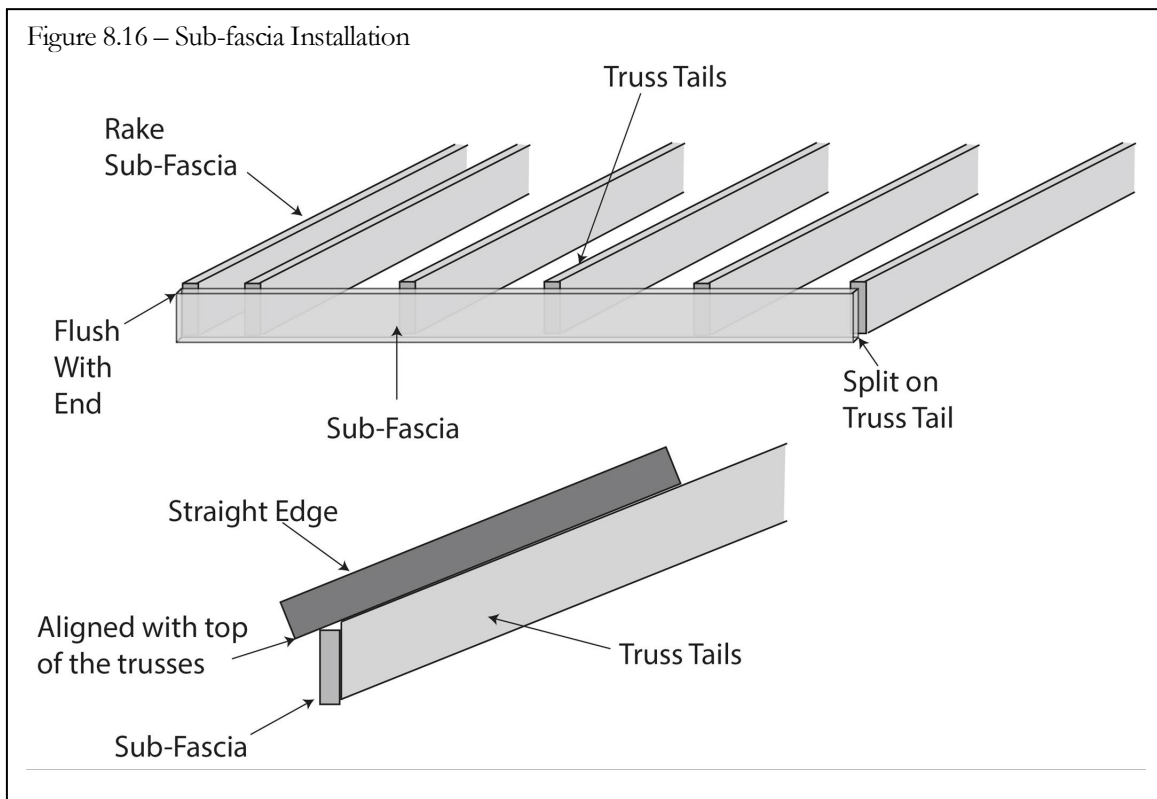
- At least two (2) volunteers on the correct ladders will be needed on the outside of the house and one (1) volunteer on the inside on a platform ladder will be needed.
- The trusses must be plumb before installing the sub-fascia.

### Safety Issues

- The correct ladders must be used. On the outside of one story houses 16' extension ladders should be used. On the outside of two story houses 24' extension ladders should be used. On the inside of either, a 7' platform ladder should be used.

### 1. Measure and Cut Sub-fascia Boards.

Cut sub-fascia which will cover the tails of the trusses from 14' long 2x6s. The boards will extend from the outside edge of the first gable rake to the outside edge of the last gable rake. Joints between boards must fall in the center of a truss tail. (See figure 8.16)



## 2. **Install Sub-fascia Boards to Truss Ends.** (See Figure 8.16)

- Set up two extension ladders on the outside of the house, one positioned at the end truss where the sub-fascia will be attached. Set up one platform ladder inside the house along the wall where the sub-fascia will be attached.
- The volunteers on the outside of the house will lift the sub-fascia into position on the tails of the trusses to be covered. Start at the rake sub-fascia at one end of the roof.
- The volunteer on the inside of the house will hold a straight edge on the top of the diagonal member of the truss.
- The outside volunteer will push the sub-fascia flush to the bottom of the block and attach to the truss with 16d common nails; 2 nails through the sub-fascia into the truss tails. The inside volunteer must ensure the truss is perpendicular to the top plate before attaching the sub-fascia.
- Move the extension ladders and platform ladder down the wall to attach the sub-fascia to each truss.

## **Truss Heel Sheathing**

### **Install Sheathing on the Truss Heels**

1. Cut pieces of  $\frac{1}{2}$ " OSB to cover the area above the OSB sheathing on the exterior walls up to the bottom of the truss diagonal members. Joints between pieces of OSB must occur over vertical framing lumber.
2. Apply a bead of caulk across the top of the wall sheathing before installing truss sheathing.
3. Position the truss sheathing above wall sheathing and secure with 8d common nails; 1 nail every 12" along the vertical framing lumber and every 8" along the horizontal framing lumber.

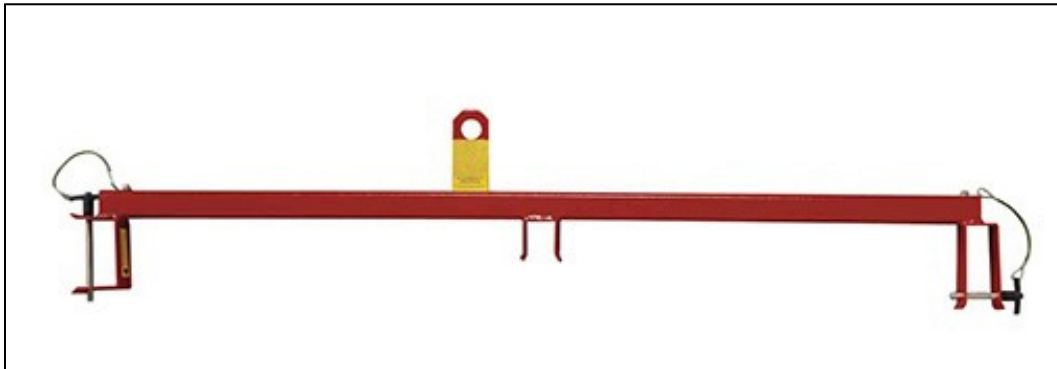
### **Install Sheathing on the Porch Truss Heels**

1. Cut pieces of  $\frac{1}{2}$ " OSB to cover the area from the bottom of the truss tails to the bottom of the porch beam. Joints between the pieces of OSB must occur over the end of a truss heels.
2. Cut pieces of  $\frac{1}{2}$ " OSB to cover the area from the bottom of the truss gables to the bottom of the porch beam.
3. Position the truss sheathing along the bottom of the beam and secure with 8d common nails; 1 nail every 12" along the bottom of the beam and every 8" along the horizontal framing lumber.

## Super Anchors

Once the trusses are all set and anchored, install the truss Super Anchors. These anchors will provide fall protection for completing the bracing for the trusses. These anchors will also be used by the roofers as they install the roof sheathing.

1. Remove all 3 pins by pressing in on the release button and pulling.
2. Slide the anchor over three (3) consecutive common trusses.
3. Reinsert the pins, again pressing in on the release pins.



## Truss Bracing

### Install Diagonal Wind Bracing

#### Critical Issues

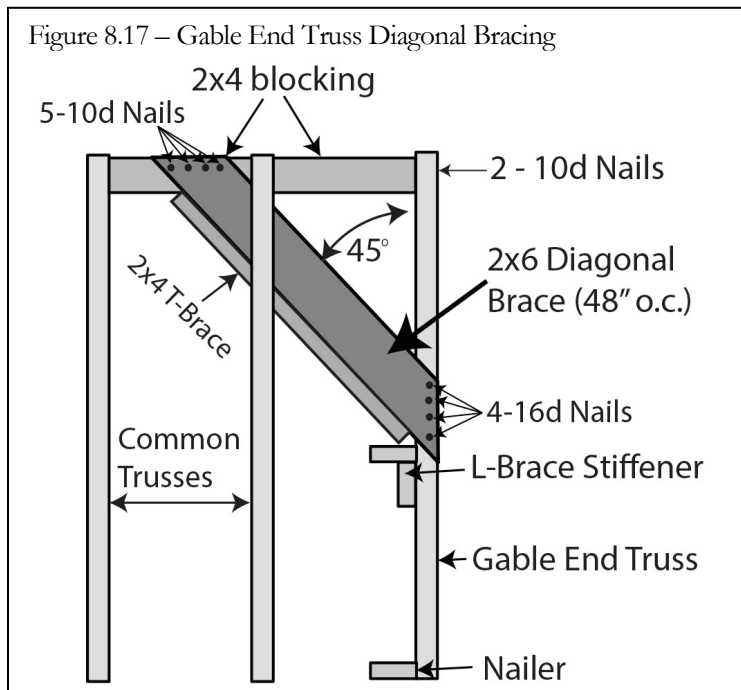
- Refer to the Truss Engineering Document to verify the specific instruction for truss bracing.

#### Safety Issues

- Installing the diagonal bracing will require working in the trusses. Workers must wear safety harnesses and be anchored to the truss anchor point above.

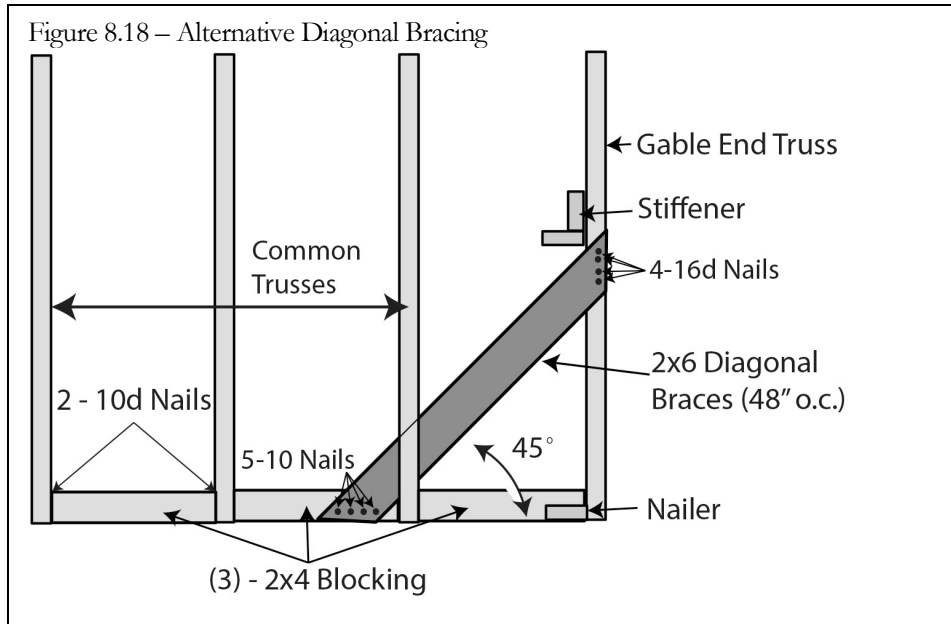
Diagonal braces may be required on the gable end trusses. The number, location and direction of the bracing depends on the height of the gable end truss. Bracing for each size gable end truss is as follows:

- Trusses less than 9' 4 1/2", no diagonal bracing is required.
- Trusses taller than 9' 4 1/2", a diagonal 2x6 brace must be installed every 4' across the width of the truss. The brace must run from the mid-point of the truss to 2x4 blocking across the tops of the trusses.
- Trusses taller than 14' 1", two (2) diagonal 2x6 braces must be installed every 4' across the width of the truss. The braces must run from the 1/3 points of the truss to 2x4 blocking across the tops.
- ❖ Alternatively, the diagonals can run down to 2x4 blocking across the bottom chords of the trusses.



### Install 2x6 Diagonal Bracing

1. Mark the L-brace stiffener with the location of the braces; 1 mark every 4'.
2. Mark the top diagonal chords of the 1<sup>st</sup> common truss with a corresponding mark to the marks on the L-brace.
3. Install 2x4 blocking between the gable end truss and the top diagonal member of the 1<sup>st</sup> common truss; one block at each location. Attach each end of the block with two (2) 10d common nails.
4. Install 2x4 blocking between the 1<sup>st</sup> and 2<sup>nd</sup> common trusses; one block at each location. Attach each end of the block with two (2) 10d common nails.
5. Install a 2x6 brace between the mid-point of the truss and the 2x4 blocking at a 45 degree angle at each bracing point.
  - a. Cut each end of the 2x6 to a 45 degree angle.
  - b. Attach the brace to the truss with four (4) 16d common nails.
  - c. Attach the brace to the 2x4 blocking with five (5) 10d common nails.
6. If any of the braces are longer than 6' 3", add a 2x4 to the 2x6 to form a T-brace.
  - a. Cut the 2x4 to cover at least 90% of the length of the 2x6.
  - b. Attach the 2x4 to the narrow edge of the 2x6 to form a "T"; one (1) 16d nail every 8".



### Alternative 2x6 Diagonal Bracing

1. Mark the L-brace stiffener with the location of the braces; 1 mark every 4'.
2. Mark the bottom horizontal chord of the 1<sup>st</sup> common truss with a corresponding mark to the marks on the L-brace.
3. Install 2x4 blocking between the gable end truss and the bottom chord of the 1<sup>st</sup> common truss; one block at each location. Attach each end of the block with two (2) 10d common nails.
4. Additionally, install 2x4 blocking between the bottom chords of the 1<sup>st</sup> and 2<sup>nd</sup> common trusses and the 2<sup>nd</sup> and 3<sup>rd</sup> common trusses; one block at each location. Attach each end of the block with two (2) 10d common nails.
5. Install a 2x6 brace between the mid-point of the truss and the 2x4 blocking between the 1<sup>st</sup> and 2<sup>nd</sup> common truss at 45 degree angle at each bracing point.
  - a. Cut each end of the 2x6 to a 45 degree angle.
  - b. Attach the brace to the truss with four (4) 16d common nails.
  - c. Attach the brace to the 2x4 blocking with five (5) 10d common nails.
6. If any of the braces are longer than 6' 3", add a 2x4 to the 2x6 to form a T-brace.
  - a. Cut the 2x4 to cover at least 90% of the length to the 2x6.
  - b. Attach the 2x4 to the narrow edge of the 2x6 to form a "T"; one (1) 16d nail every 8".

### Bracing Nailing Chart

Horizontal L-Brace Stiffener		
	L-Brace (2x6 to 2x4)	16d – 6" o.c.
	L-Brace 2x4 to gable end verticals	(4) – 10d each stud
	Gable end verticals to L-Brace 2x6	(2) – 10d each stud
Vertical L-Brace Stiffener		
	L-Brace (2x4 to 2x4)	16d – 6" o.c.
	L-Brace to gable end vertical	10d – 6" o.c.

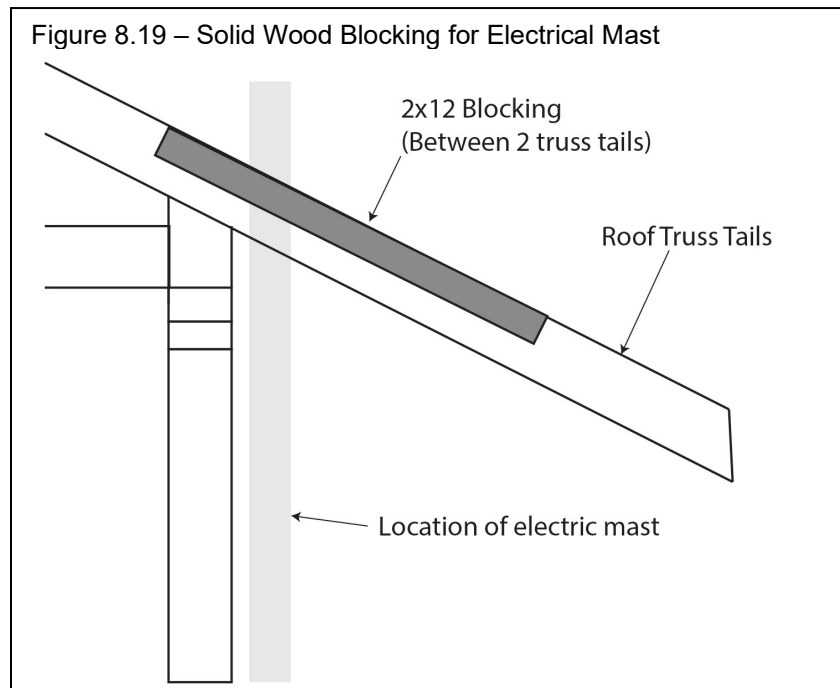
<b>Diagonal Brace from Stiffener to top of trusses</b>		
	2x4 blocking to truss	Toenail (2) – 10d at each end
	2x6 diagonal to 2x4 blocking	(5) – 10d
	2x6 diagonal to gable stud	(4) – 16d
<b>Diagonal Brace from Stiffener to bottom of trusses</b>		
	2x4 blocking to truss	Toenail (2) – 10d at each end
	2x6 diagonal to 2x4 blocking	(5) – 10d
	2x6 diagonal to gable stud	(4) – 16d
<b>Cat Walks (Purlins)</b>		
	2x4 purlin to truss bottom chord	(2) – 16d each

### Install Cat Walks

- Nail the 2x4s cat walks to the trusses while holding the trusses to 24" o.c. Nail down through the 2x4 cat walks into the horizontal truss members, using 16d common nails; 2 nails per truss. Ensure the lengths of 2x4s overlap by 1 bay.

### Solid Wood Blocking for Electrical Mast

If the electrical mast will extend through the roof, identify its location and add 2x12 blocking between the roof trusses tails above that location. (see figure 8.19)



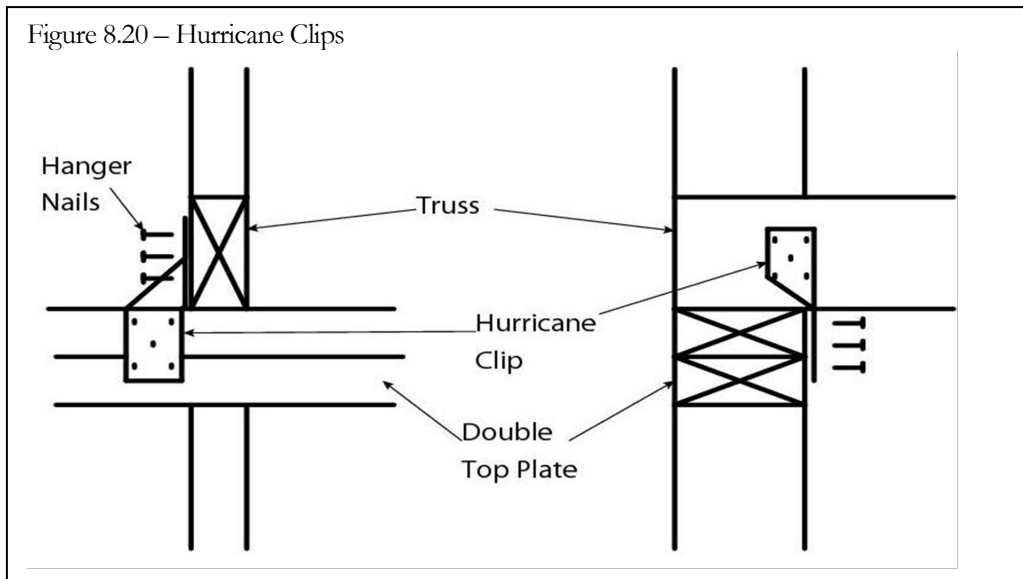
### Install Hurricane Clips

**Critical Issues**

- Installing the hurricane clips is often dangerous to the fingers. Holding the nails with needle-nose pliers keeps the fingers out of the way of the hammer head.

### **Safety Issues**

- Use the correct ladders. Platform ladders in open areas or straight ladders in close areas work best. Do not lean step ladders.
- Install the metal framing ties (hurricane clips) with hanger nails to fasten the trusses to the double top plate. (See Figure 8.20)
  - Hurricane clips are required for all trusses.
  - Install 1 tie to each end of each truss. Attach the plates using Simpson nails; a nail must be installed in every hole of the tie.
  - Make sure the tie is installed so the top fin does not hang below the truss.



Before continuing, stop and complete the “**Truss Post-Installation Checklist**” found in Procore/Inspections.



# Roof Sheathing

## Sheet the Roof

### *Critical Issues*

- Most house roof sheathing is done by roofing sub-contractors. Check with the Habitat Superintendent for specific on each house.
- The roof sheathing is installed perpendicular to the trusses

### *Safety Issues*

- Fall Protection is required on all roofs.

#### 1. Install Fall Protection

- Install the anchors. The anchors will be attached to the trusses per the Manufacturer's instructions. One anchor is required for each person on the roof. (See "Common Truss Anchors" above).
- Each person on the roof must wear a harness and be attached to an anchor with a retractable lifeline.

#### 2. Install First Row of Sheathing.

- Snap a chalk line across the tops of the trusses, 48 ½" from the outside edge of the sub-fascia board. The first sheets of OSB will be aligned with this line.
- The sheathing cannot extend past the edge of the sub-fascia. With a 5-12 pitch roof the top edge of the sub-fascia will extend 3/16" past the bottom edge.
- Cut a 4x8 sheet of 1/2" OSB to a length to cover the rake and first three (3) bays; to the mid-point of the third common truss. Place the cut edge over the rake.
- Snap chalk lines across the first sheet of OSB at 24", 48" and 72" from the non-cut edge. These lines will be used to identify where to install the nails.
- Lay the first sheet of OSB on the tops of the trusses with top edge flush to the chalk line. This is best done from inside the house with two volunteers on platform ladders. All roof sheathing must be installed with the rough side up.
- Align top back corner with the edge of the rake sub-fascia and the chalk line, then nail top back corner to rake with one (1) 8d common nail. Align the top front corner with the chalk line and in the middle of the third common truss, then nail in place with one (1) 8d common nail.
- Pull the middle trusses to the chalk lines on the OSB and place one (1) 8d common nail through the top edge of the OSB.

- From an extension ladder, nail the bottom edge of the OSB to the trusses.
- Finish nailing each line with 8d common nails every 8”.
- Continue sheathing the first row with full sheets of OSB using the same process. Loosely butt each sheet to the previous sheet.
- Cut the last sheet to fit over the front rake. This sheet must cover the gable rake, gable truss, and at least 2 trusses back. If the opening is too small, cut the previous sheet to 72”.

### 3. Install Slide Guards.

#### **Safety Issues**

- **Slide Guards are not fall protection. Anyone on the roof must wear a harness.**

- From an extension ladder, attach roof jacks to the top of the first row of OSB using 16d common nails.
- Lay 2x6s across the jacks to form a slide barrier.

### 4. Install 2nd Row.

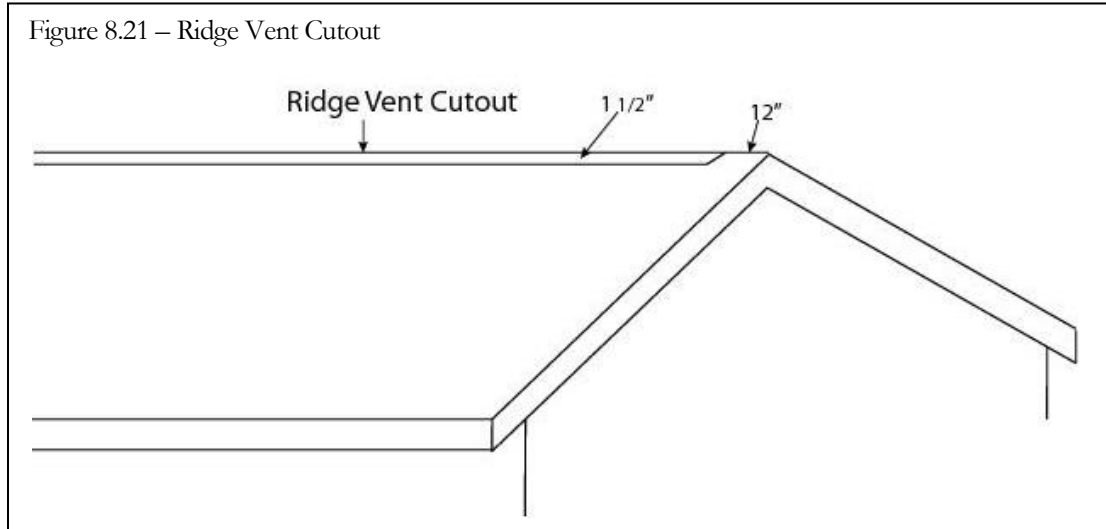
- Cut a piece of ½” OSB to cover the rake and the 1st bay to the middle of the 1st common truss. This will stagger the sheathing to ensure that no two vertical joints fall on the same truss.
- Snap chalk lines across the first sheet of OSB at 24” from the front.
- Install “H” clips between the 1st and 2nd rows of sheathing; 1 in the middle of each bay.
- Slide the half sheet of OSB into the “H” clips and flush with the back edge of the 2x6 rake sub-fascia. The front edge of the OSB should split the 1st common truss.
- Nail the top corner on the rake with 8d common nails.
- Align the common truss with the chalk line and nail the top edge.
- Standing on the first row of sheathing, finish nailing each row with an 8d common nail every 8”.
- Continue sheathing the second row using full sheets of OSB. Insert “H” clips at every space between the trusses.

### 5. Install Remaining Rows.

- Alternate starting with full and half sheets of OSB.
- Snap chalk lines on each sheet of OSB 24” OC.
- Install “H” clips between all remaining rows of sheathing; 1 in the middle of each bay.

### 6. Install Ridge Vent Cutout. (See Figure 8.21).

- The last row will be cut to a width which is 1 ½" less than the distance from the top edge of the previous row and the top peak of the house, except for the last 12" from either gable end. The last foot will continue to the peak. The space in the peak will allow the proper circulation for the ridge vent.



Before continuing, stop and complete the “**Roof Sheathing Checklist**” found in Procore/Inspections.