

# CB22 GRAIN BIN ROOF 25PSF - 10,000LB – 90MPH - 72"PEAK



## INSTALLATION MANUAL P/N 887314



*Trusted. Tested. True.*

# Chief Industries, Inc. – Agri/Industrial Division

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## Manual Revisions

- 8-31-2015
  - Updated warranty information
- 1-1-2016
  - General formatting update

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4400 East 39<sup>th</sup> Street • PO Box 848

Kearney, NE 68847

Phone 800.359.7600

For more information about Chief Industries, Inc. and additional products or services please visit our website

[www.agri.Chiefind.com](http://www.agri.Chiefind.com)

## STANDARD LIMITED WARRANTY

### Chief Grain Bin Products

1. **Definitions.** The following terms, when they appear in the body of this Standard Limited Warranty for Grain Bin Products in initial capital letters shall have the meaning set forth below:
  - A. Accepted Purchase Order shall mean the Purchase Order identified below.
  - B. Chief shall mean Chief Agri/Industrial, a division of Chief Industries, Inc.
  - C. Original Owner shall mean the original owner identified below.
  - D. Product shall mean the Agri/Industrial Equipment as described in the Accepted Purchase Order.
  - E. Reseller shall mean the authorized Chief Agri/Industrial Equipment dealer identified below.
2. **Limited Product Warranty.** Upon and subject to the terms and conditions set forth below, Chief hereby warrants to the Reseller, and, if different, the Original Owner as follows:
  - A. All new Products delivered to the Reseller or the Original Owner by Chief pursuant to the Accepted Purchase Order will, when delivered, conform to the specifications set forth in the Accepted Purchase Order;
  - B. All new Products delivered pursuant to the Accepted Purchase Order will, in normal use and service, be free from defects in materials or workmanship; and
  - C. Upon delivery, Chief will convey good and marketable title to the Products, free and clear of any liens or encumbrances except for, where applicable, a purchase money security interest in favor of Chief.
3. **Duration of Warranty and Notice Requirements.** Subject to the **Exceptions, Exclusions and Limitations** set forth below, the warranties set forth in Section 2 above shall apply to all covered non-conforming conditions that are discovered within the first sixty (60) months following delivery of the Product to the carrier designated by the Reseller and/or the Original Owner at Chief's manufacturing facility in Kearney, Nebraska (the "Warranty Period") and are reported to the Chief as provided in Section 4 below within thirty (30) days following discovery (a "Notice Period").
4. **Notice Procedure.** In order to make a valid warranty claim, the Reseller and/or the Original Owner must provide Chief with a written notice of any nonconforming condition discovered during the Warranty Period within the applicable Notice Period specified in Section 3 above. Said notice must be in writing; be addressed to Chief Industries, Inc., Agri/Industrial Division, Customer Service Department, P.O. Box 848, Kearney, NE 68848; and contain the following information: (a) the Customer's name and address; (b) the Reseller's name and address; (c) the make and model of the Product in question; (d) the current location of the Product; (e) a brief description of the problem with respect to which warranty coverage is claimed; and (f) the date on which the Product was purchased.
5. **Exceptions and Exclusions.** Anything herein to the contrary notwithstanding, the warranties set forth in Section 2 above do **not** cover any of the following, each of which are hereby expressly excluded:
  - A. Defects that are not discovered during the applicable Warranty Period;
  - B. Defects that are not reported to the Chief Agri/Industrial Division Customer Service Department in conformity with the notice procedure set forth in Section 4 above within the applicable Notice Period specified in Section 3;
  - C. Any used or pre-owned Products;
  - D. Any Chief manufactured parts that are not furnished as a part of the Accepted Purchase Order;

- E. Any fixtures, equipment, materials, supplies, accessories, parts or components that have been furnished by Chief but are manufactured by a third party;
  - F. Any Products which have been removed from the location at which they were originally installed;
  - G. Any defect, loss, damage, cost or expense incurred by the Reseller or the Original Owner to the extent the same arise out of, relate to or result, in whole or in part, from any one or more of the following:
    - (i) Usual and customary deterioration, wear or tear resulting from normal use, service and exposure;
    - (ii) Theft, vandalism, accident, war, insurrection, fire or other casualty;
    - (iii) Any damage, shortages or missing parts which result during shipping or are otherwise caused by the Reseller, the Original Owner and/or any third party;
    - (iv) Exposure to marine environments, including frequent or sustained salt or fresh water spray;
    - (v) Exposure to corrosive, chemical, ash, smoke, fumes, or the like generated or released either within or outside of the structure on which the Product is installed, regardless of whether or not such facilities are owned or operated by the Reseller, the Original Owner or an unrelated third party;
    - (vi) Exposure to or contact with animals, animal waste and/or decomposition;
    - (vii) The effect or influence the Product may have on surrounding structures, including, without limitation, any loss, damage or expense caused by drifting snow;
    - (viii) Any Product or portion thereof that has been altered, modified or repaired by the Reseller, the Original Owner or any third party without Chief's prior written consent;
    - (ix) Any Product or portion thereof that has been attached to any adjacent structure without Chief's prior written approval;
    - (x) Any Product to which any fixtures, equipment, accessories, materials, parts or components which were not provided as a part of the original Accepted Purchase Order have been attached without Chief's prior written approval;
    - (xi) The failure on the part of the Reseller, the Original Owner or its or their third party contractors to satisfy the requirements of all applicable statutes, laws, ordinances rules, regulations and codes, (including zoning laws and/or building codes);
    - (xii) The use of the Product for any purpose other than the purpose for which it was designed; and/or
    - (xiii) The failure of the Reseller, the Original Owner and/or any third party to:
      - (a) properly handle, transport and/or store the Product or any component part thereof;
      - (b) properly select and prepare a site that is adequate for the installation and/or operation of the Product or any component part thereof;
      - (c) properly design and construct a foundation that is adequate for the installation and/or operation of the Product or any component part thereof;
      - (d) properly set up, erect, construct or install the Product and/or any component part thereof; and/or
      - (e) properly operate, use, service and/or maintain the Product and each component part thereof.
6. **Resolution of Warranty Claims.** In the event any nonconforming condition is discovered within the Warranty Period and Chief is notified of a warranty claim as required by Section 4 prior to the end of the applicable Notice Period set forth in Section 3 above, Chief shall, with the full cooperation of the Reseller and the Original Owner, immediately undertake an investigation of such claim. To the extent Chief shall determine, in its reasonable discretion, that the warranty claim is covered by the foregoing Limited Product Warranty, the following shall apply:

- A. Warranty Claims With Respect to Covered Non-Conforming Conditions Discovered Within the First Three Hundred Sixty Five (365) Days and Reported to Chief Within Thirty (30) Days of Discovery. In the case of a warranty claim which relates to a covered non-conforming condition that is discovered during the first three hundred sixty five (365) days of the Warranty Period and is reported to Chief as required by Section 4 within thirty (30) days of discovery as required by Section 3, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as their sole and exclusive remedy, work in cooperation with the Reseller and the Original Owner to correct such non-conforming condition, and in connection therewith, Chief will ship any required replacement parts to the "ship to address" set forth in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska, and will either provide the labor or reimburse the Reseller or the Original Owner, as may be appropriate in the circumstances, for any out of pocket expense the Original Owner may reasonably and necessarily incur for the labor that is required to correct such non-conforming condition, provided that if work is to be performed by the Reseller or a third party contractor, Chief may require at least two competitive bids to perform the labor required to repair or correct the defect and reserves the right to reject all bids and obtain additional bids. Upon acceptance of a bid by Chief, Chief will authorize the necessary repairs.
- B. All Other Warranty Claims. Except as is otherwise provided in subsection 6A above, in the case of all other warranty claims which relate to covered non-conforming conditions that are discovered during the Warranty Period and are reported to Chief as required by Section 4 within thirty (30) days following discovery, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as the Reseller's and the Original Owner's sole and exclusive remedy, ship any required replacement parts to the Original Owner at the "ship to address" specified in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska; and **in such event, Chief shall have no responsibility or liability to either the Reseller or the Original Owner for the cost of any labor required to repair or correct the defect.**
7. Warranty Not Transferable. This Warranty applies only to the Reseller and the Original Owner and is **not transferable**. As such, this Warranty does **not** cover any Product that is sold or otherwise transferred to any third party following its delivery to the Original Owner.
8. Limitation on Warranties, Liabilities and Damages. The Reseller and the Original Owner expressly agree that the allocation of the risk, liability, loss, damage, cost and expense arising from any Product that does not conform to the limited warranty given in Section 2 above are fair and reasonable and acknowledge that such allocation was expressly negotiated by the parties and was reflected in the Purchase Price of the Product. Accordingly the Reseller and the Original Owner expressly agree as follows:
- A. Disclaimer of Implied Warranties. **EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH HEREIN, CHIEF MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, WHETHER EXPRESS OR IMPLIED, BY OPERATION OF LAW, COURSE OF DEALING OR OTHERWISE WITH RESPECT TO THE PRODUCT, ANY COMPONENT PART THEREOF OR ANY OTHER GOODS OR SERVICES THAT CHIEF MANUFACTURES, FABRICATES, PRODUCES, SELLS OR PROVIDES TO THE DEALER OR THE ORIGINAL OWNER PURSUANT TO THE TERMS OF ANY ACCEPTED PURCHASE ORDER, INCLUDING WITHOUT LIMITATION ANY REPRESENTATION OR WARRANTY WITH RESPECT TO DESIGN, CONDITION, MERCHANTABILITY OR FITNESS OF THE PRODUCT OR ANY OTHER GOODS OR SERVICES FOR ANY PARTICULAR PURPOSE OR USE.**
- B. Limitation on Liability. **EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH IN SECTION 6 ABOVE, CHIEF'S LIABILITY TO THE DEALER AND/OR THE ORIGINAL**

OWNER WITH RESPECT TO ANY DEFECTS IN ANY PRODUCTS OR FOR ANY OTHER GOODS OR SERVICES WHICH DO NOT CONFORM TO THE WARRANTIES SET FORTH ABOVE SHALL NOT, IN ANY EVENT, EXCEED THE ACTUAL COST OF SUCH NON-CONFORMING PRODUCT, GOODS OR SERVICES AS DETERMINED PURSUANT TO THE ACCEPTED PURCHASE ORDER; AND

- C. **Limitation on the Nature of Damages.** EXCEPT AS EXPRESSLY PROVIDED IN SECTION 6 ABOVE, CHIEF SHALL NOT, UNDER ANY CIRCUMSTANCES, BE LIABLE TO THE DEALER, THE ORIGINAL OWNER OR ANY THIRD PARTY FOR ATTORNEY FEES COURT COSTS OR ANY OTHER SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LIQUIDATED OR PUNITIVE DAMAGES OF ANY NAME, NATURE OR DESCRIPTION AS A RESULT OF THE FAILURE OF ANY PRODUCT OR ANY OTHER GOODS OR SERVICES PURCHASED BY THE DEALER OR THE ORIGINAL OWNER FROM CHIEF PURSUANT TO THE ACCEPTED PURCHASE ORDER TO CONFORM TO THE LIMITED WARRANTIES SET FORTH IN SECTION 2 ABOVE.
8. **Applicable Law.** This Limited Product Warranty has been issued, accepted and entered into by the Reseller, the Original Owner and Chief in the State of Nebraska and shall be governed by, and construed in accordance with, the internal laws of the State of Nebraska. Any legal action or proceeding with respect to any goods or services furnished to the Original Owner by Chief in connection herewith, or any document related hereto shall be brought only in the district courts of Nebraska, or the United States District Court for the District of Nebraska, and, by execution and delivery of this Limited Product Warranty, the undersigned Original Owner hereby accept for themselves and with respect to their property, generally and unconditionally, the jurisdiction of the aforesaid courts. Further, the undersigned Original Owner hereby irrevocably waives any objection, including, without limitation, any *forum non conveniens*, which it may now or hereafter have to the bringing of such action or proceeding in such respective jurisdictions.

4843-5948-9057, v. 1

## Warning

### Water Sensitive Materials - Read this notice carefully

Bundles must be inspected and carrier advised immediately if damage is Important Noted. White rust is a corrosion attack of the zinc coating resulting from the presence of water. Anywhere rust is found will result in a reduction of the life of the galvanized steel.

If water has entered a bundle or if condensation has formed between sheets, the bundle must be opened, the sheets separated and all surfaces dried.

#### **If sheets are to be installed within 10 days:**

Store bundled sheets off the ground high enough to allow air circulation beneath bundle and to prevent water from entering. Store 1 end at least 8" (20.32cm) higher than the opposite end. Support long bundles in the center. Prevent rain from entering the bundle by covering with a tarpaulin, making provision for air circulation between the draped edges and the ground.

Do not wrap in plastic.

#### **If sheets are not to be installed within 10 days:**

Provide inside dry storage. Storage beyond 6 months is not recommended. If white rust is apparent upon receipt of shipment, notify Chief immediately. Damage to sheets, resulting from improper storage, is the responsibility of the receiver.





## Before You Begin

Before starting the installation of the bin, take time to thoroughly study the construction methods in this manual, this will save you time and money.

Chief makes no warranty concerning components, accessories or equipment not manufactured by Chief.

When using a cutting torch or welding galvanized material, the possibility of developing toxic fumes will exist. Provide adequate ventilation and respiratory protection when using this type of equipment during installation.

### Introduction

Thank you for purchasing a Chief grain bin. Proper installation and operation will ensure you the best overall experience with your grain bin and guarantee smooth operation.

This proprietary information is loaned with the expressed agreement that the drawings and information therein contained are the property of Chief Industries, Inc. and will not be reproduced, copied, or otherwise disposed of, directly or indirectly, and will not be used in whole or in part to assist in making or to furnish any information for the making of drawings, prints or other reproduction hereof, or for the making of additional products or equipment except upon written permission of Chief Industries, Inc. first obtained and specific as to each case. The acceptance of this material will be construed as an acceptance of the foregoing agreement.

The technical data contained herein is the most recent available at the time of publication and is subject to modification without notice. Chief Industries, Inc. reserves the right to modify the construction and method of operation of their products at any time without any obligation on their part to modify any equipment previously sold and delivered.

### Model Number Description

The model nomenclature distinguishes the application of the grain bin. The information includes a designation of the applicable structure diameter, eave height, roof design and design criteria utilized. The definition of the model number nomenclature is as follows:

Example: CB 22 - 18 - J Rib - SZA

(a) (b) - (c) - (d) - (e)

(a) CB = Chief Bin

(b) 22 = Grain Bin Diameter

Where: 22 = 22 sheets in circumference

(c) 18 = Grain Bin Eave Height

Where: 18 = 18 sheets in height

(d) J Rib = Roof Design Type

Where: J Rib = J Rib design

Where: V Rib = V Rib design

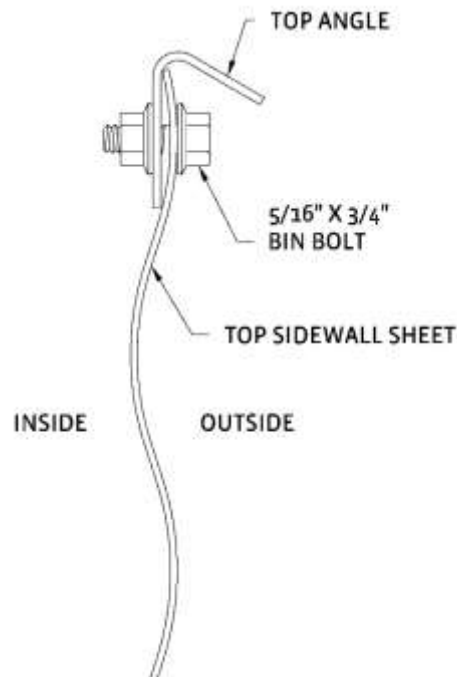
(e) Grain Bin Design Criteria for seismic and wind

## Installation Procedures

Prior to the installation of the roof components, assemble the top 2 sidewall rings and stiffeners according to the instructions found in the grain bin installation manual. Refer to the Chief grain bin installation manual for specific instructions.

Attach the top angle to the inside of the top sidewall ring using 5/16"x3/4" (.79x1.90cm) bolts.

**Important Note:** There is 1 top angle per sidewall sheet.



**Important Note:** Prior to starting the installation it is very important to plan ahead and verify the order and location of all bin components. This includes:

- Roof vents and manways
- Ladder, platform and spiral stair components
- Aeration components
- Upgraded stiffener locations for material handling support structures

When installing hardware the minimum and maximum torque values shown below must be followed. All hardware must seat tight against the corresponding component.

<b>Bolt Diameter</b>	<b>Minimum Torque</b>	<b>Maximum Torque</b>
5/16" (.79cm)	22 ft.-lbs.	28 ft.-lbs.
7/16" (1.11cm)	60 ft.-lbs.	75 ft.-lbs.
1/2" (1.27cm)	50 ft.-lbs.	58 ft.-lbs.
5/8" (1.58cm)	105 ft.-lbs.	121 ft.-lbs.
3/4" (1.90cm)	175 ft.-lbs.	201 ft.-lbs.

Please note the following wrench / socket size to be used on the corresponding hardware:

<b>Bolt Size</b>	<b>Head Size</b>	<b>Nut Size</b>
5/16"	1/2" wrench	1/2" wrench
7/16"	5/8" wrench	11/16" wrench
1/2"	3/4" wrench	3/4" wrench
5/8"	15/16" wrench	15/16" wrench
3/4"	1-1/8" wrench	1-1/8" wrench

## Crane Weight Capacity

Verify the total roof dead load. This weight includes the roof panels, all structural members and included hardware.

When determining the crane capacity necessary to install the roof structure, the boom distance must be considered. If a single crane will not lift the roof structure two cranes may be used, utilizing a spreader bar. The spreader bar must be adequately designed to carry the entire roof dead weight.

**Important Note:** Overloading the crane capacity can result in substantial property damage and severe personal injury. Always verify crane capacity prior to lifting roof structure.

**Important Note:** The weight of a single A-Frame bay completely assembled with X bracing and hardware = 1,000 lbs (454 kg).

## Assembly Bolting Sequence

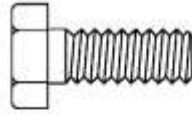
Install all components in the following order.

- Top angles
- Rafter A-frames.
  - Ring segment clips
  - Rafter reinforcing plates
  - Ring segments
  - Roof struts
  - X-brace clips
  - X-bracing
  - Eave brackets
  - Eave channel clips
  - Eave channels
- Roof panel standoffs
- Lower roof panels
- Upper roof flashing clips
- Upper roof panels
- Upper roof flashing extensions
- Cap flashing

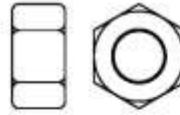
## Part Identification

Use the following information to identify parts used during installation.

3/4" X 2"  
BOLT  
#019046



3/4" NUT  
#540205



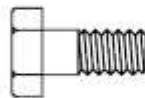
3/4"  
FLAT WASHER  
#753269



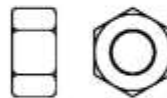
5/8" X 3"  
BOLT  
#385317



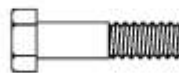
5/8" X 1-1/2"  
BOLT  
#963175



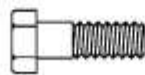
5/8" NUT  
#964405



1/2" X 2"  
BOLT  
#708016



1/2" X 1-1/2"  
BOLT  
#464842



1/2" NUT  
#963481



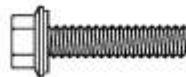
1/2"  
FLAT WASHER  
#708289



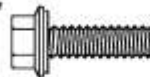
7/16" X 3"  
BIN BOLT  
#101703



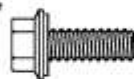
7/16" X 2"  
BIN BOLT  
#820878



7/16" X 1-1/2"  
BIN BOLT  
#820944



7/16" X 1-1/4"  
BIN BOLT  
#960811



7/16" WHIZ  
FLANGE NUT  
#501635



5/16" X 1-1/4"  
BIN BOLT  
#820605



5/16" X 3/4"  
BIN BOLT  
#820589



5/16" WHIZ  
FLANGE NUT  
#708206



#12-24 X 1-1/2"  
SELF-DRILLING  
SCREW  
#820590



#9388913  
UPR RING SEGMENT  
QTY = 22



—	CB20 A #9388901 = 121.000"
—	CB20 B #9388902 = 107.250"
—	CB20 C #9388903 = 101.500"

7

#9389991  
MID RING SEGMENT  
QTY = 22



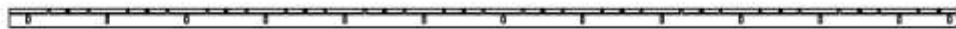
#9388908  
LWR RING SEGMENT  
QTY = 22



#9388904  
ROOF RING  
QTY = 22

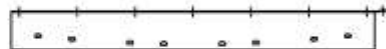


#9347811  
TOP ANGLE  
QTY = 22



7

#9388909  
EAVE CHANNEL  
QTY = 22



#9381486  
FLASHING CLIP



#9341272  
ROOF RING SHIM



#9380729  
WORKING RING BRKT



#9347827  
LH EAVE CLIP



#9383737  
.25" RING SEGMENT CLIP



#9347828  
RH EAVE CLIP



#9383792  
X-BRACE CLIP



#9381166  
ROOF RING BRKT



#9621347  
X-BRACE SPACER

#9391047  
EAVE TIE OFF



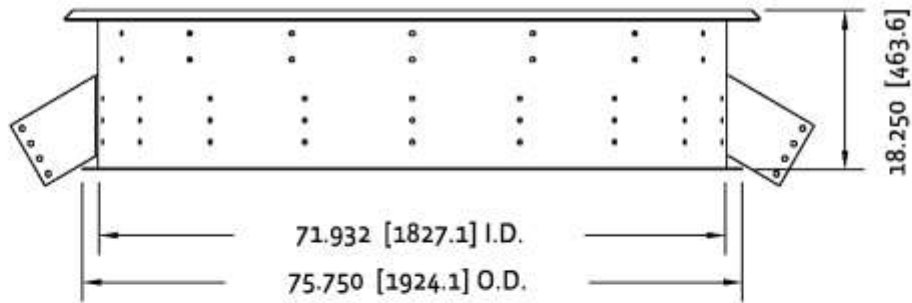
#9391048  
PEAK TIE OFF



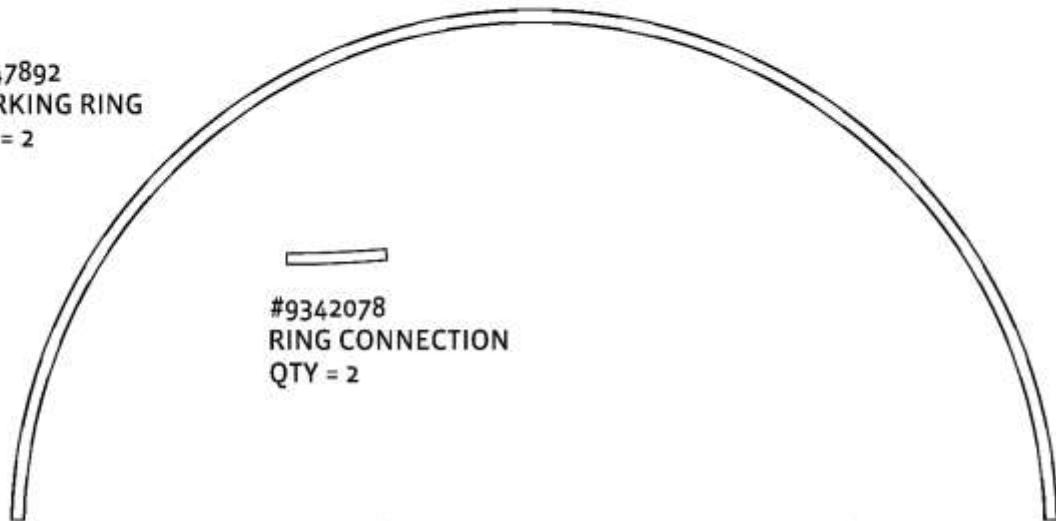
#9391059  
TIE OFF SHIM



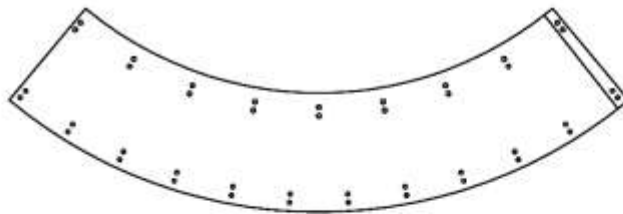
#9347850  
PEAK RING  
QTY = 1



#9347892  
WORKING RING  
QTY = 2



#9347856  
ROOF PNL FLASHING  
QTY = 4



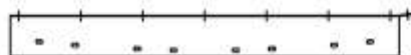
#9347815  
CAP FLASHING  
QTY = 8



#9382255  
TOP STANDOFF  
QTY = 22



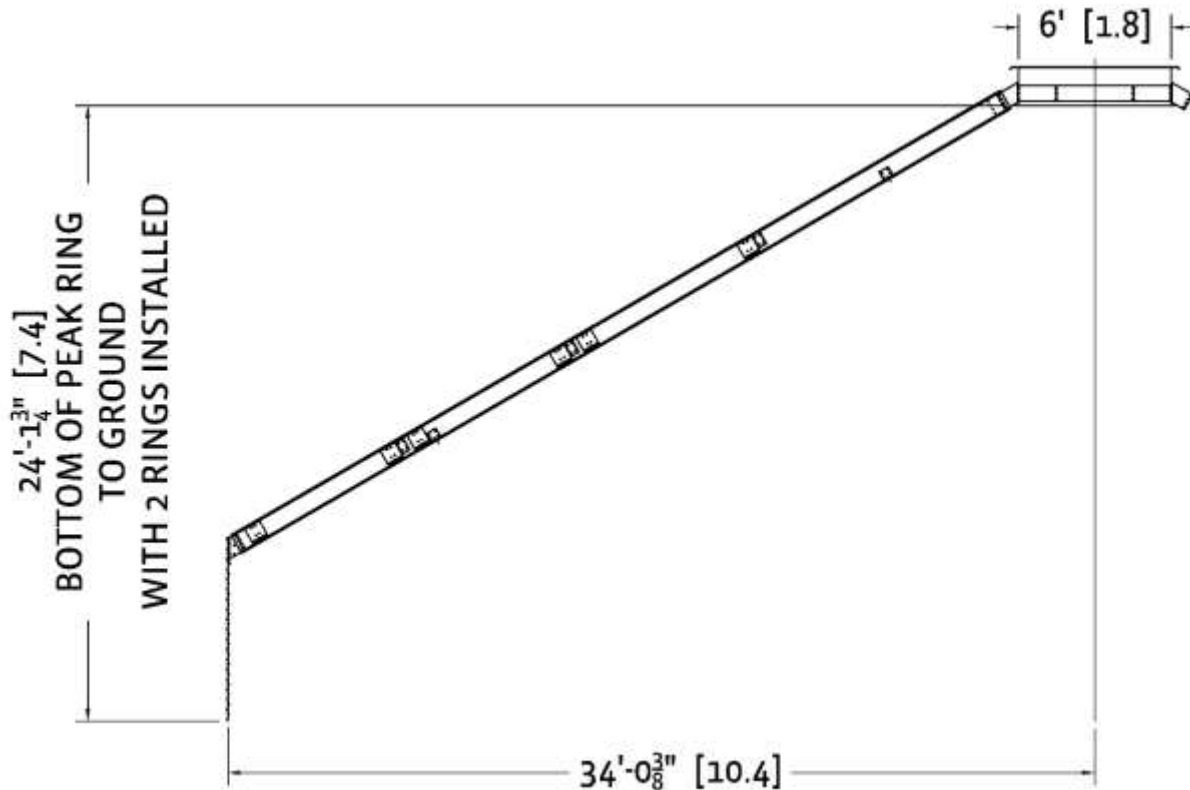
#9388909  
BOTTOM STANDOFF  
QTY = 22



## Peak Height for Roof Installation

Position a structure to hold the inner ring at the approximate height, centering the inner ring at the center of the grain bin.

The peak heights listed below are to the bottom of the peak ring with 2 sidewall sheet rings installed. If 1 sidewall sheet ring is desired, deduct 42.50" (107.9cm) from the heights listed below.

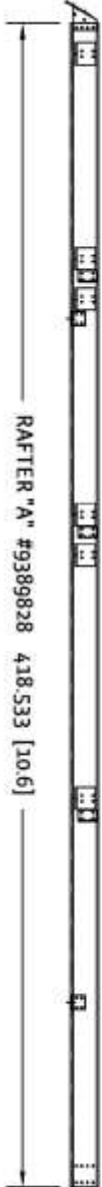
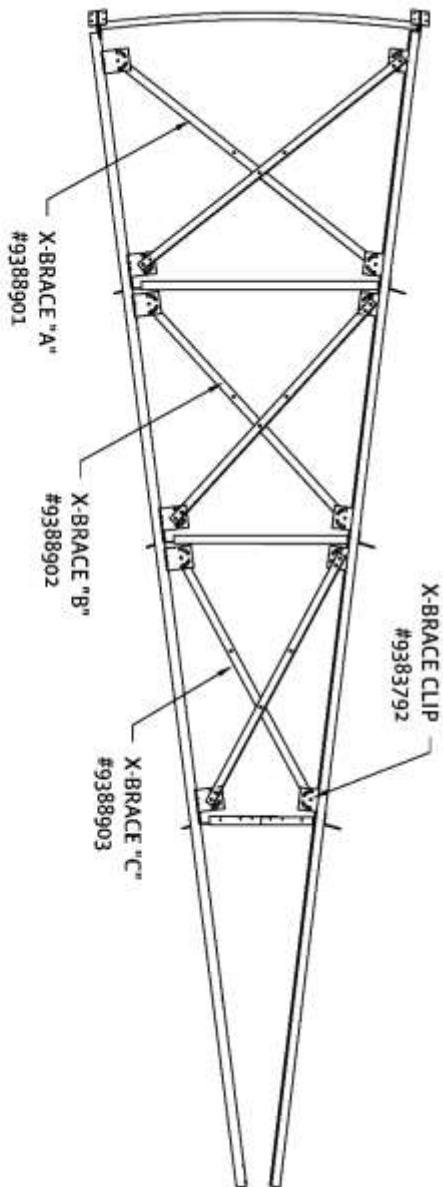
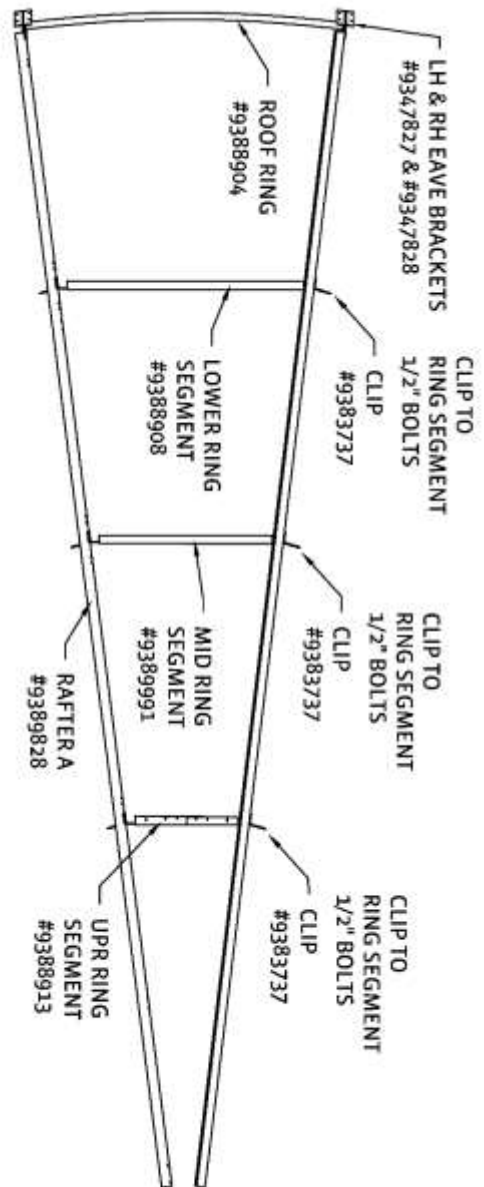


## Roof Structure Installation

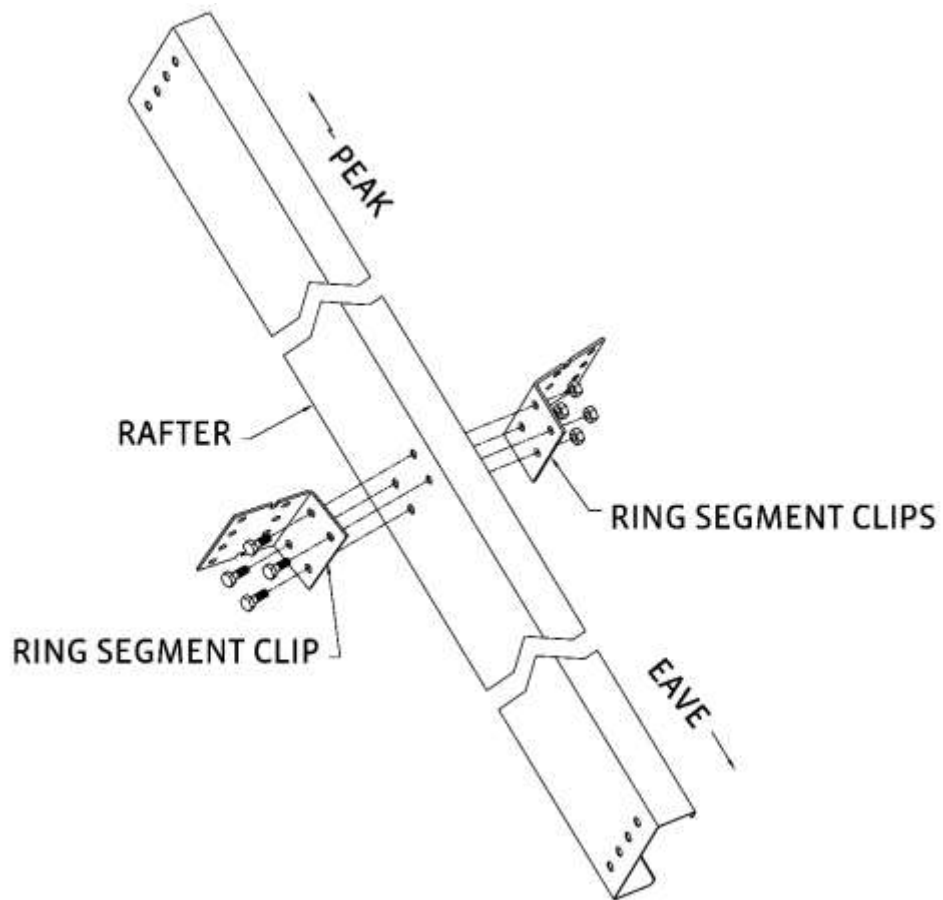
Pre-assemble the roof rafter A-frames as shown in the following illustration. For a CB22 there is a total of 12 A-frames. 4 A-frames will have interior x bracing and 7 A-frames will be without bracing. Tighten all bolts in the A-frame structures prior to installing on the roof.

**Important Note:** Extra holes should be filled in with  $\frac{1}{2}" \times 1\frac{1}{2}"$  (1.27x3.81cm) bolts.



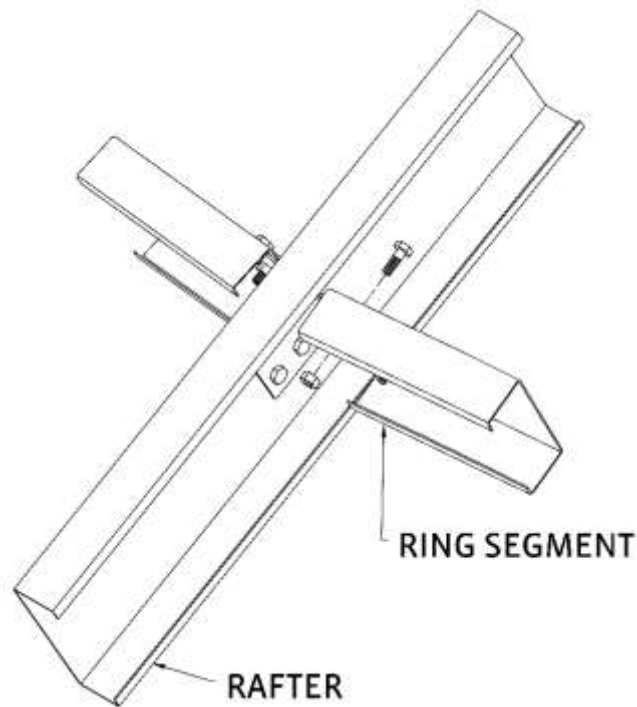


Attach the ring segment clips to every rafter as shown in the following illustration. Ring segment clip 9383737 requires 1/2"x1-1/2" (1.27x3.81cm) bolts.

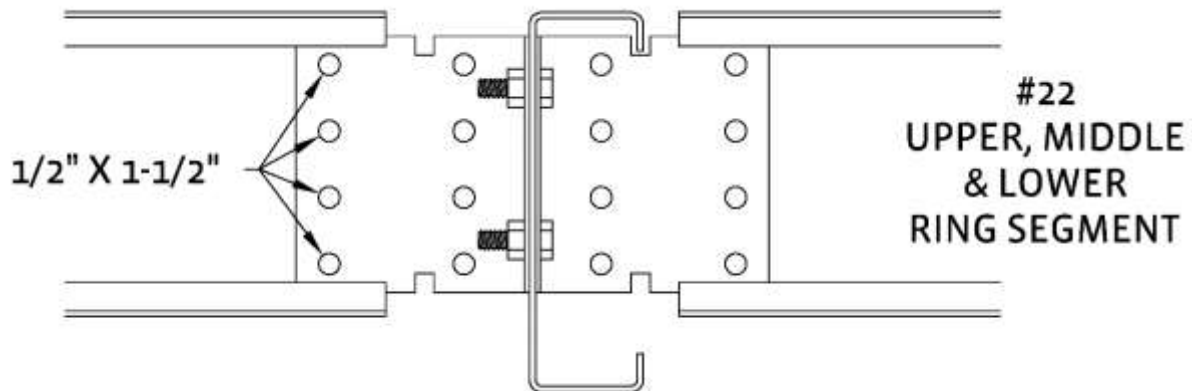


Attach the ring segments to the ring segment clips as shown in the following illustration.

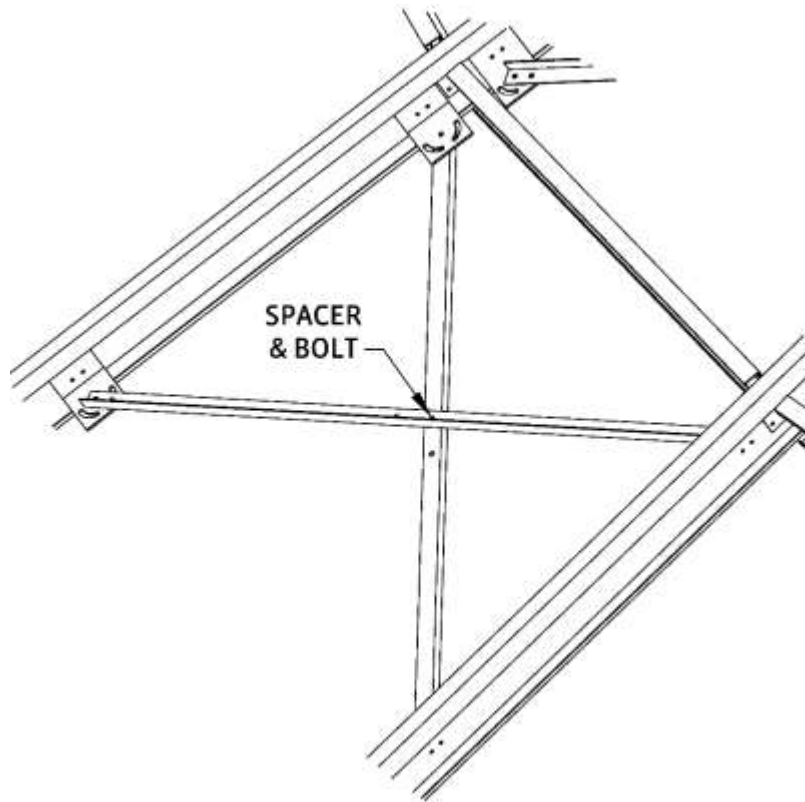
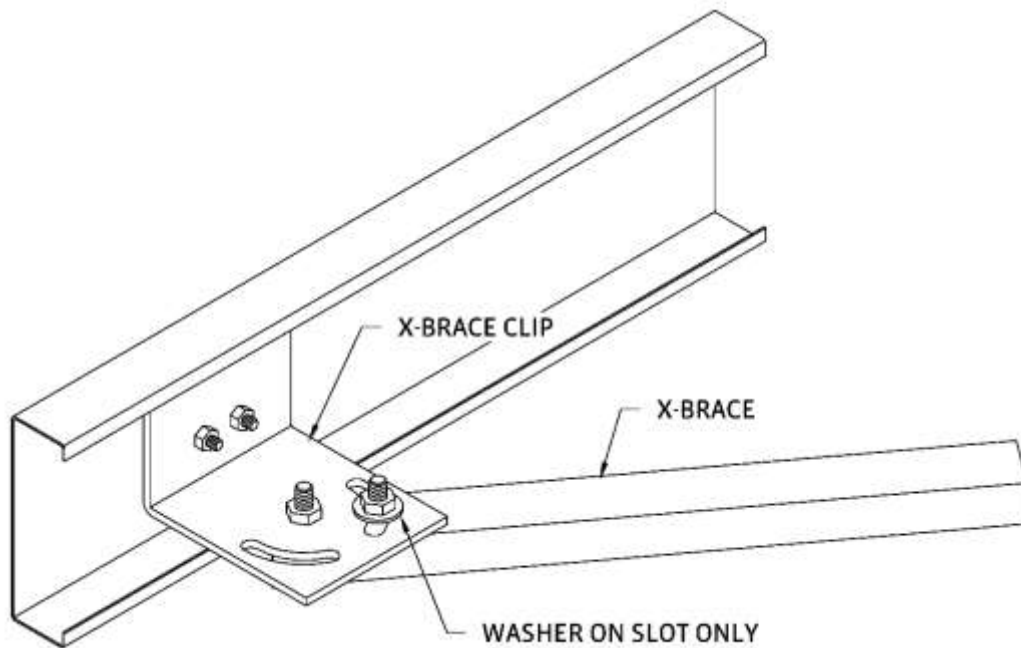
**Important Note:** No washers are required on the ring segments



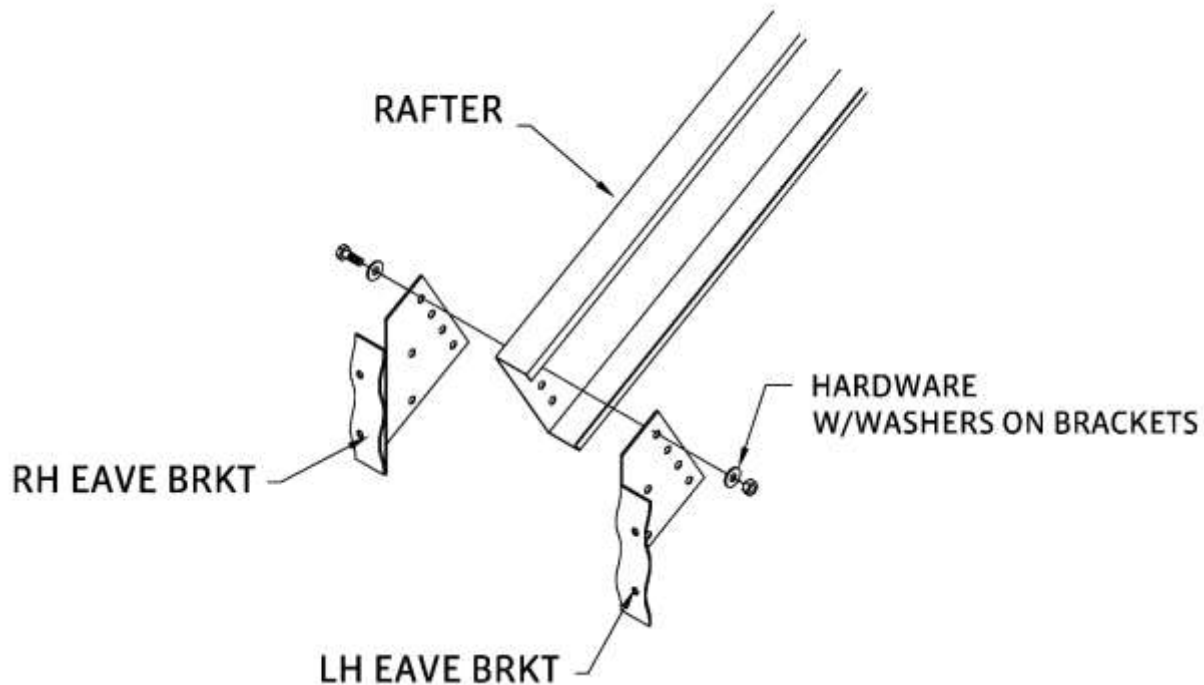
Located at the eave, looking upward towards the peak, verify the position of the ring segment on the clip is correct according to its position on the rafter. Verify the correct bolt size is used in the ring segments.



Attach the x-brace clips to the rafters using 1/2"x1-1/2" (1.27x3.81cm) bolts. Attach the x-braces to the clips using 1/2"x2" (1.27x5.08cm) bolts and 3/4" (1.90cm) washers. The washers are required on the x-brace clip slot. Attach the center of the x-braces together using a spacer located between the x-braces and a 3/4"x2" (1.90x5.08cm) bolt.



Attach the left hand and right hand eave brackets to the lower part of the rafter located at the bin eave. These eave brackets use 1/2"x1-1/2" (1.27x3.81cm) bolts. Hand tighten hardware only.

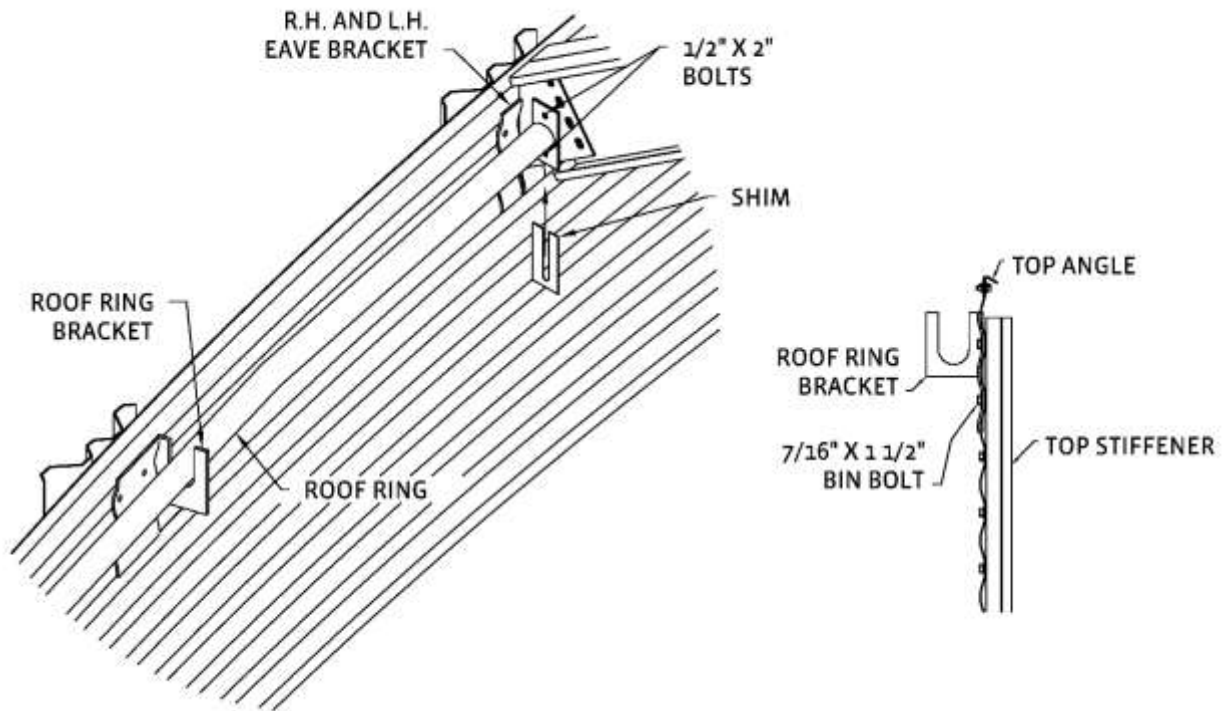


After all the A-frames are built, equally space and attach 4 frames to the peak ring and sidewall. Next attach a left hand and right hand eave bracket to the interior of the top sidewall sheet behind the 2 ring top stiffener using 7/16" x 1-1/2" (1.11x3.81cm) bin bolts with the bolt head located on the interior of the bin, as shown in the following illustration.

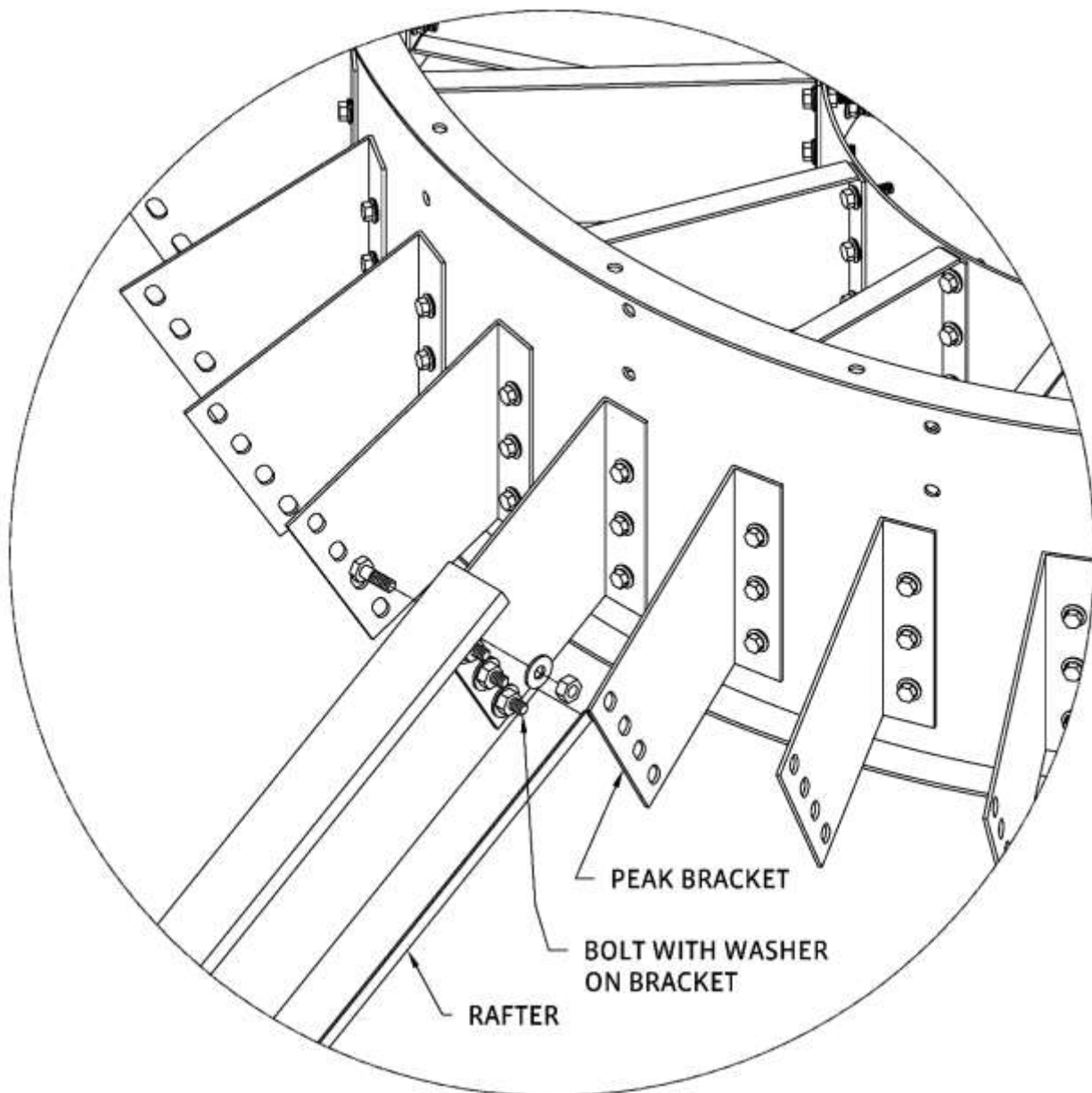
**Important Note:** 1 left hand and right hand eave bracket is required per sidewall sheet equally spaced around the bin. On 3 stiffened bins, the rafters will be located on 1 and 2 ring top stiffeners.

After the A-frame structure is assembled, attach the roof rings to the eave brackets between each rafter. Attach the roof rings using 1/2"x1-2" (1.27x5.08cm) bolts. Hand tighten hardware only at this time. Add shim plates between the roof ring end plates and eave brackets as required to ensure that roof rings remain tight against the rafter brackets.

**Important Note:** Verify the rafters are being held straight, adding additional shims as needed.

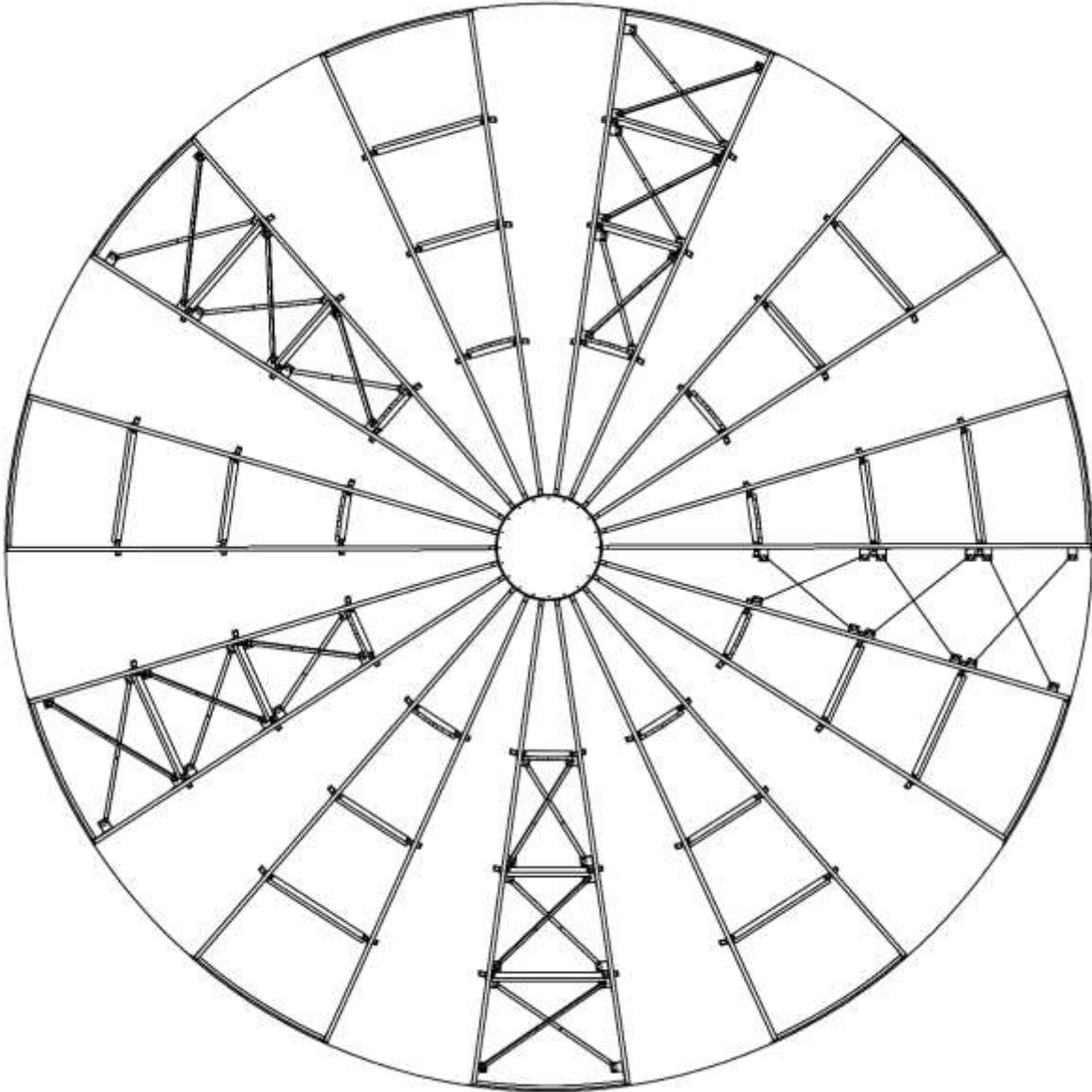


Attach the A-frame rafters to the peak brackets using 1/2"x1-1/2" (1.27x3.81cm) bolts with the washers located against brackets as shown in the following illustration.



Once the 4 initial A-frames are installed verify that the peak ring is level, then continue installing the remaining A-frame rafter bays.

After all the A-frame bays are completely installed verify that the structure is identical to the following illustration.

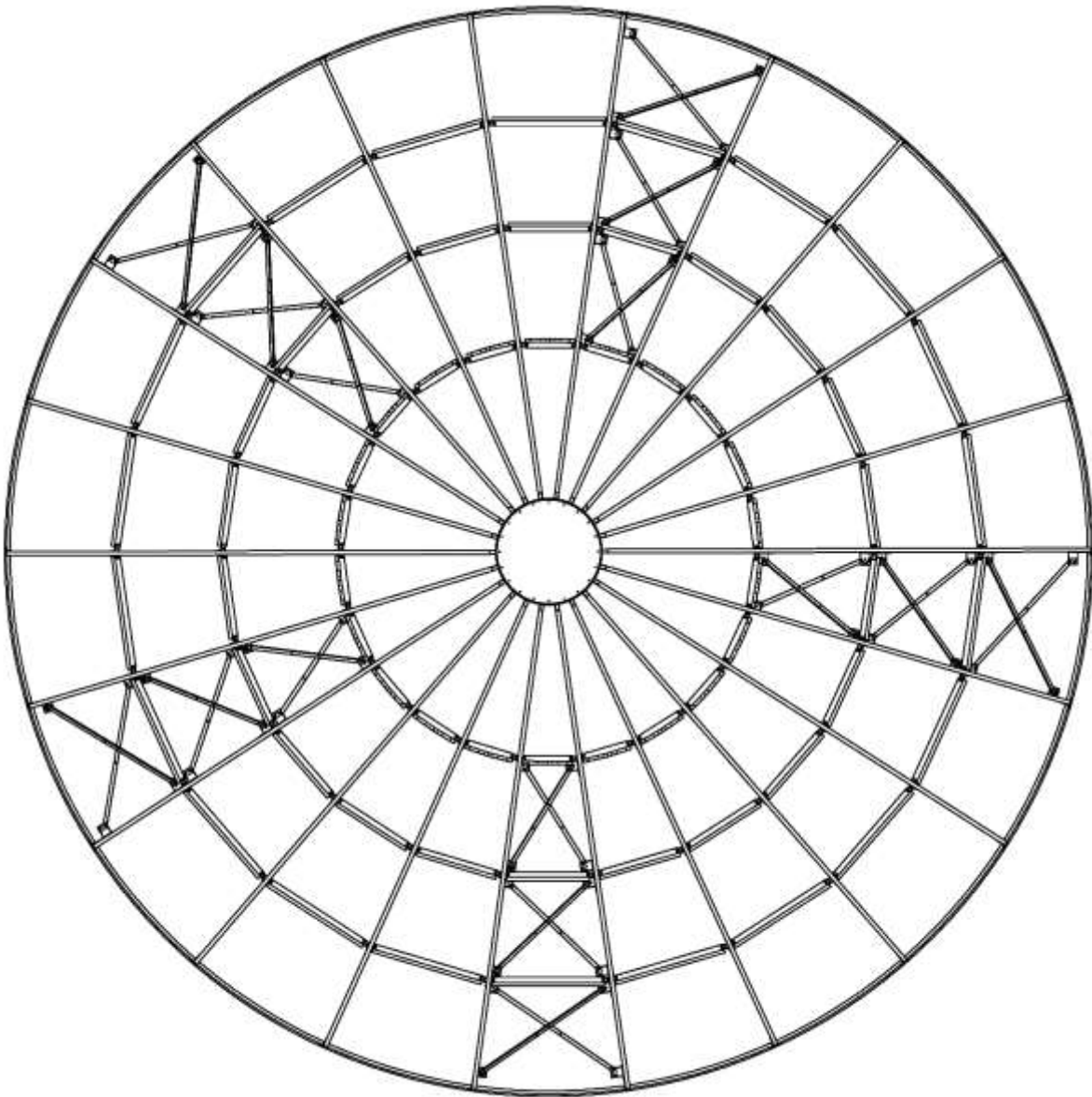




Next, after all the A-frame rafter bays are installed, begin installing the remaining ring segments and bracing.

**Important Note:** Leave bolts loose until the remaining structure is installed, and then proceed to tighten all remaining hardware.

Once completed verify the roof structure is identical to the following illustration.



## Roof Panel Installation

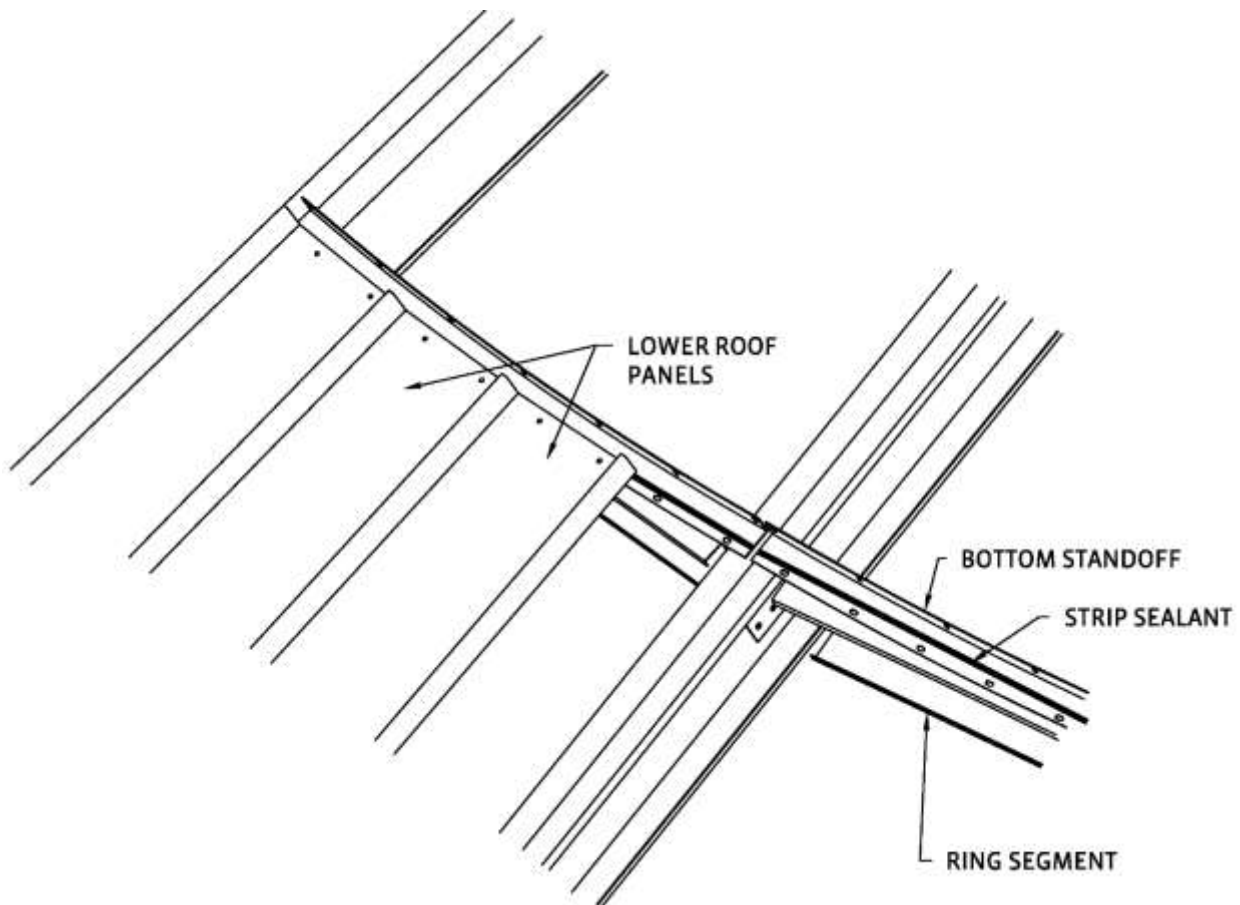
The CB22 incorporates a split panel design. The roof panels will be installed with a separate lower and upper section.

**Important Note:** Roof panels will be shipped using 2 different coded bundles. Verify that when installing, panels are used from alternating bundles to assist with ease of assembly.

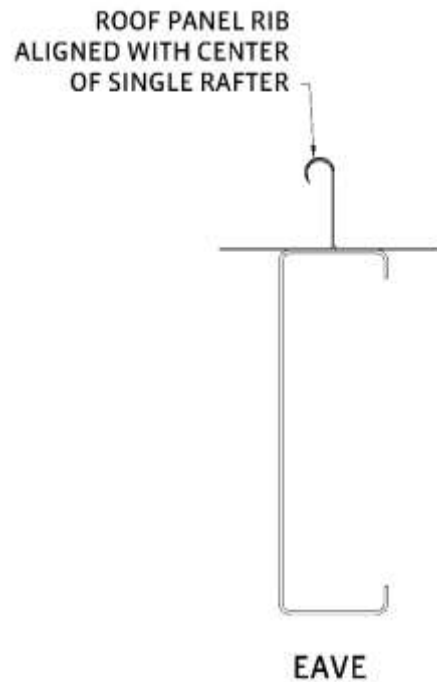
## Lower Roof Panel Installation

Locate the top side of the middle ring segment and install the bottom standoff angle in the center of this ring segment. Place sealant on the standoff angle where the lower roof panels will be attached. Roof panels will be installed with 5/16" x 1-1/4" (.79x3.17cm) sealing head bin bolts with the bolt heads located on the exterior of the bin roof panel.

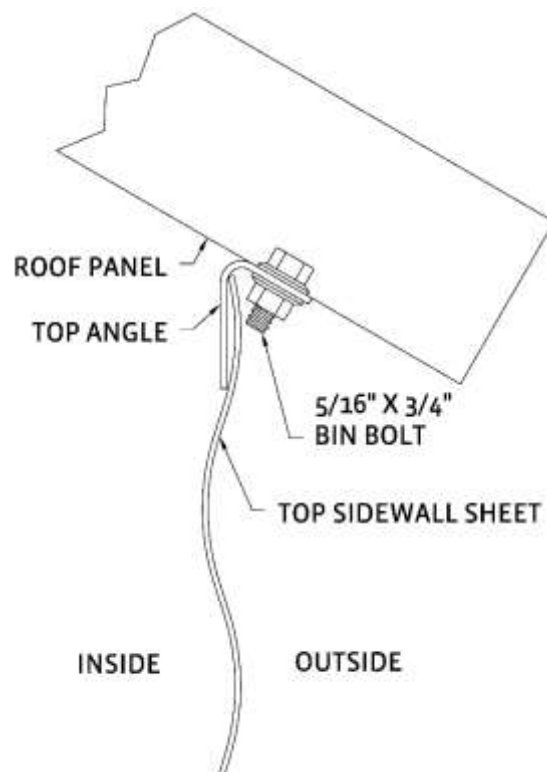
Attach the upper end of the lower roof panel to the bottom standoff angle and ring segment as shown in the following illustration. At the sidewall location bolt the wide end of the lower roof panel to the top angle.



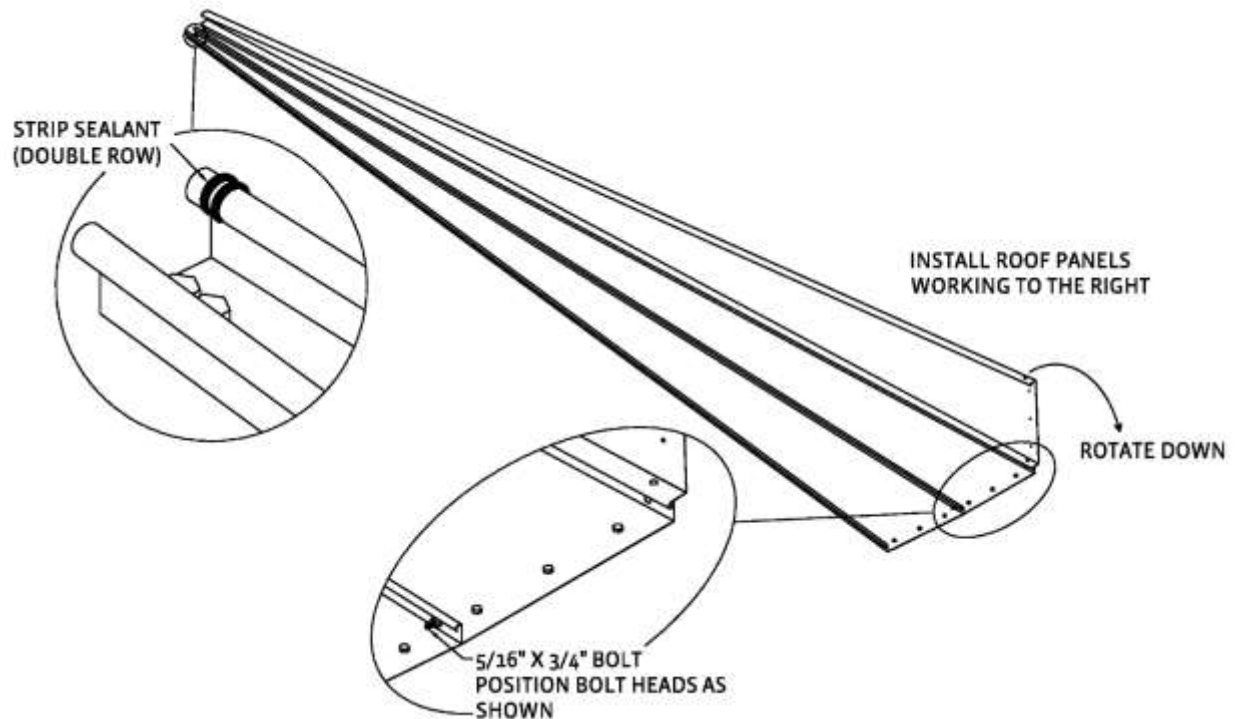
**Important Note:** Verify that the roof panel rib is aligned with the rafter centerline.



As each roof panel is set into place, insert an alignment punch through the hole in the rib at the bottom of each roof panel. Temporarily clamp the two roof panels together with vise grips so that the punch can be removed. Insert a 5/16" x 3/4" (.79x1.90cm) bolt and only hand tighten the hardware at this time.



Install roof panels in a counter clockwise direction, always working to the right around the bin. Place sealant on the top right rib of the previously installed roof panel. Position the roof panel in a vertical position and lock the left rib of the current panel over the right rib of the previously installed panel. Slowly rotate the roof panel down.

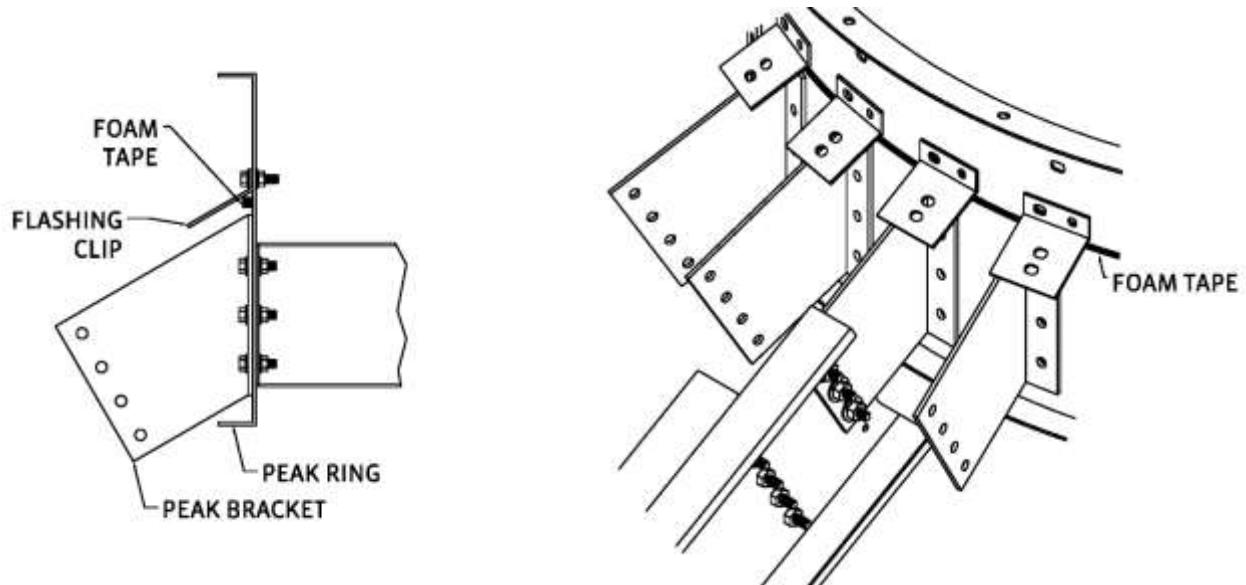


Continue the installation of the remaining roof panels as described previously. Align roof panel holes and tighten hardware as described previously. When the last roof panel is placed, it will have to be interlocked by using a rubber mallet. Starting at the top and working down the length of the panel, tap the vertical rib until it is locked to the other panel.

**Important Note:** Any additional manhole access panels should be placed evenly around the bin when installing the roof panels.

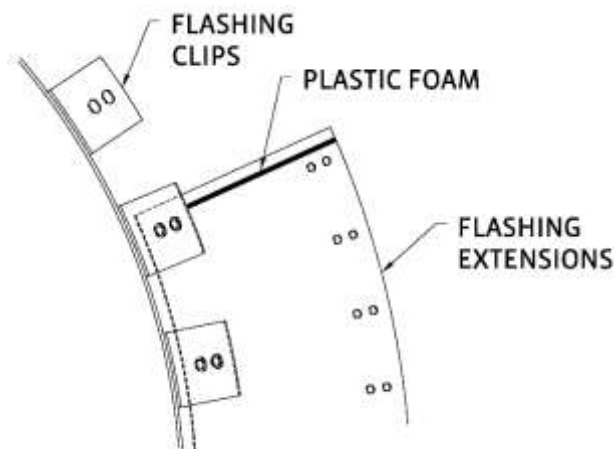
## Upper Roof Panel Installation

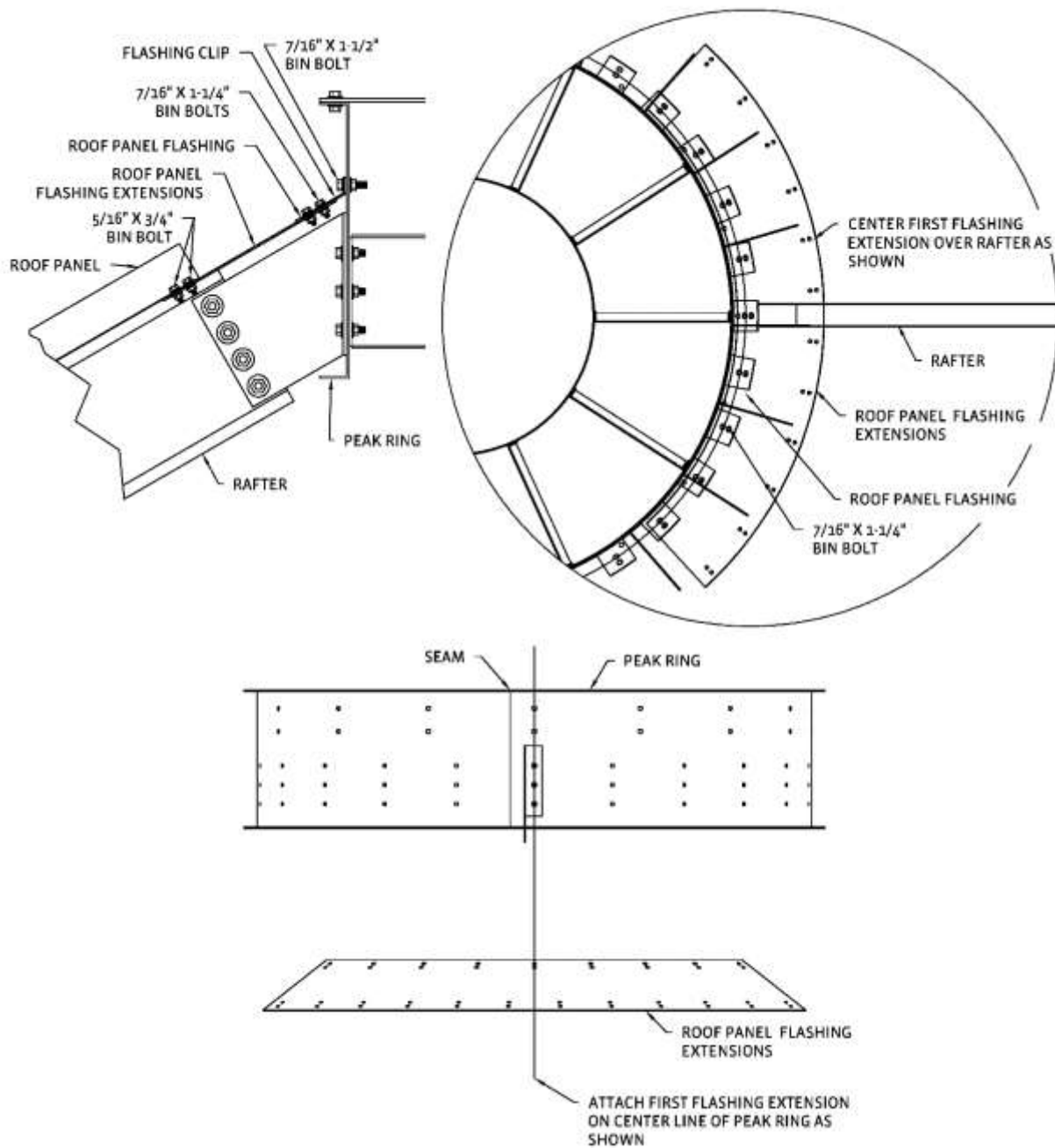
Locate the peak flashing clips and attach these to the peak ring with 7/16" x 1-1/4" (1.11x3.17cm) bin bolts. Place foam tape around the complete perimeter of the peak ring underneath the flashing clips.



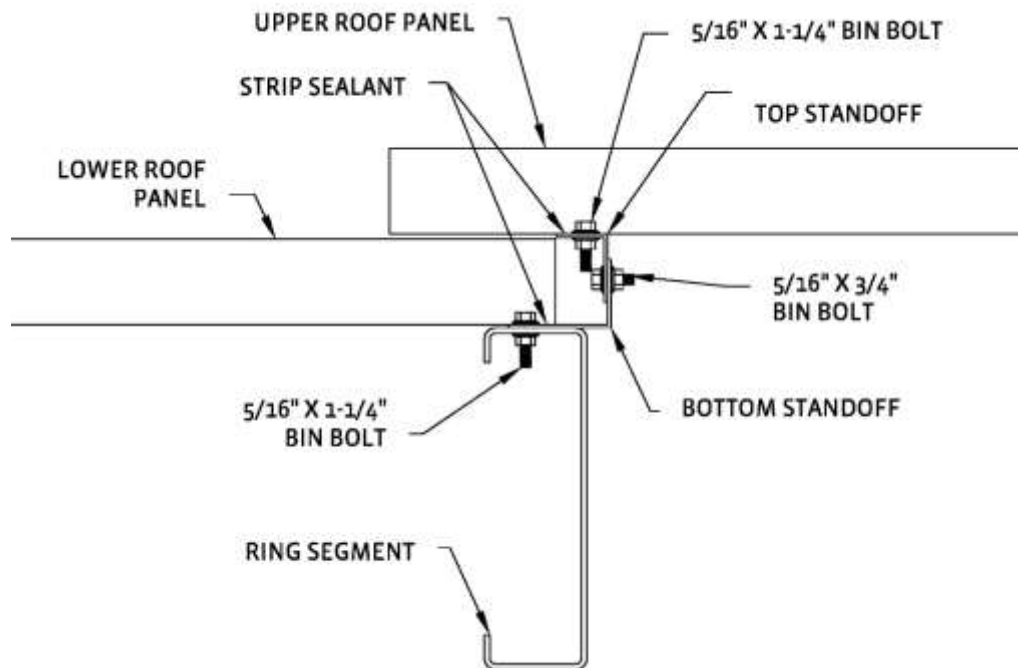
Install the roof panel flashing extensions as shown in the following illustrations. These extensions are installed in a clockwise pattern around the peak with 7/16" x 1-1/4" (1.11x3.17cm) bin bolts. The first flashing extension must be centered on the roof rafter and the flashing clip on the peak ring.

**Important Note:** Flashing extensions must be oriented properly as shown in the following illustrations to correctly align roof panels. Foam sealant is required on the edge of the flashing extension to create a watertight seal between components.

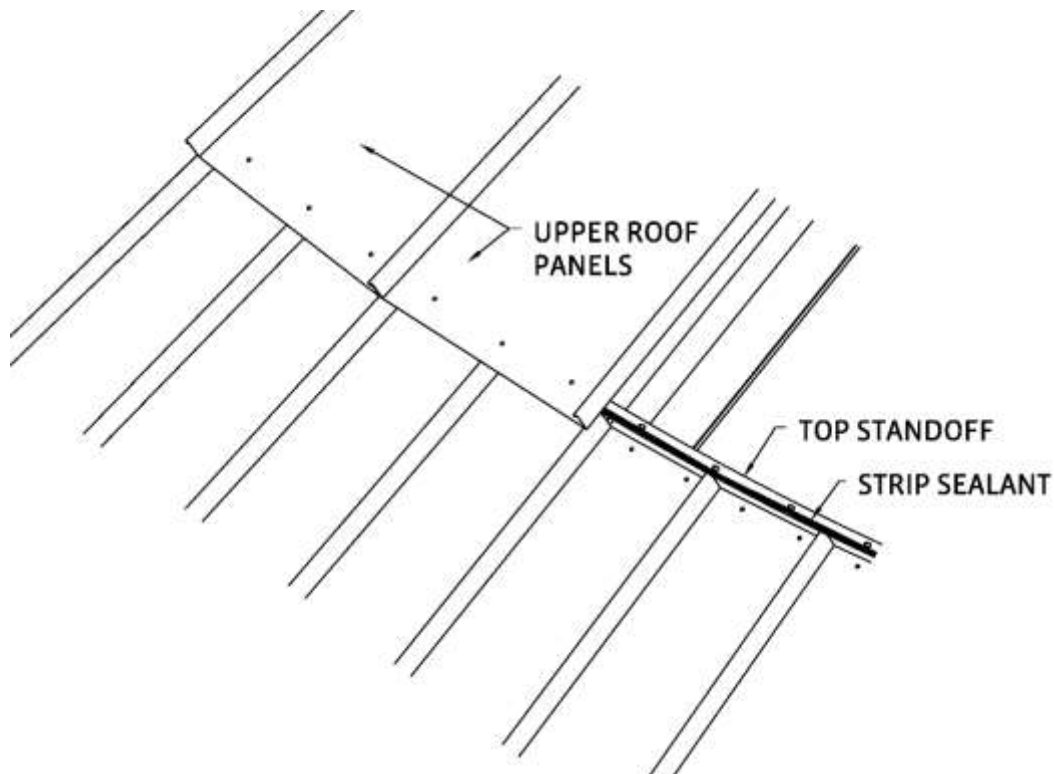




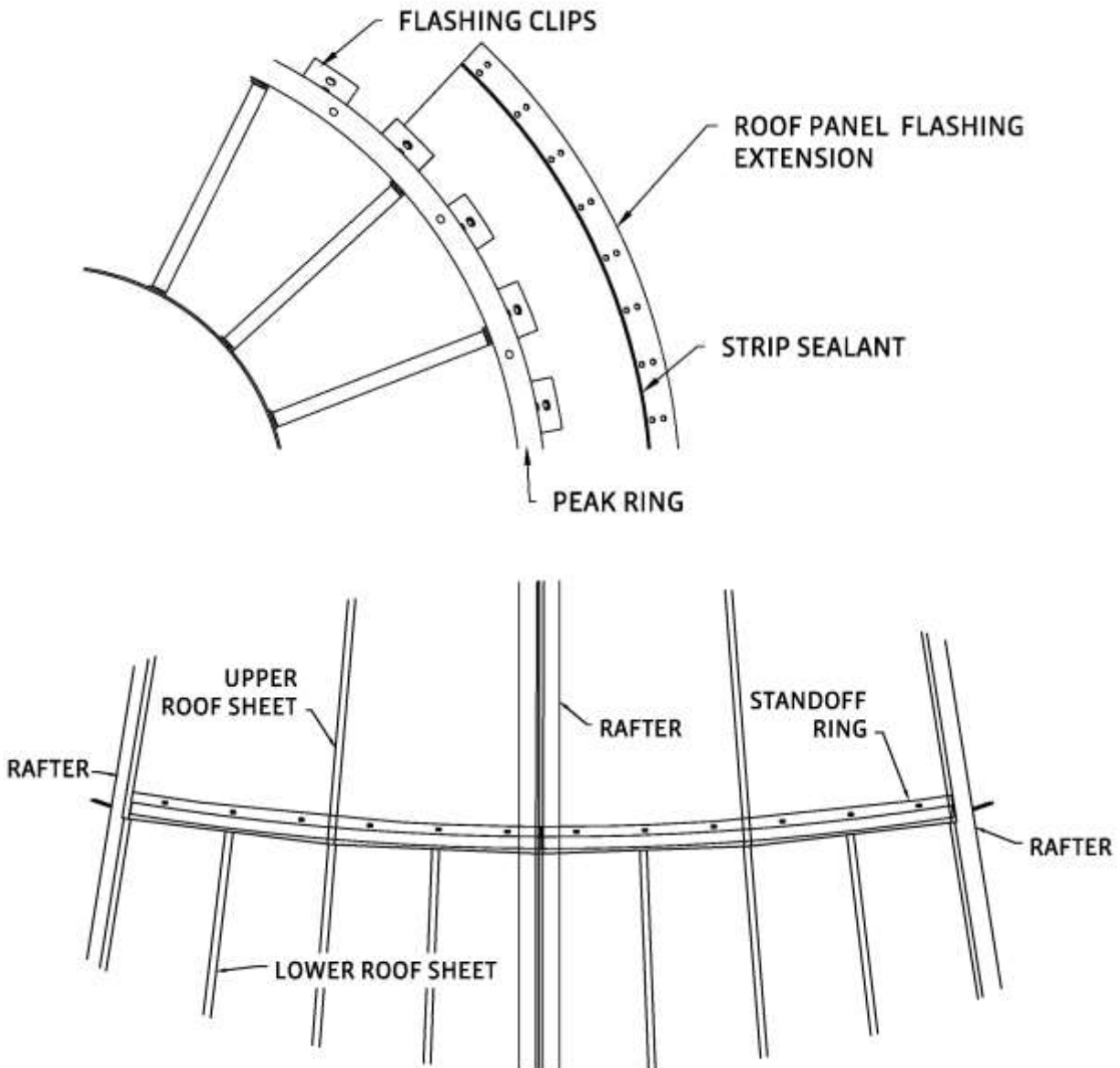
At the ring segment where the lower roof panel is installed locate the bottom standoff angle that was previously installed. Install the top standoff angle to inside of the bottom standoff angle and attach angles together with 5/16" x 3/4" (.79x1.90cm) bin bolts as shown in the following illustration.



Place sealant on the top side of the top standoff angle where upper roof panels will be attached.

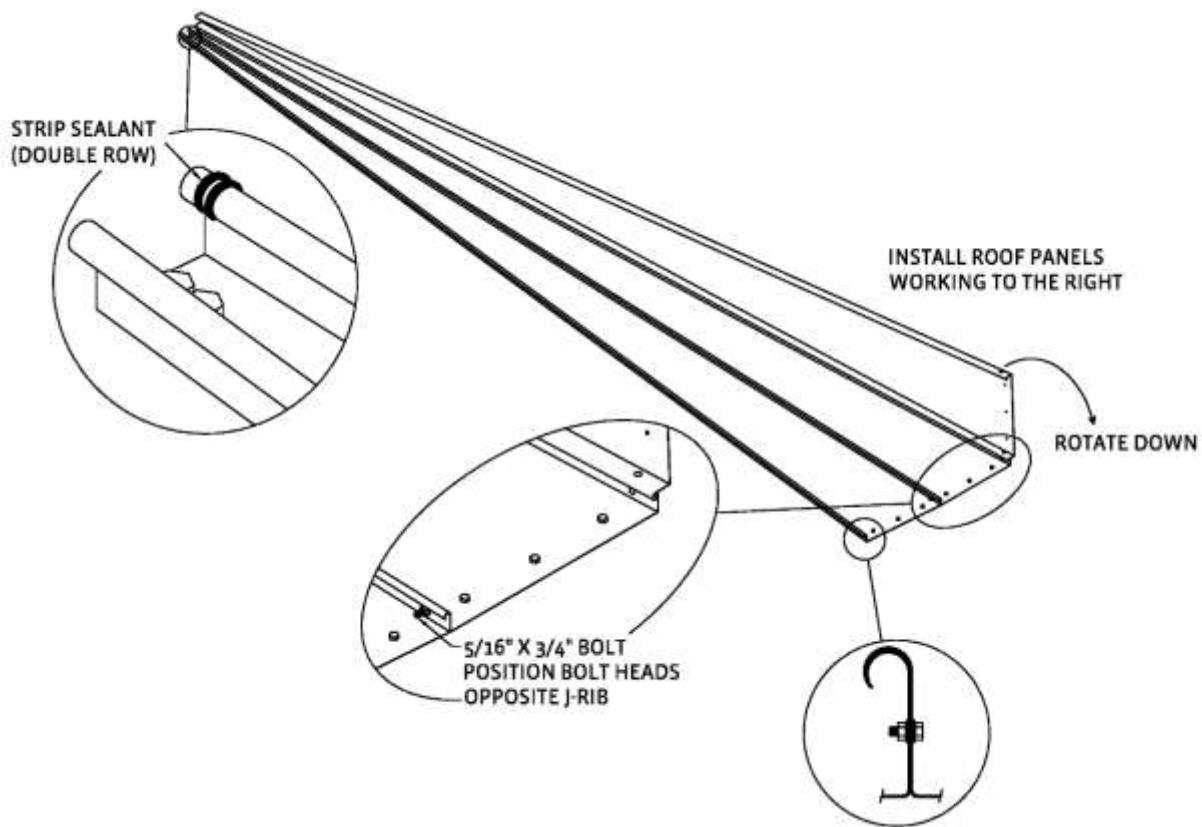


Place sealant on the roof panel flashing extensions where the top end of the upper roof panel will contact the flashing. Attach the top end of the roof panel with 5/16" x 3/4" (.79x1.90cm) bin bolts with the bolt heads located on the exterior of the bin roof panel. Verify that the upper roof panel rib is aligned with the center of the roof rafter.





Install roof panels in a counter clockwise direction, always working to the right around the bin. Place sealant on the top right rib of the previously installed roof panel. Position the roof panel in a vertical position and lock the left rib of the current panel over the right rib of the previously installed panel. Slowly rotate the roof panel down.

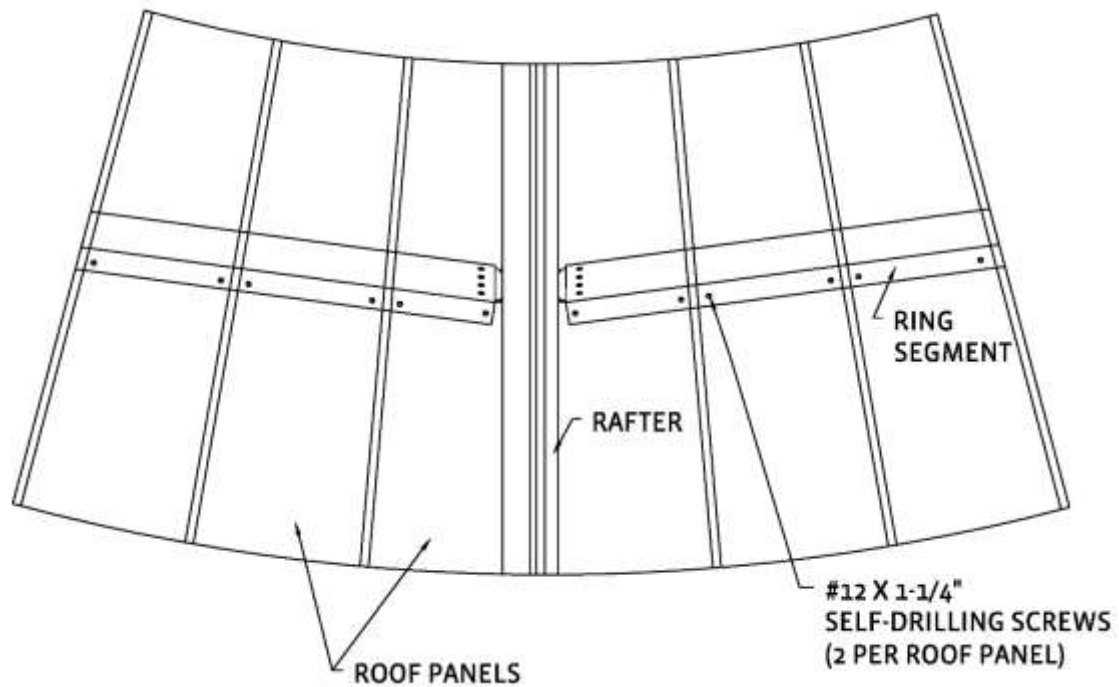


As each roof panel is set into place, insert an alignment punch through the hole in the rib at the bottom of each roof panel. Temporarily clamp the two roof panels together with vise grips so that the punch can be removed. Insert a 5/16" x 3/4" (.79x1.90cm) bolt and only hand tighten the hardware at this time.

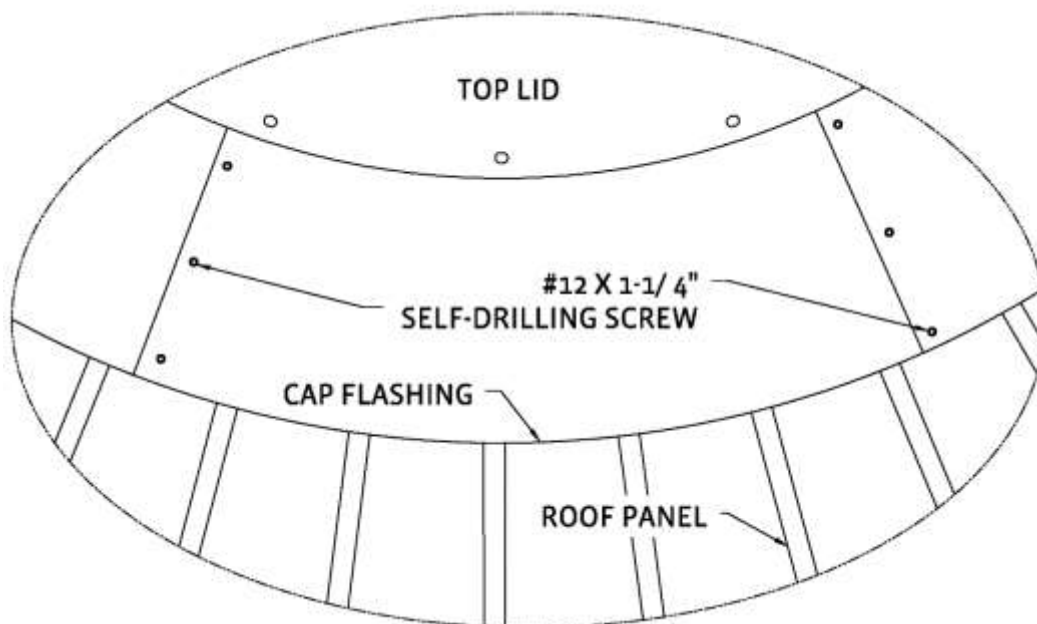
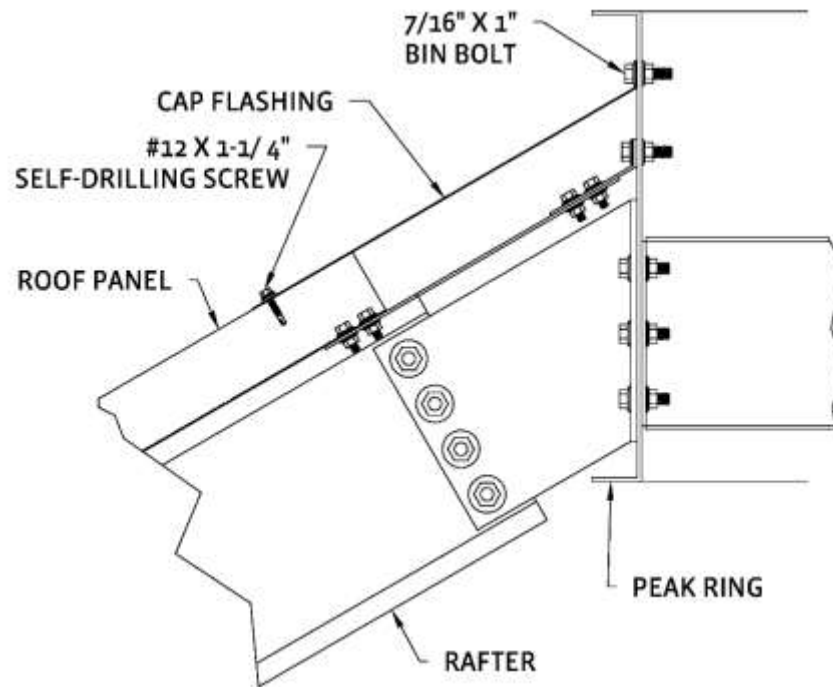
Continue the installation of the remaining roof panels as described previously. When the last roof panel is placed, it will have to be interlocked by using a rubber mallet. Starting at the top and working down the length of the panel, tap the vertical rib until it is locked to the other panel. Align roof panel holes and tighten hardware as described previously.

Attach each upper and lower roof panel to the ring segments using (2) #12 x 1" self-drilling screws per roof panel as shown.

**Important Note:** Self drilling screws are required only in the middle and lower ring segments.



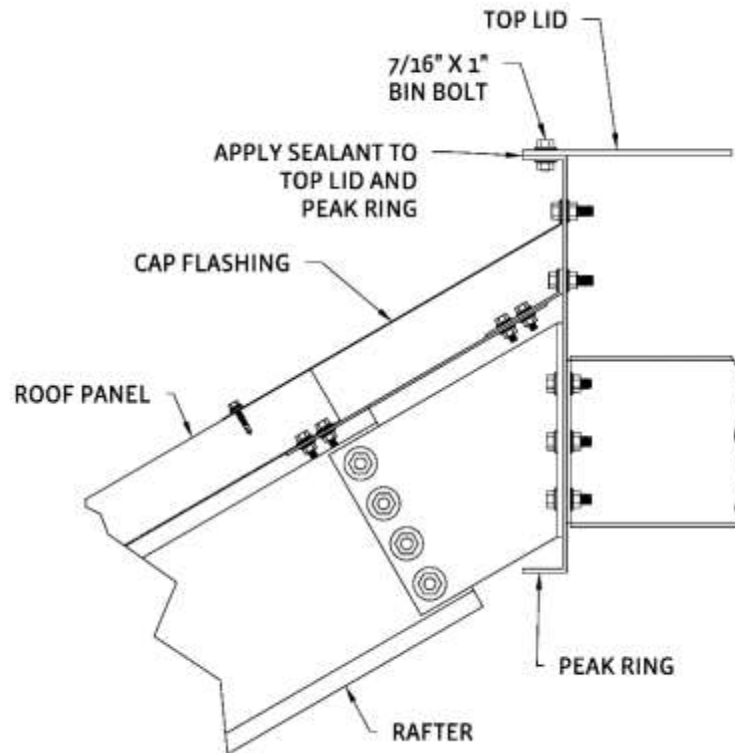
Install the cap flashing pieces to the peak ring with 7/16" x 1" (1.11x2.54cm) bin bolts. After the cap flashing pieces are attached to the peak ring, secure the cap flashing overlaps together with #12 x 1-1/4" self-drilling screws.



## Accessory Installation

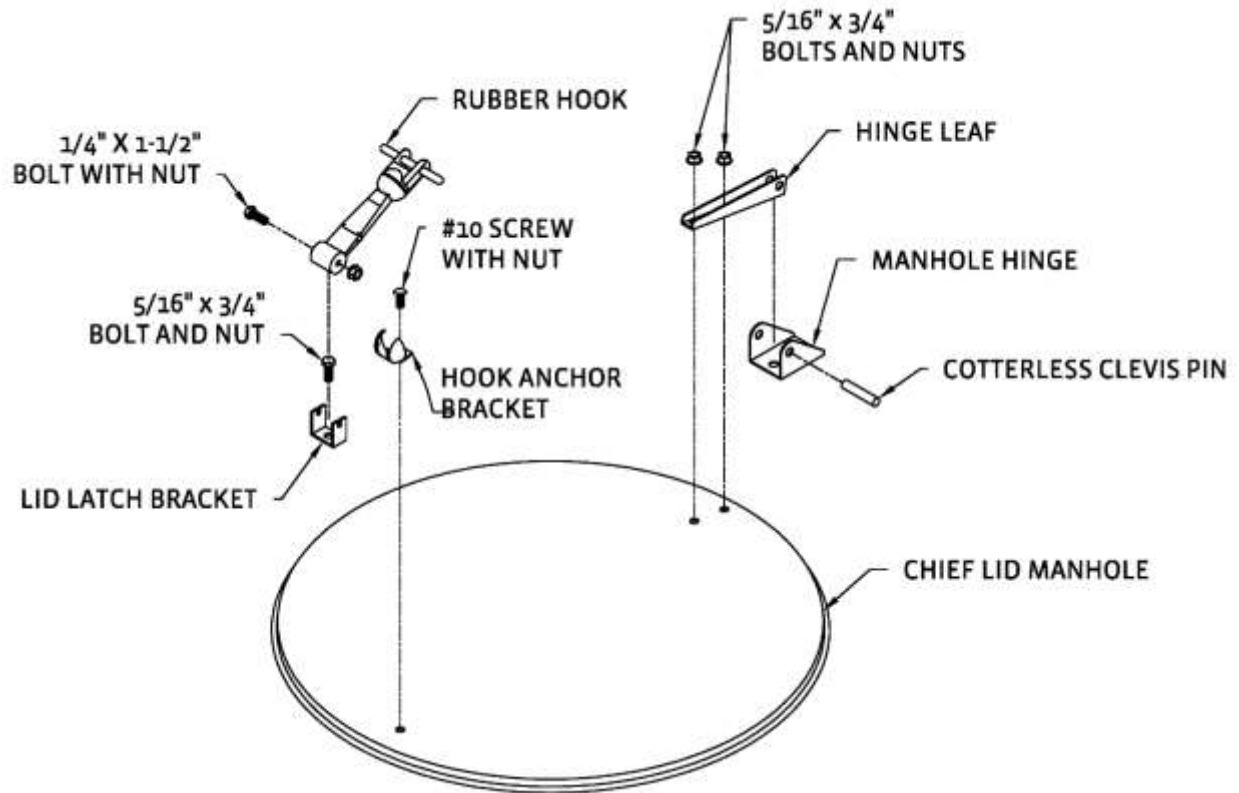
### Roof Peak Lid

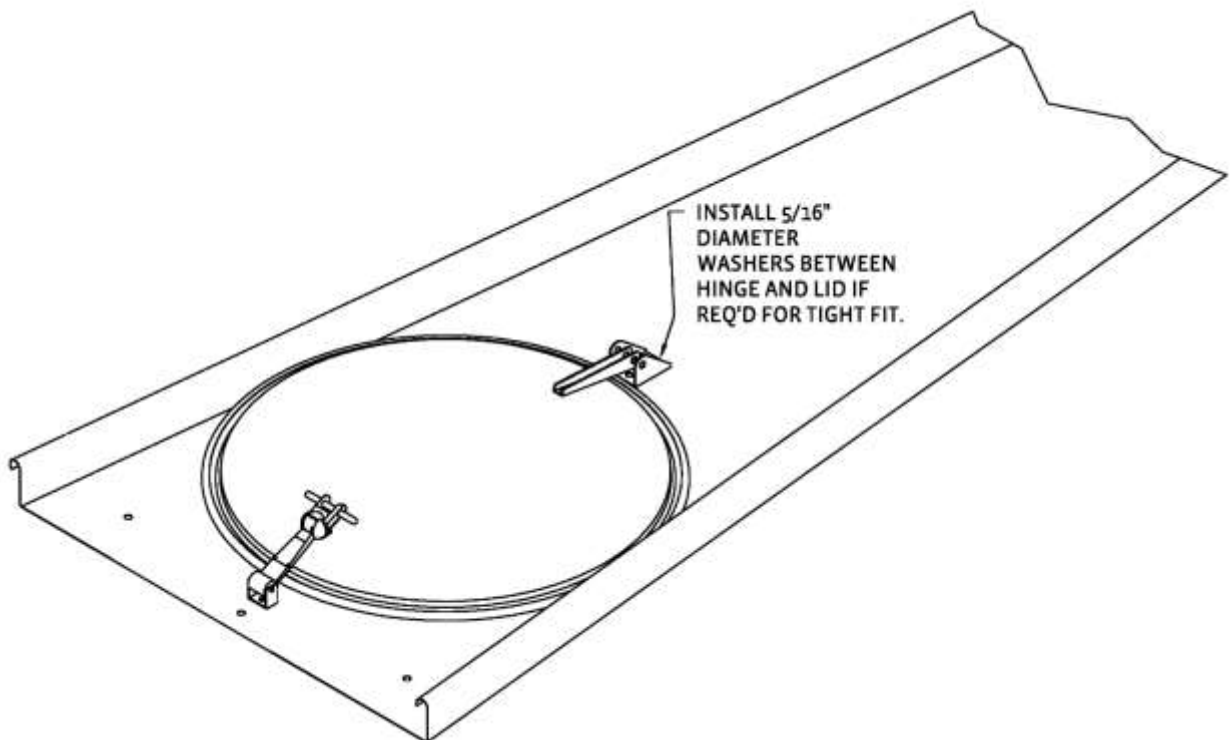
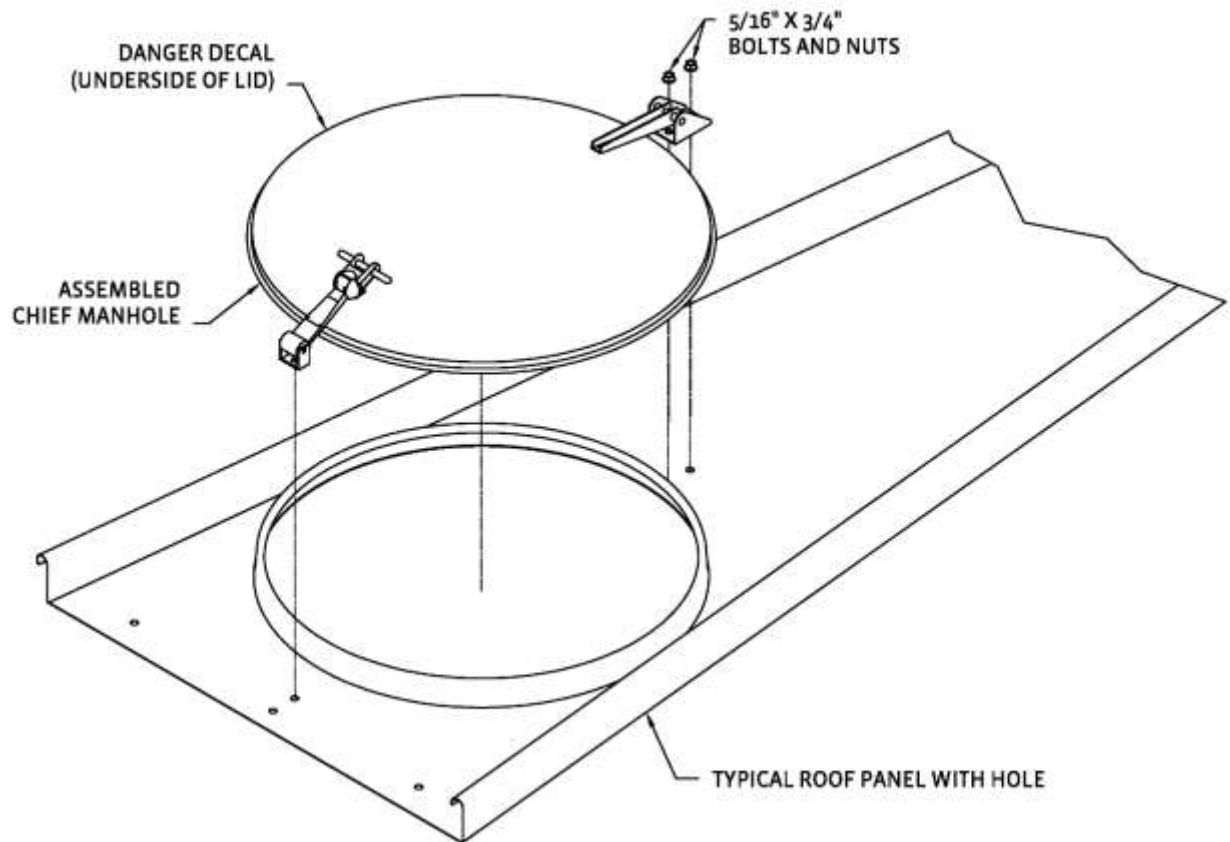
Install the roof peak top lid by first applying sealant to the peak ring. Next secure the top lid with 7/16" x 1" (1.11x2.54cm) bin bolts as shown in the following illustration. Bolt heads will be to the top surface of the bin lid.



## Manhole Cover

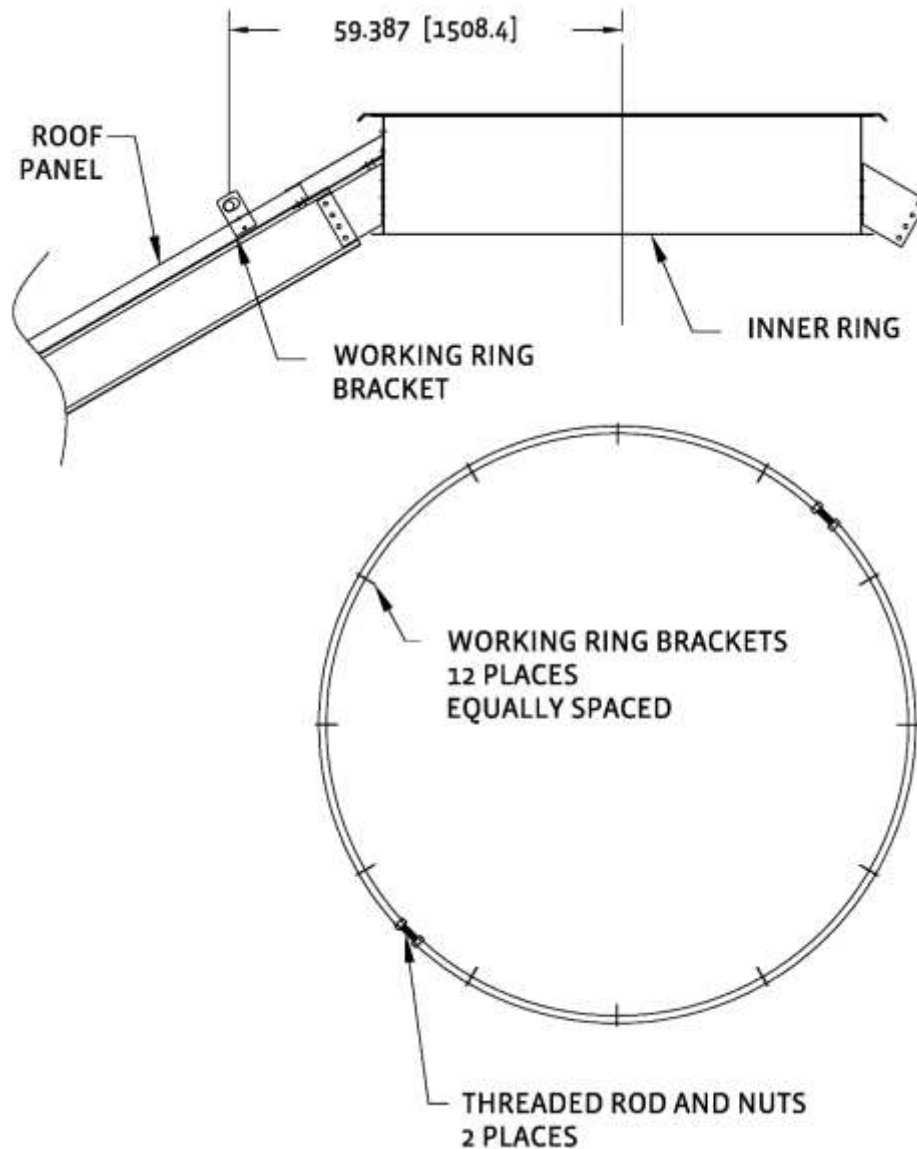
Install the manhole cover as shown in the following illustrations. Verify that the hinge is located towards the bin peak. Secure the manhole cover with 5/16" x 3/4" (.79x1.90cm) bin bolts. The bolts connecting the hinge to the roof panel and the leaf bracket to the manhole cover will have the bolts heads located on the interior of the bin.





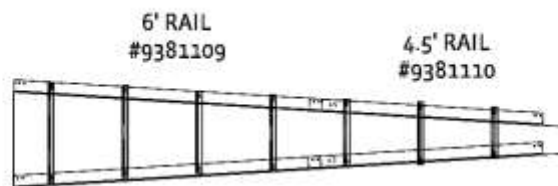
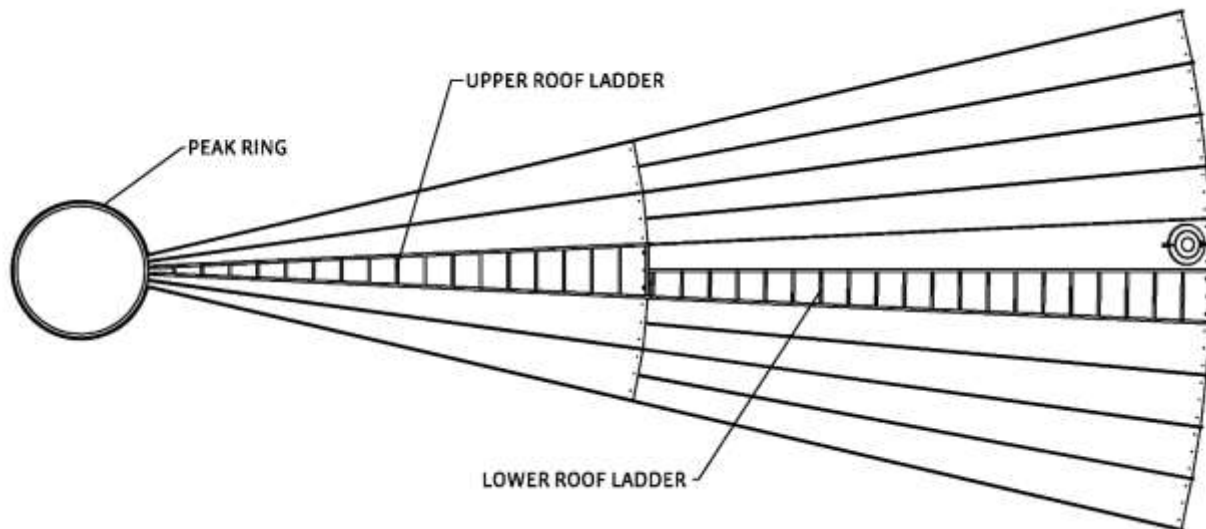
## Roof Working Ring

Install the working ring as shown in the following illustration. Verify that the working ring brackets are equally spaced around the ring. The working ring segments will be connected with threaded rod and nuts, and must be expanded as needed to allow the ring to fit tightly against the brackets. Secure the working ring brackets with 5/16" x 3/4" (.79x1.90cm) bin bolts.

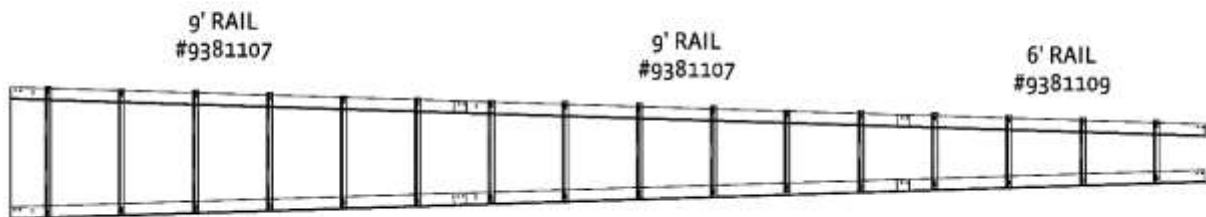


## Roof Ladder

Install the roof ladder as shown in the following illustration. The roof ladder will be located adjacent to the manhole and roof rafter. Verify that quantities of specific length components are located correctly on the roof.

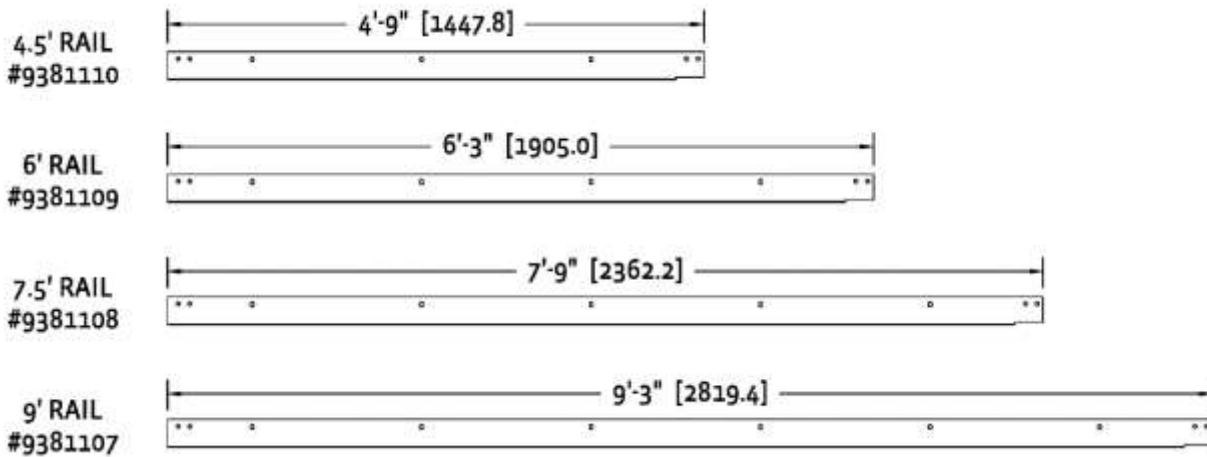


**CB22 UPPER 30DEG**

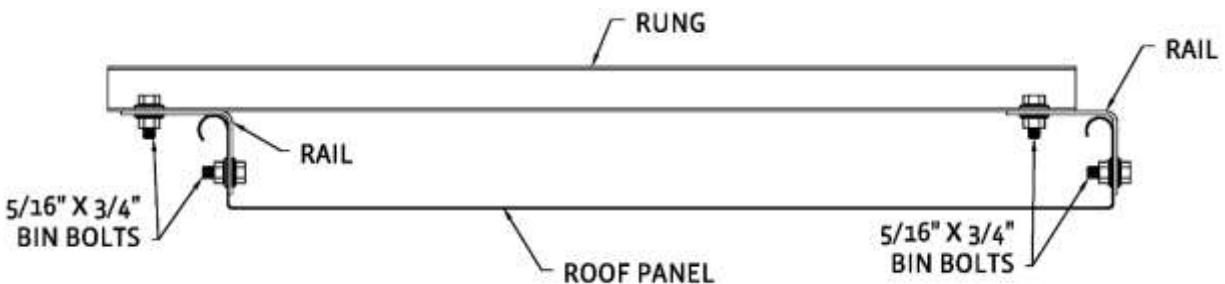


**CB22 LOWER 30DEG**

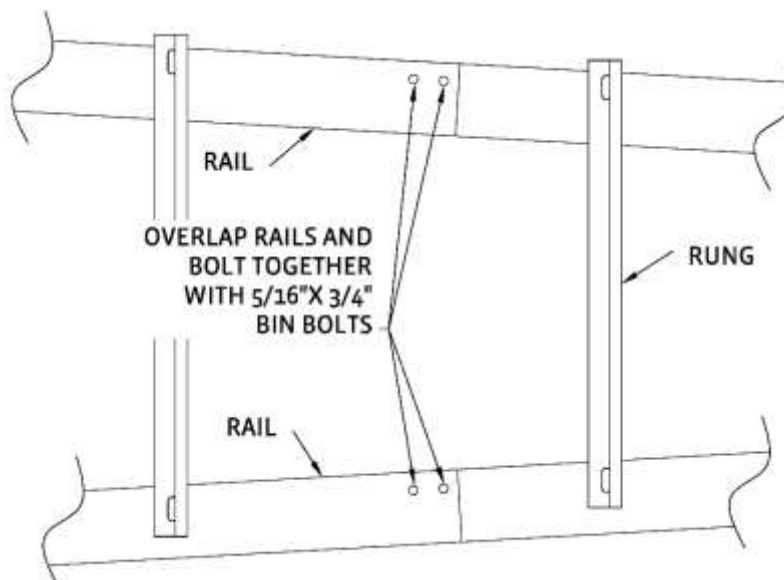




Attach the roof ladder rails to the roof panels by field drilling holes into the vertical rib of the roof panel. Secure the working ring brackets with 5/16" x 3/4" (.79x1.90cm) bin bolts. Roof ladder rungs will then be attached to the roof ladder rails and secured with 5/16" x 3/4" (.79x1.90cm) bin bolts.



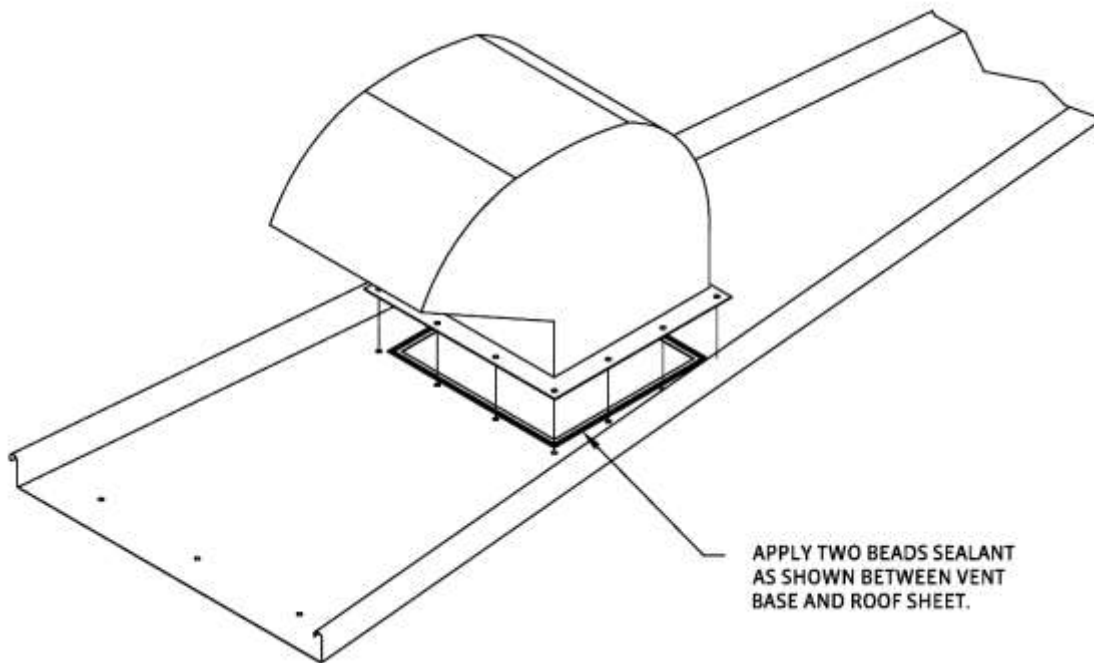
Working up from the roof eave to the roof peak, the rails will need to be overlapped when transitioning from 1 section of rails to the next. Overlap these rails as shown in the following illustration and secure the rails with 5/16" x 3/4" (.79x1.90cm) bin bolts.



## Gooseneck Vents

Gooseneck vents are attached to pre-punched roof panels to provide proper airflow for aeration systems. Prior to installation of hardware apply sealant to the perimeter of the pre-punched opening between the roof panel and the vent base. Secure the vent to the roof panel with 5/16" x 3/4" (.79x1.90cm) bin bolts.

**Important Note:** Do not weld vents to the roof panels.

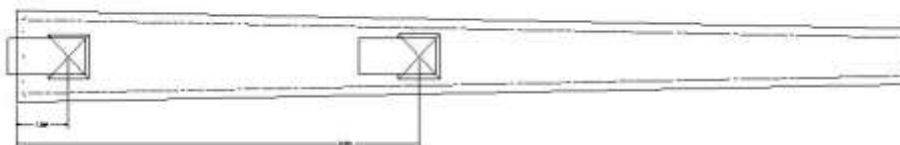


The pre punched roof panels may be located in 3 separate locations and are required to be equally spaced around the bin during the roof installation. In addition to being equally spaced, the vents must be staggered correctly in 3 locations.

33% of the total vents are located in the standard upper panel location as shown in the following illustration.



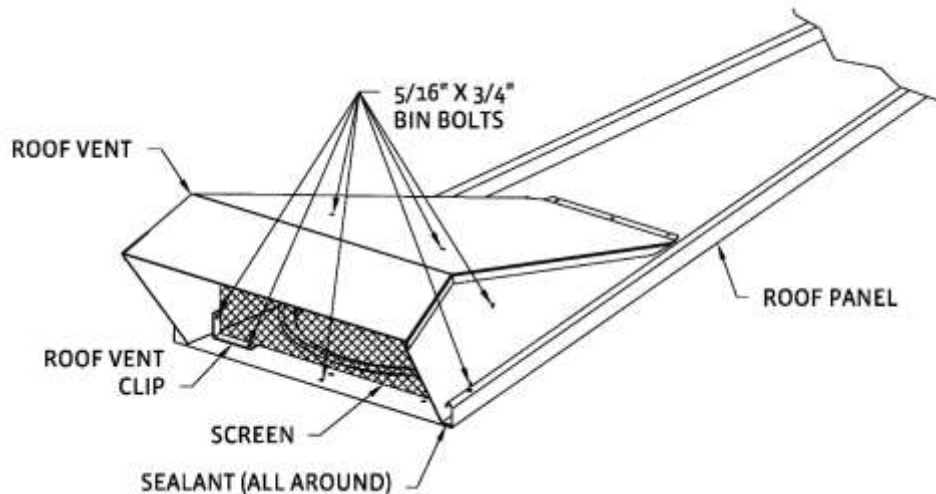
33% of the total vents are located in the low location of the lower panel, and 33% of the total vents are located in the high position of the lower panel as shown in the following illustration.



## Low Profile Vents

Low profile vents are attached to pre-punched manway roof panels to provide proper airflow for aeration systems.

Install the screen and clips on the roof vent body using 5/16" x 3/4" (.79x1.90cm) bin bolts, nuts and flat washers as shown below. The bolt heads should be located on the exterior of the vent with the washers and nuts on the inside against the screen.



Locate the roof vent assembly on the roof panel (over the manhole) by aligning the holes in the clips with the corresponding holes in the lower end of the roof panel. Mark the outline of the roof vent with a marking pencil so that the vent can be returned to the same position after the caulking is applied.

Remove the vent from the roof panel, turn upside down, and apply sealant to the mounting surface of the sides and top. At this time, locate the roof vent in its original position and secure the vent using 5/16" x 3/4" (.79x1.90cm) bin bolts in the holes directly above and below the manhole.

Next install the #14 x 3/4" self-drilling screws use the holes in the vent as a guide. Alternatively, 3/8" (.95cm) holes can be drilled through the vent and roof panel to attach the vent with 5/16" x 3/4" (.79x1.90cm) bin bolts.

Finally install 5/16" x 3/4" (.79x1.90cm) bin bolts in the clips and bottom of screen as shown in the previous illustration.

**Important Note:** Roofs with structural beams may require field installation of angles between beams at both top and bottom of the manhole opening if 20 PSF or 30 PSF live loading is required.

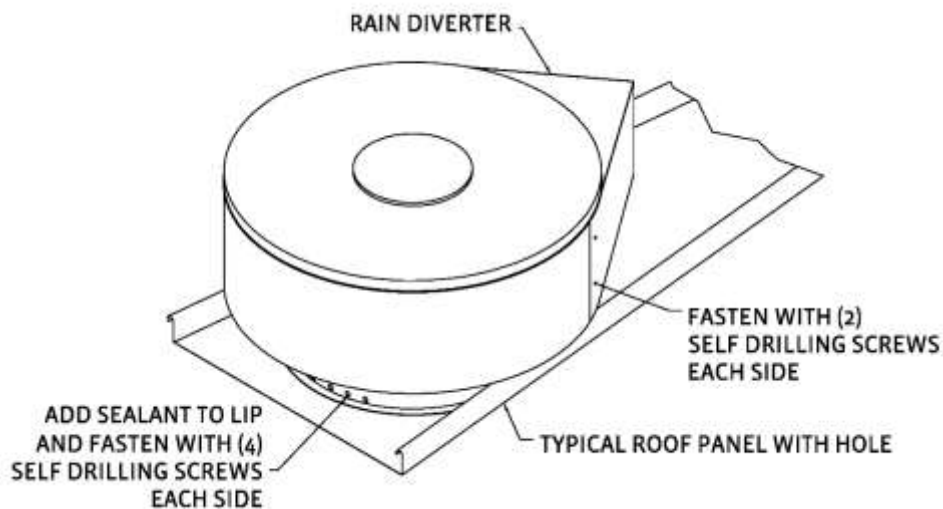
## Mushroom Vents

Mushroom vents are attached to pre-punched roof panels to provide proper airflow for aeration systems.

**Important Note:** Proper planning is required to locate the pre-punched roof panels correctly during the roof installation.

Locate the pre-punched roof panel and apply sealant on the base of the extruded lip where the vent base will be located. Place the vent over the extruded lip and fasten with (8) #12 x 1.25" self-drilling screws equally spaced around the perimeter of the base.

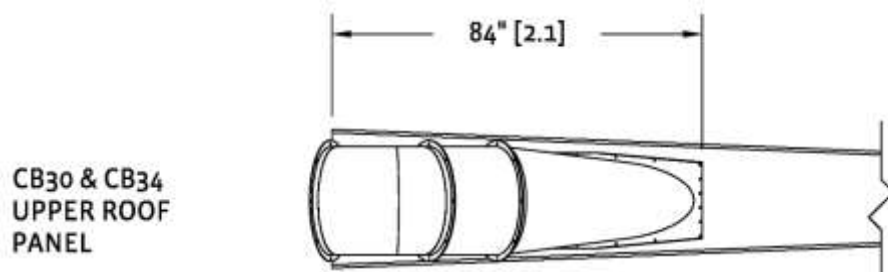
Next fasten the rain diverter on the top of the vent towards the roof peak. Verify that the rain diverter makes contact with the roof panel. Fasten the rain diverter with (2) #12 x 1.25" self-drilling screws per side.



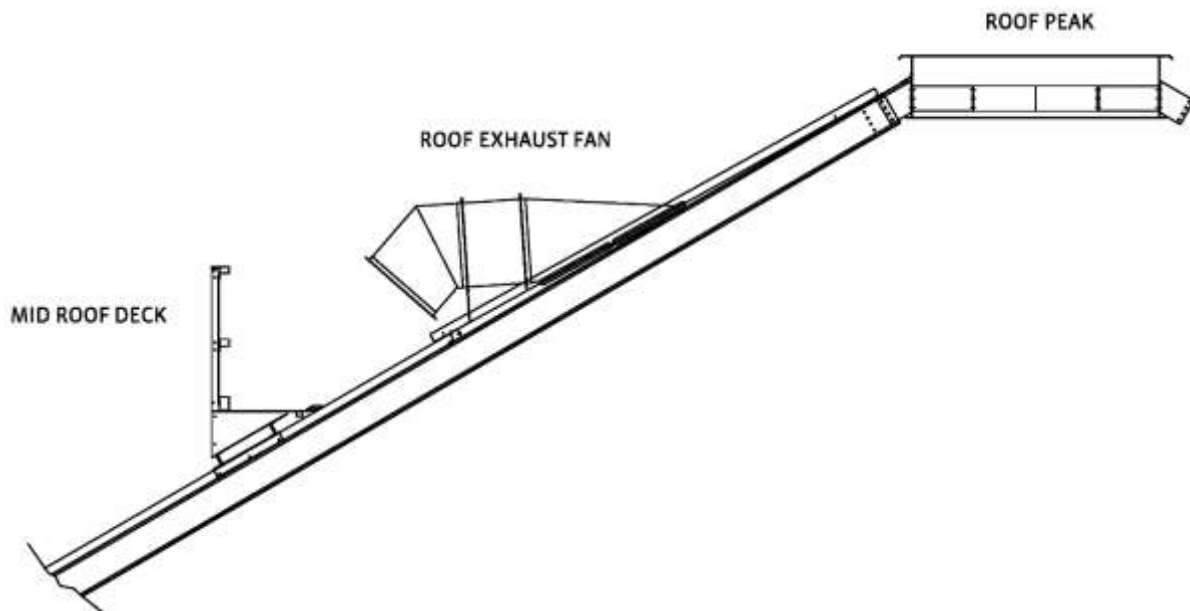
## Roof Fans

Roof fans can be attached to the upper roof panels to provide proper airflow for aeration systems. The following details are shown for location purposes only. Refer to the corresponding separate installation manual for roof exhaust fans and mid roof access deck provided with shipment.

**Important Note:** Proper planning is required to locate the pre-punched roof panels correctly during the roof installation.

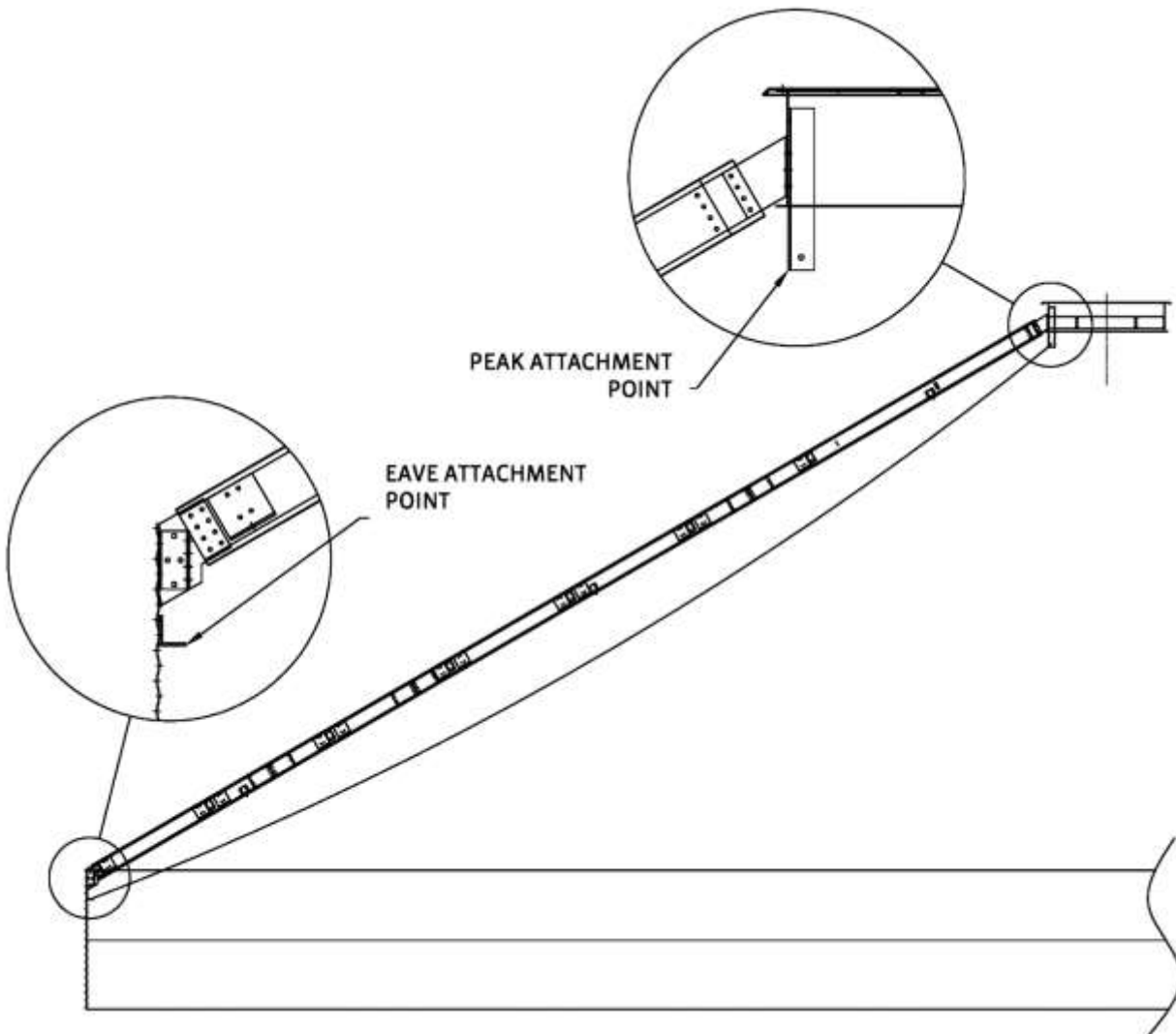


**NOTE:** DISTANCE SHOWN IS FROM BACK OF FAN TO BOTTOM OF UPPER ROOF SHEET. CB22, CB24 & CB26 BINS REQUIRE FAN TO BE INSTALLED ON 2 ROOF PANELS.



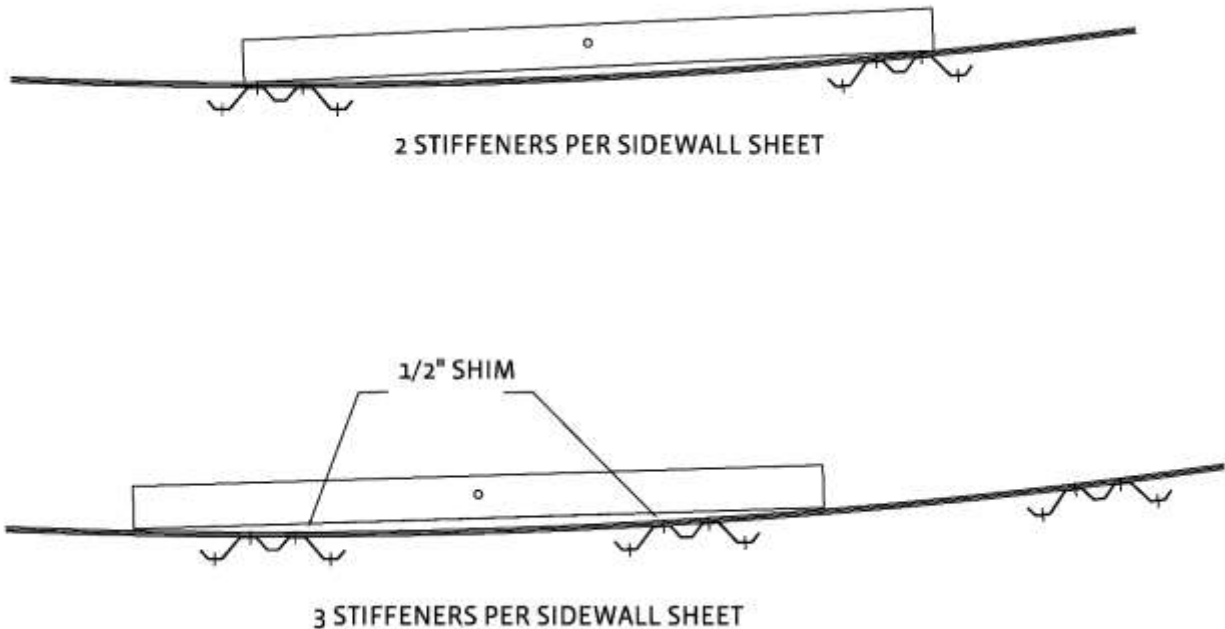
## Safety Tie-Off Access Packages

Tie off anchors are provided at 2 locations on the bin. 1 is located at the bin eave manhole location and 1 is located at the bin peak. Attach tie-off anchor locations to wall and peak ring as shown in the following illustrations. Holes will need field drilled for installation. Fasten the 4 x 4 x 3/8" angle with (8) 7/16" Grade 8 bolts.

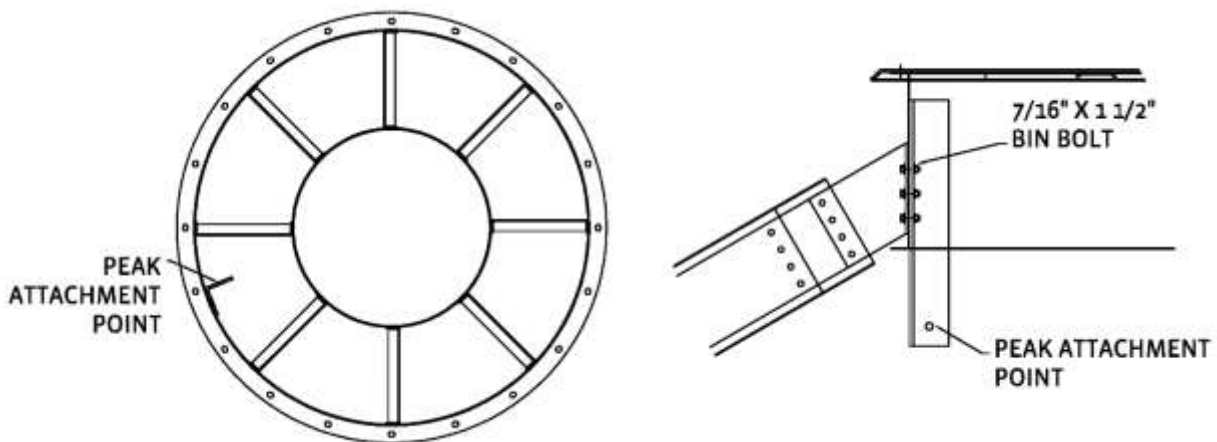


**Sidewall Tie-Off Location**

On 3 stiffened bins, place a 1/2" shim between angle and sidewall sheet. Attach the ends of the angle behind the sidewall stiffeners with (8) 7/16"x2" (1.11x5.08cm) grade 8 bolts. Holes will need field drilled for attachment.

**Peak Tie-Off Location**

Attach angle behind the peak ring with (3) 7/16"x1.5" (1.11x3.81cm) grade 8 bolts. Holes will need field drilled for attachment.



## Temperature Cable Packages

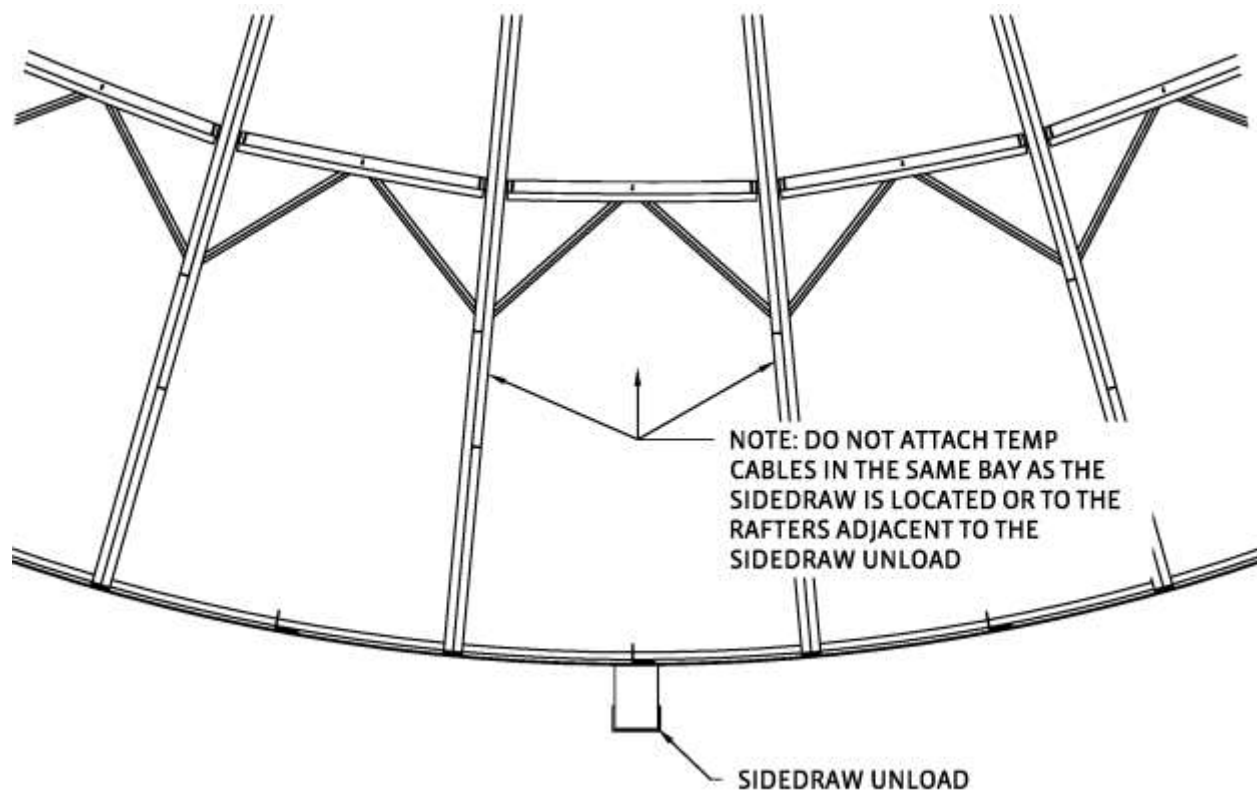
For all temperature cable packages follow the temperature cable manufacturer's recommendations and installation instructions. Provide adequate sealant where the temperature cable leads exit the bins.

Support of temperature cables by any means other than Chief Industries' recommended brackets may cause structural damage to the bin roof and will nullify the Chief grain bin warranty.

**Important Note:** Structured roofs are designed for a maximum load of 2,000 lbs (907kg) per temperature cable. If this load is exceeded, this may cause structural damage to the bin roof and will nullify the Chief grain bin warranty.

Bin Size	Number of Temperature Cable	Radius From Bin Centerline
CB22	4	8'-1" (246.38cm)
	8	26'-4" (802.64cm)
Total Cables:	12	

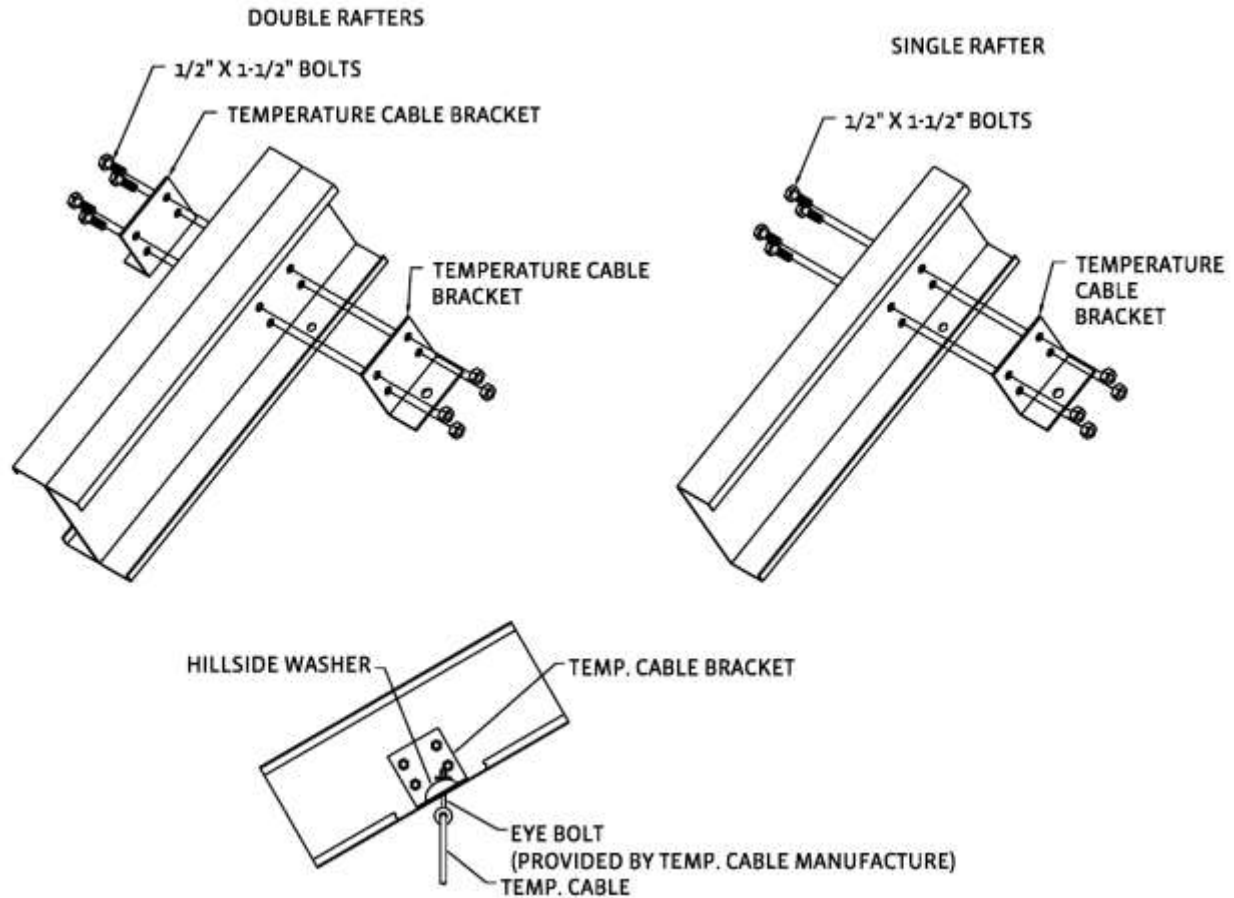
Do not attach temperature cables to roof rafters adjacent to a side draw unload system or in the same bay that a side draw unload system is located.





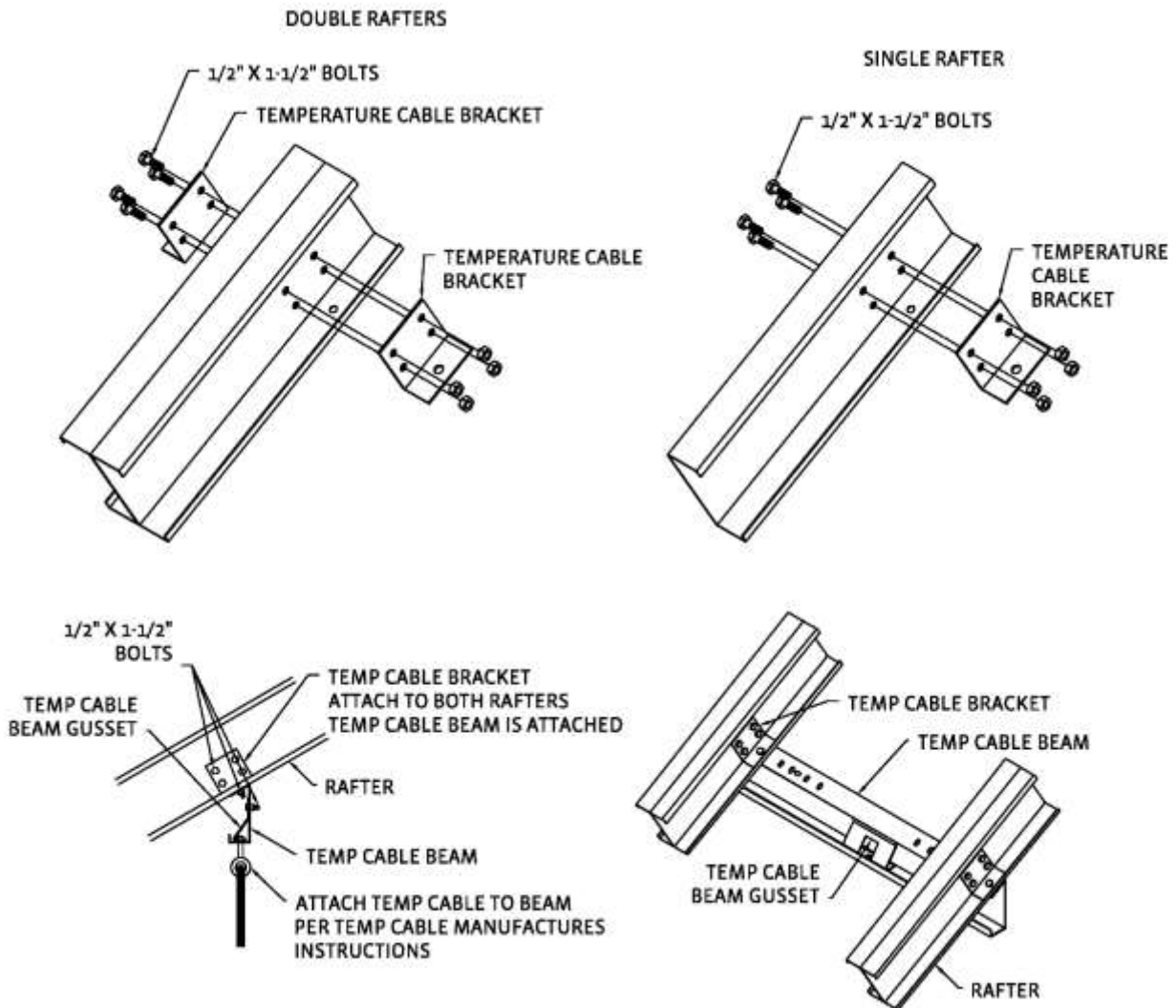
For bins 15 rings and shorter, install the temperature cable brackets as shown in the following illustration. Then attach the temperature cable eye bolt to the rafter using the temperature cable manufacturer's instructions.

**Important Note:** Do not install more than 1 temperature cable per roof beam.

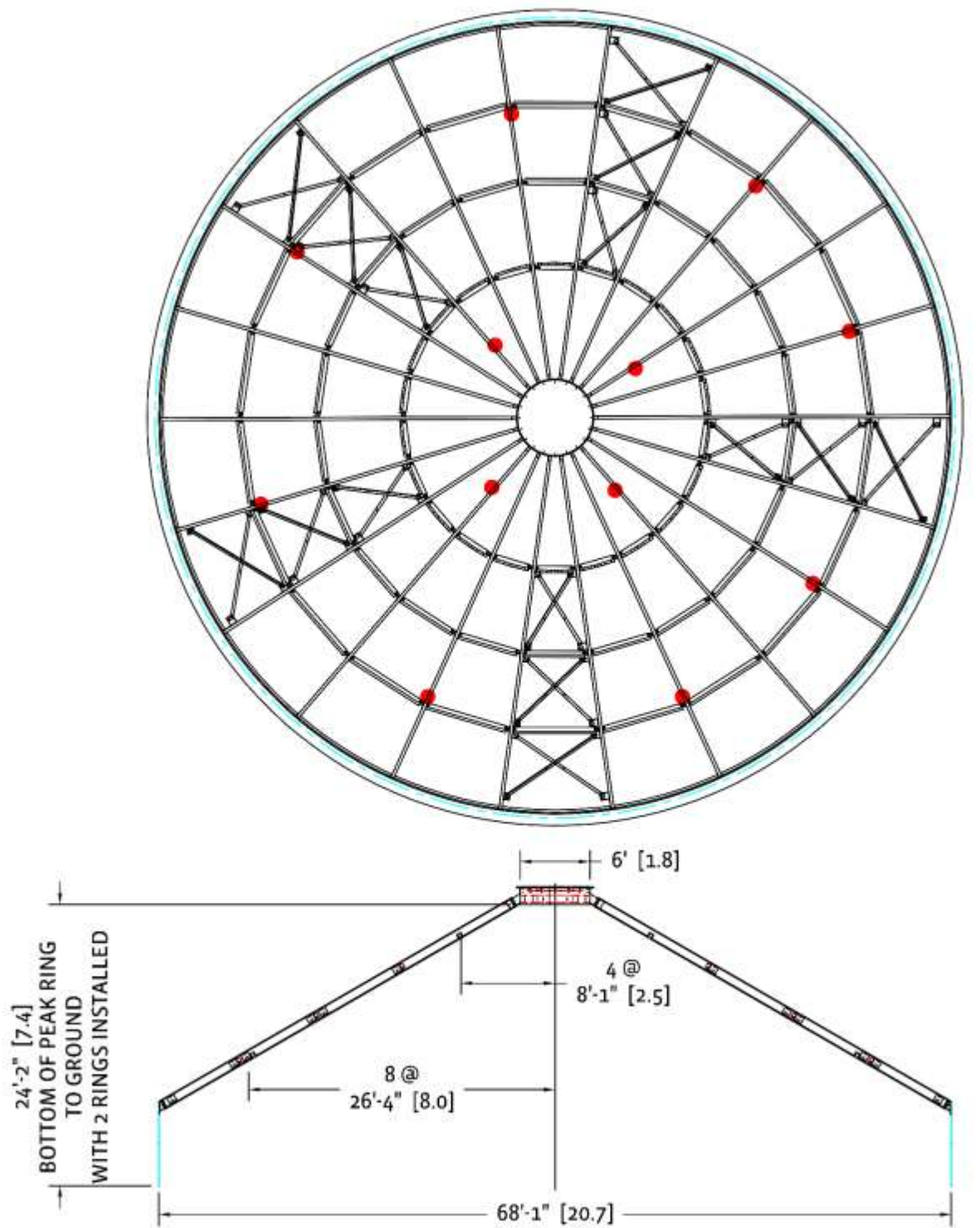


For bins 16 rings and higher, install the temperature cable brackets as shown in the following illustration. Then attach the temperature cable support beams to the bottom of the roof rafters, using pipe spacers as needed when roof x bracing interferes with the temperature cable beams. Then attach the temperature cable eye bolt to the support beam using the temperature cable manufacturer's instructions.

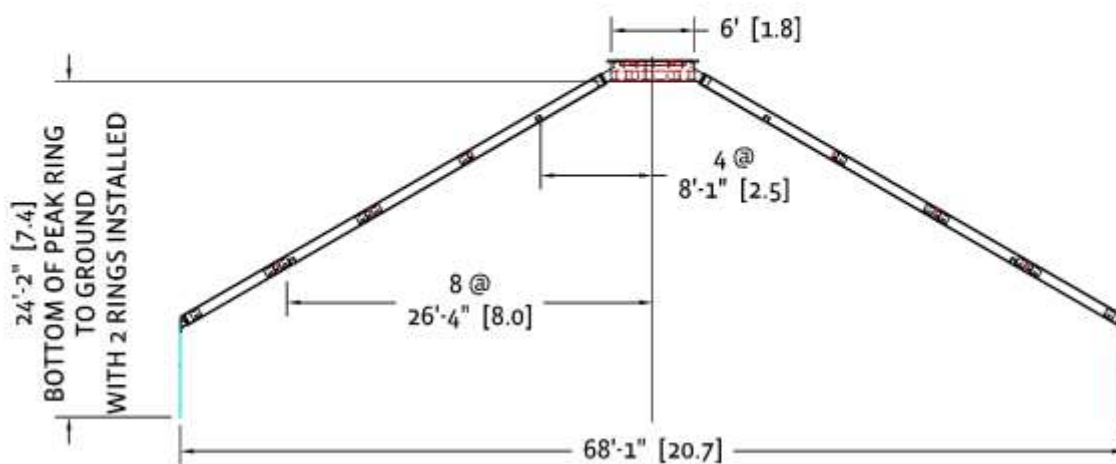
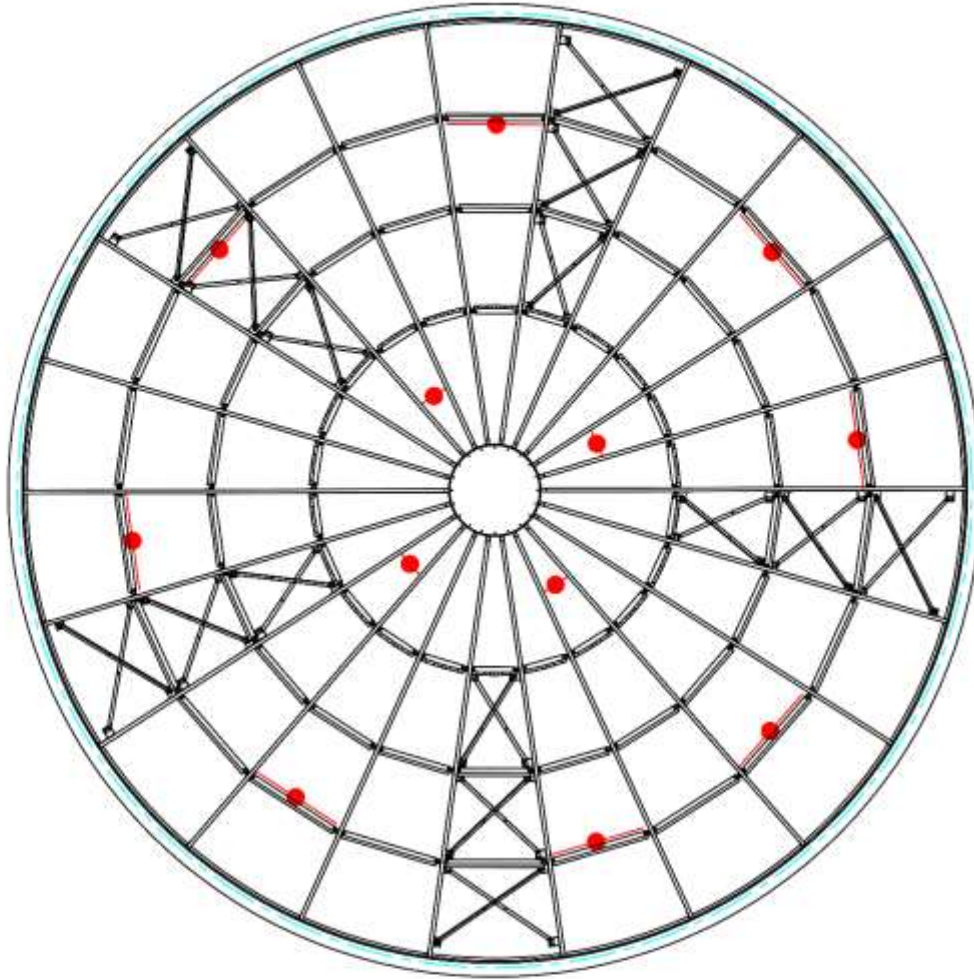
**Important Note:** Do not install more than 1 temperature cable per roof beam.



Once completed verify the temperature cable layout is identical to the following illustrations:



**CB22 (68'-1") TEMP. CABLE LAYOUT (15 RINGS AND SHORTER)**



CB22 (68'-1") TEMP. CABLE LAYOUT (16 RINGS AND TALLER)





Should you have any questions concerning assembly instructions, parts or drawings, please feel free to contact us at any of the following.

© Chief Industries, Inc. Inc.  
4400 East 39<sup>th</sup> Street • PO Box 848  
Kearney, NE 68847  
Phone 800.359.7600

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