30 Degree Roof Construction

Installation Manual

PNEG-1092

Date: 8-24-06

a division of
THE GSI GROUP

PNEG-1092

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SAFETY GUIDELINES

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting ***personal safety*** and ***preventing equipment problems***. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below. Please read the manual and pay attention to these sections. Failure to read this manual and it's safety instructions is a misuse of the equipment and may lead to serious injury or death.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates

NOTE **NOTE** indicates information about the equipment that you should pay special attention to.

THE MANUFACTURER DOES NOT WARRANT ANY ROOF DAMAGE CAUSED BY EXCESSIVE VACUUM OR INTERNAL PRESSURE FROM FANS OR OTHER AIR MOVING SYSTEMS. ADEQUATE VENTILATION AND/OR "MAKEUP AIR" DEVICES SHOULD BE PROVIDED FOR ALL POWERED AIR HANDLING SYSTEMS. THE MANUFACTURER DOES NOT RECOMMEND THE USE OF DOWNWARD FLOW SYSTEMS (SUCTION). SEVERE ROOF DAMAGE CAN RESULT FROM ANY BLOCKAGE OF AIR PASSAGES. RUNNING FANS DURING HIGH HUMIDITY/COLD WEATHER CONDITIONS CAN CAUSE AIR EXHAUST OR INTAKE PORTS TO FREEZE.

Properly Store Grain Bin/Silo Materials Prior to Construction to Prevent Wet Storage Stain:

Wet storage stain (rust) will develop when closely packed bundles of galvanized material such as sidewall and roof sheets have moisture present from any source. Roof and sidewall bundles should be inspected on arrival for the presence of moisture. If moisture is present, moisture must not be permitted to remain between the sheets. In the case of moisture presence, sheets or panels should be separated immediately, wiped down, dried and sprayed with a light oil or diesel fuel.

Where possible, sidewall bundles, roof sheets and other closely packed materials should be stored in a dry, climate controlled building. Storage inside a dry building should be done if at all possible. Where outdoor storage is unavoidable, the materials should be raised out of contact from the ground or vegetation. Stacking and spacing materials should not be corrosive or wet. Materials must be protected from the weather. Weather protection that permits more air movement around the bundles is best.

The storage method of the roof bundles and sidewall sheets may also help minimize moisture presence. Roof bundles should be stored inclined. The bundles should be stored and secured in a safe & stable manner. Turning the bundles over and storing with the center of the dome “up” like a arch is an option. Sidewall bundles may be stored on edge, **however these bundles should be secured in such as way as they cannot fall over and cause injury.**

Should “white rust” or “wet storage stain” occur, contact the manufacturer immediately concerning methods to minimize the adverse effect upon the galvanized coating.

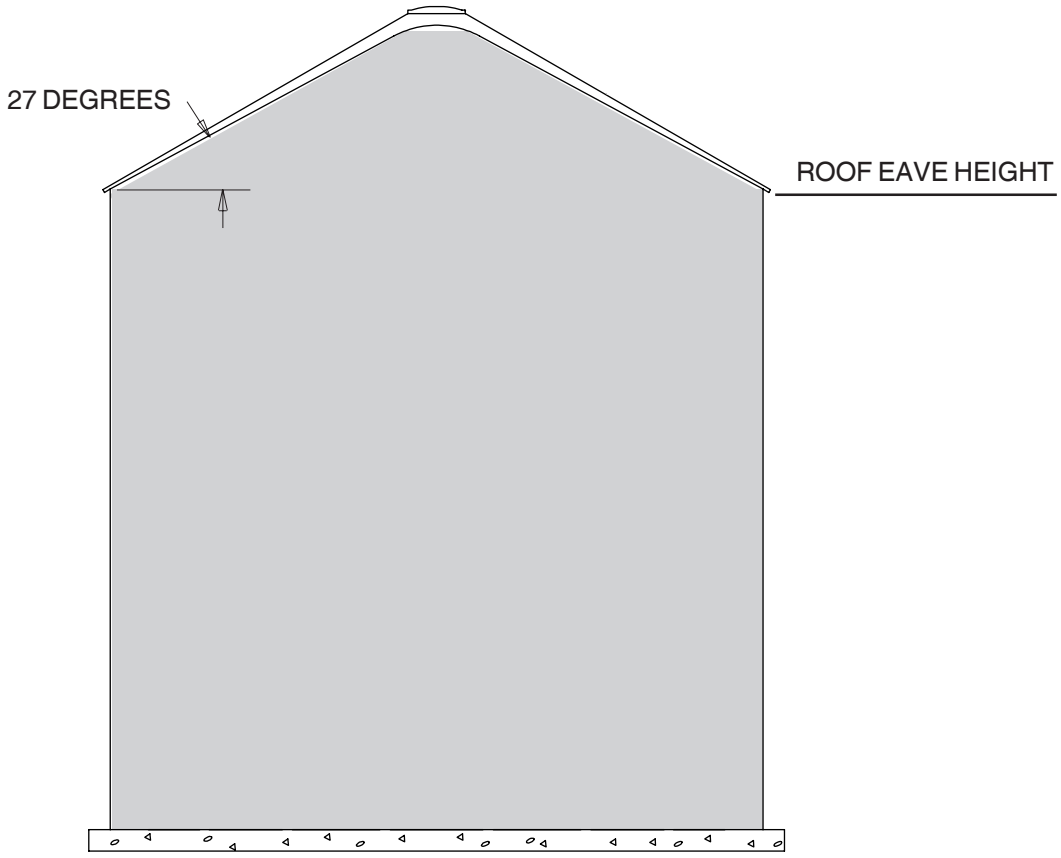
ATTENTION: The decal shown below should be present on the inside of the two ring door cover, 24" porthole door cover and the roof manway cover. If a decal has been damaged or is missing in any of these locations contact the manufacturer for a free replacement decal.

DECALS
P.O. BOX 20
ASSUMPTION, IL. 62510-0020
(217) 226-4421

ATTENTION: The decal shown below should be present on the outside of the two ring door cover, 24" porthole door cover and roof manway cover. If a decal has been damaged or is missing in any of these locations contact the manufacturer for a free replacement decal.

DECALS
P.O. BOX 20
ASSUMPTION, IL. 62510-00020
(217)-226-4421

OVERFILL WARNING



MAXIMUM BIN CAPACITY

(Based on grain with an angle
of repose of 27 degrees)

WARNING

DO NOT OVERFILL BIN. Stored grain, although heaped in the center, should be no higher than the roof eaves at the outer edge (see drawing above). Filling the bin above this point creates excessive internal pressure and may cause swelling and eventual roof failure. The over filling of a bin may also cause the blockage of roof vents and eaves, which will lead to a build of air pressure causing roof damage.

Date	Employer's Signature	Employee

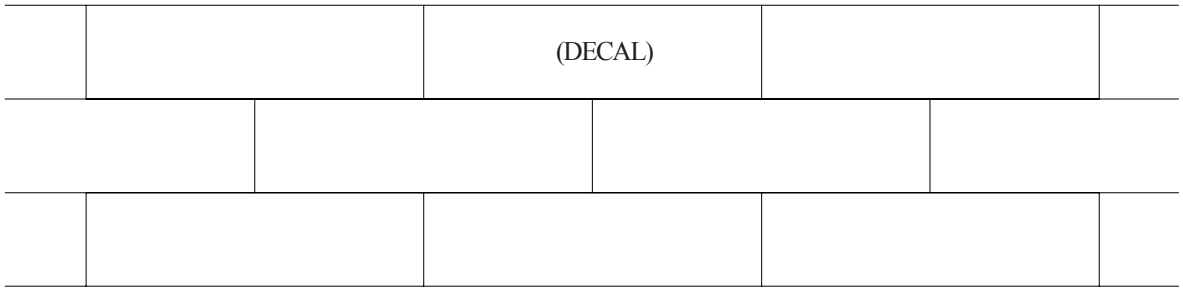
Proper Decal Sheet Placement

You will need to build at least one (1) ring before starting roof construction.

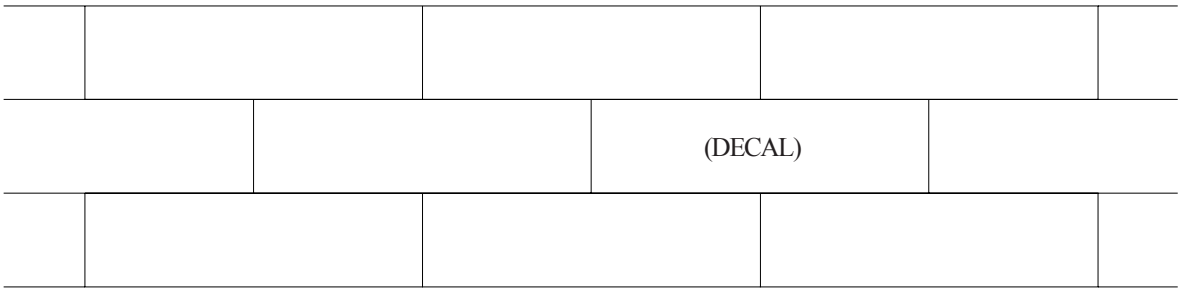
Reference the bin/silo construction manual you received with the bin. This manual will be packaged in the sidewall hardware box.

Note for several of the lines (WS, FC & NS) the sidewall sheet has a "top" and "bottom". It is important to reference these details.

FC SERIES, NS SERIES, AND WS SERIES TANKS
(DECAL SHEET IS IN THE FIRST RING FROM THE TOP)

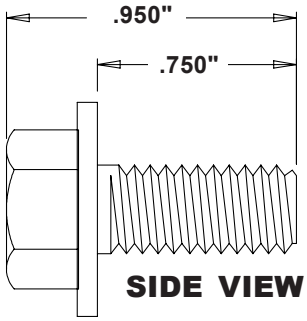


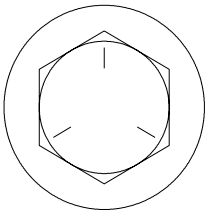
ALL COMMERCIAL SERIES TANKS (NC, NCHT, WC)
(DECAL SHEET IS IN THE SECOND RING FROM THE TOP)



BOLT USAGE

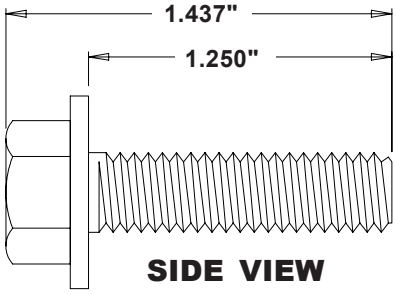
S-275

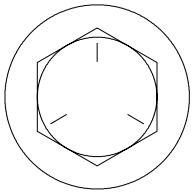




This bolt is used in attaching roof panels to the top sidewall sheet and attaching roof panels and flashing to the center collar.

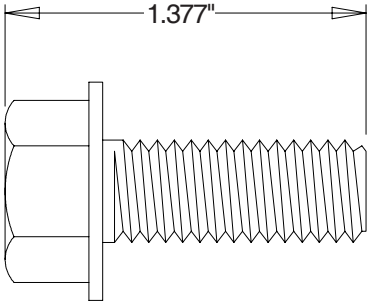
S-277

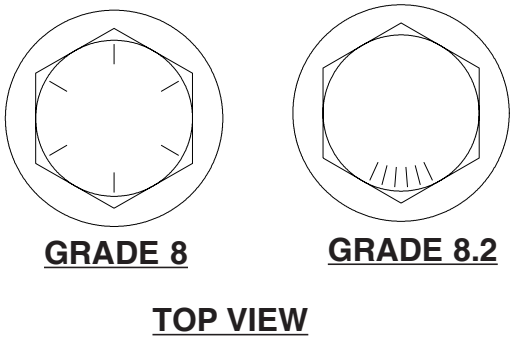




This bolt is primarily used to connect roof panels together where they overlap.

S-7927

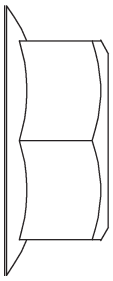




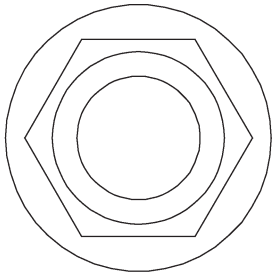
.375" x 1.000" hex flanged head **without** a plastic sealing washer.
This bolt is used on the roof rafter splices for commercial roof systems.

NUT USAGE

S-3611



SIDE VIEW

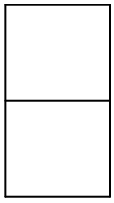


TOP VIEW

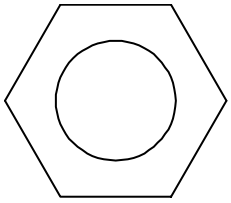
.3125 SERRATED FLANGE NUT

This nut is used in attaching roof panels to the roof channels and to the sidewall sheets, as well as attaching roof panels and flashing to the center collar.

S-396



SIDE VIEW



TOP VIEW

.3125 HEX NUT

This nut is primarily used in sidewall sheet connections.

Instructions For Stirring Devices

Bins are offered in more than one structural series for specific uses. In order to maintain warranty, the appropriate "series" grain bin must be used. Consult the sales catalog or contact the Engineering Department for current recommendations. Especially note that use of any stirring device with 3 or more vertical screws may require a heavier than "standard" series bin. Any recirculating device or system should be used in the "recirculating" series bins.

WARNING !! Additional loads on grain bin sidewalls, roofs and floors can be created by stirring devices. If high-moisture grain is loaded too deep and too fast, any unstiffened bin wall can be overloaded. Observe the following installation and operation procedures if your bin is to be equipped with the stirring device.

1. Read owner's manual for your stirring device and follow all instructions set forth by the manufacturer.

2. IMPORTANT: Install the switch for your stirring device near the roof manway opening so that the unit can be observed while stirring.

3. Make sure there are no obstructions (such as protruding ladders).

4. Run the unit one complete revolution after about 3 ft. of grain has been put into the bin, to see that the unit is operating correctly.

5. Operate the stirring device continuously while filling and drying to avoid compacted grain around the vertical screws.

6. If it becomes necessary to stop a stirring device with laterally moving screws, attempt to stop it with the vertical screws nearest to the center of the bin (away from the sidewall). Should a device stop or stall for any reason and remain inoperative for any length of time, the auger carriage should be supported to the grain surface before restarting. The vertical auger should be turned by hand (with a pipe wrench) before power is applied.

7. For best results, fill the bin to one-half the final intended depth. Dry grain to 16% and continue filling (use filling rates specified by stirring device manufacturer). If necessary to fill to the top without stopping, reduce the filling rate and drying air temperature so that the stirring rate can keep up with the drying rate.

8. Do not overfill bin. Filling should be stopped at bottom of top ring or 30" below track.

9. The preceding steps are general instructions which apply to the major types of stirring devices. Since there are several different manufacturers, it is important that you read your operator's manual thoroughly for specific instructions applicable to your machine.

Auto-Vent Assembly & Installation Instructions

The following instructions are for assembling and installing the Auto-Vent. First, check the packing list to ensure all components have been shipped. The unit is easiest assembled in the **upside down position** as shown in the instructions. Roof vent location should be as shown on the following page.

Assembly

1. Take all parts out of the shipping box and check if all parts are present.

2. Turn one (1) roof vent housing (MIS-6778) upside down. (See Figure #1)

3. Insert 5/16" x 1.1/4" bin bolt with neoprene washer through hole in the side of roof vent. Place jamb nut onto the bolt and tighten. (See Figure #1)

4. Slide flap assembly (MIS-6777) onto bolt. The bolt should slide through hole in the flap assembly bracket. Install with curvature cupped upward and the brackets in the position as shown.

5. Insert 5/16" x 1.1/4" bin bolt with neoprene washer through the other side of the roof vent, through jamb nut and other flap assembly bracket. Tighten nut against vent housing side.

6. Apply a bead of tube caulking around three (3) housing sides of the roof vent where it meets the hold down angle.

7. Place hold-down angle (MIS-4404) on the assembled roof vent. The wide end of the hold-down angle must face vent discharge. Once aligned, screw nine (9) #10 self-drilling (S-280) screws through the roof housing and into the holddown angle. (See Figure #2).

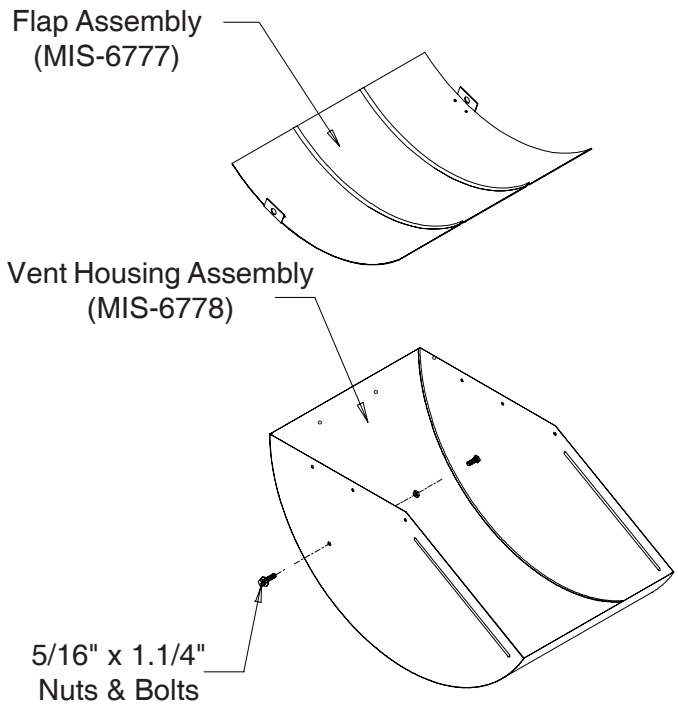


Figure #1

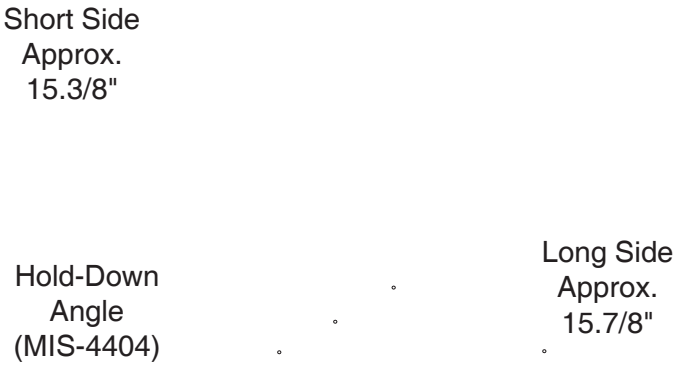


Figure #2

Installation

8. If the roof sheet does not have a prepunched hole for the roof vent, a hole must be cut. The cut hole should match the roof vent. The hole's inside edge should be approximately fifteen (15) inches from the eave. (See Figure #5)

9. Place the three (3) foam strips on roof sheet, as shown in Figure #4. Position roof vent over foam strips and bolt down using 5/16" x 3/4" bin bolts and nuts. (Note: See instructions below for lower two (2) bolts of vent).

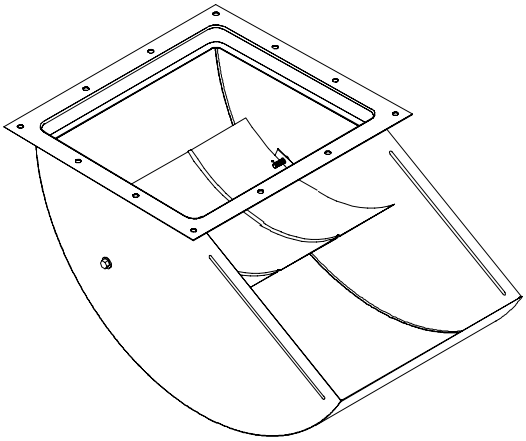


Figure #3

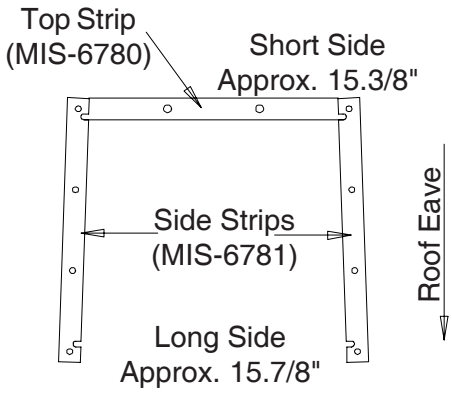


Figure #4

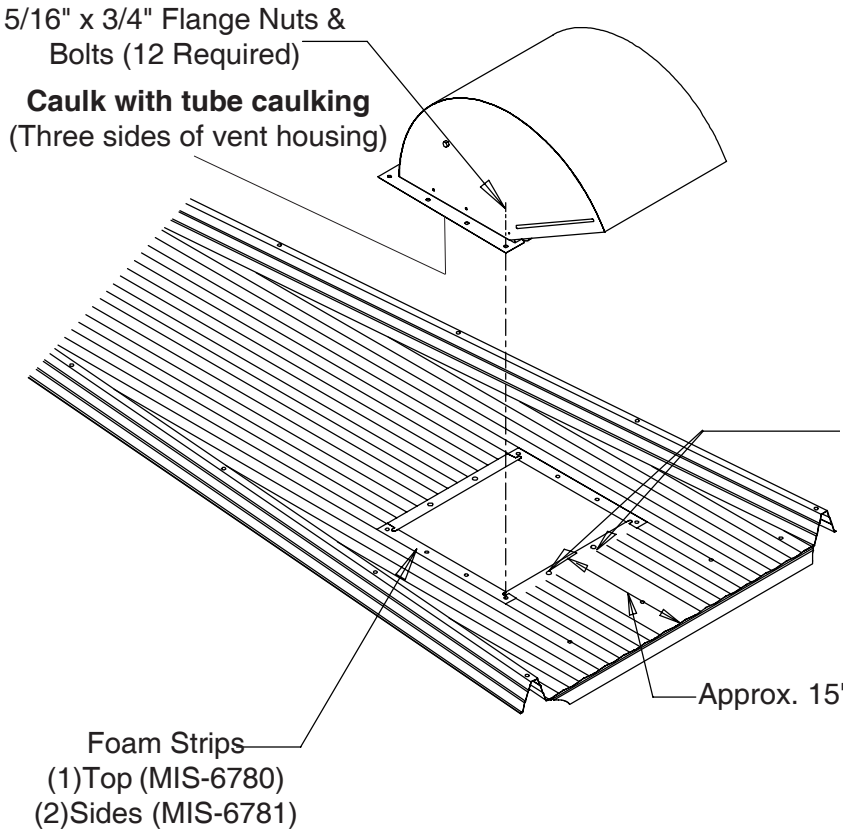


Figure #5

Wire Grill Guard Roof Vent Assembly & Installation Instructions

The following instructions are for assembling and installing the Wire Grill Guard Roof Vent. First, check the packing list to ensure all components have been shipped. The unit is easiest assembled in the **upside down position** as shown in the instructions. Roof vent location should be as shown on the following page.

Assembly

1. Take all parts out of the shipping box and check if all parts are present.

2. Turn one (1) roof vent housing (MIS-6778) upside down. (See Figure #1)

3. Insert 5/16" x 1.1/4" bin bolt with neoprene washer through hole in the side of the roof vent. Place jamb nut onto the bolt and tighten. (See Figure #1).

4. Slide on eyelet of Grill Guard onto the 5/16" bin bolt.

5. Insert 5/16" x 1.1/4" bin bolt with neoprene washer through the other side of the roof vent, through jamb nut and other eyelet of Grill Guard. Tighten nut against vent housing side.)

6. Apply a bead of tube caulking around three(3) housing sides of the roof vent where it meets the holddown angle.

7. Place holddown angle (MIS-4404) on the assembled roof vent. The wide end of the hole-down angle must face vent discharge. Once aligned, screw nine (9) #10 self drilling (S-280) screws through the roof housing and into the holddown angle. (See Figure #2).

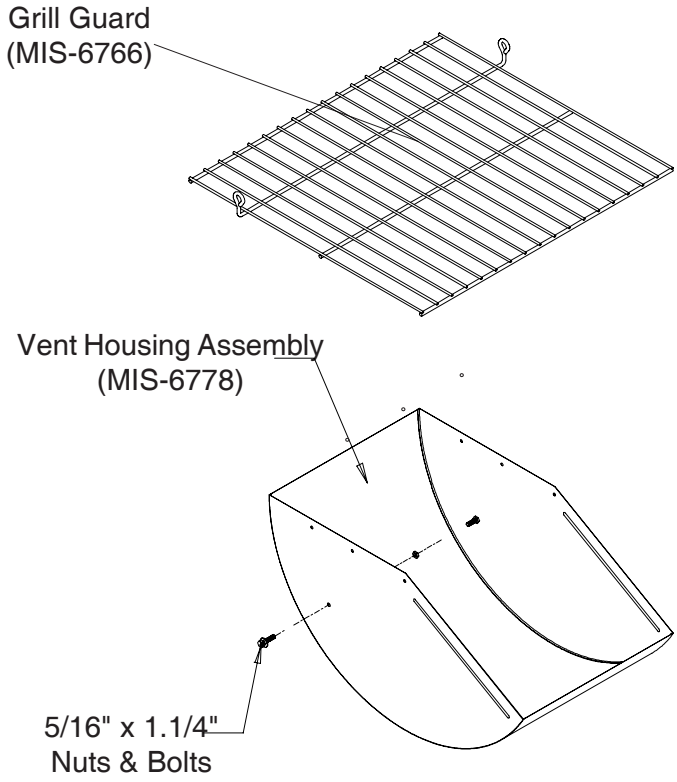


Figure #1

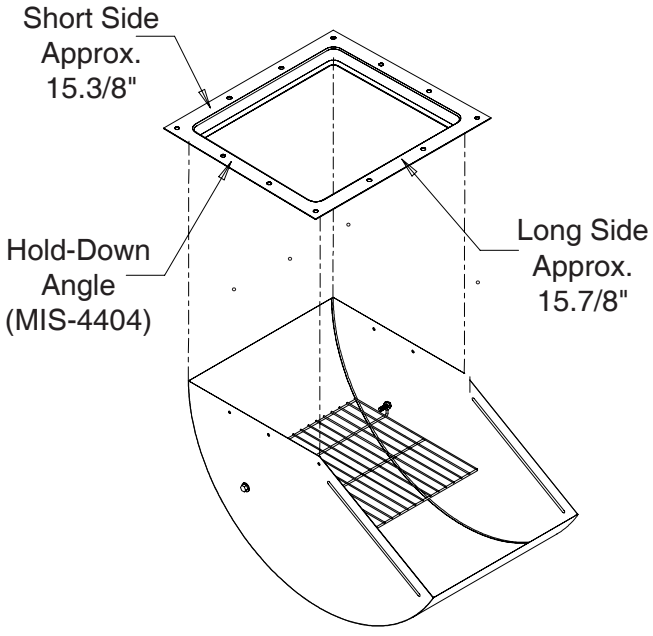


Figure #2

Installation

8. If the roof sheet does not have a prepunched hole for the roof vent, a hole must be cut. The cut hole should match the roof vent. The hole's inside edge should be approximately fifteen (15) inches from the eave. (See Figure #5)

9. Place the three (3) foam strips on roof sheet, as shown in Figure #4. Position roof vent over foam strips and bolt down using 5/16" x 3/4" bin bolts and nuts. (Note: See instructions below for lower two (2) bolts of vent).

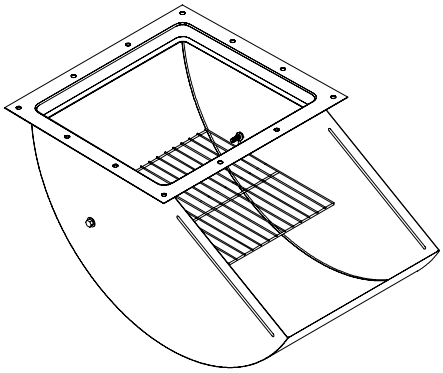


Figure #3

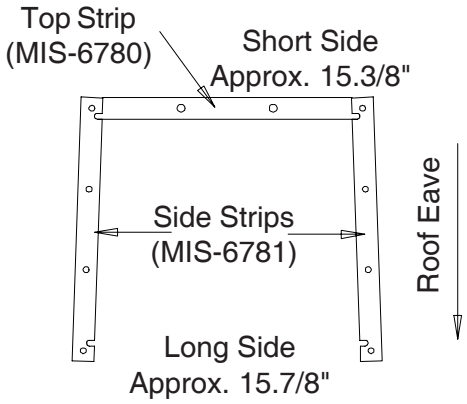


Figure #4

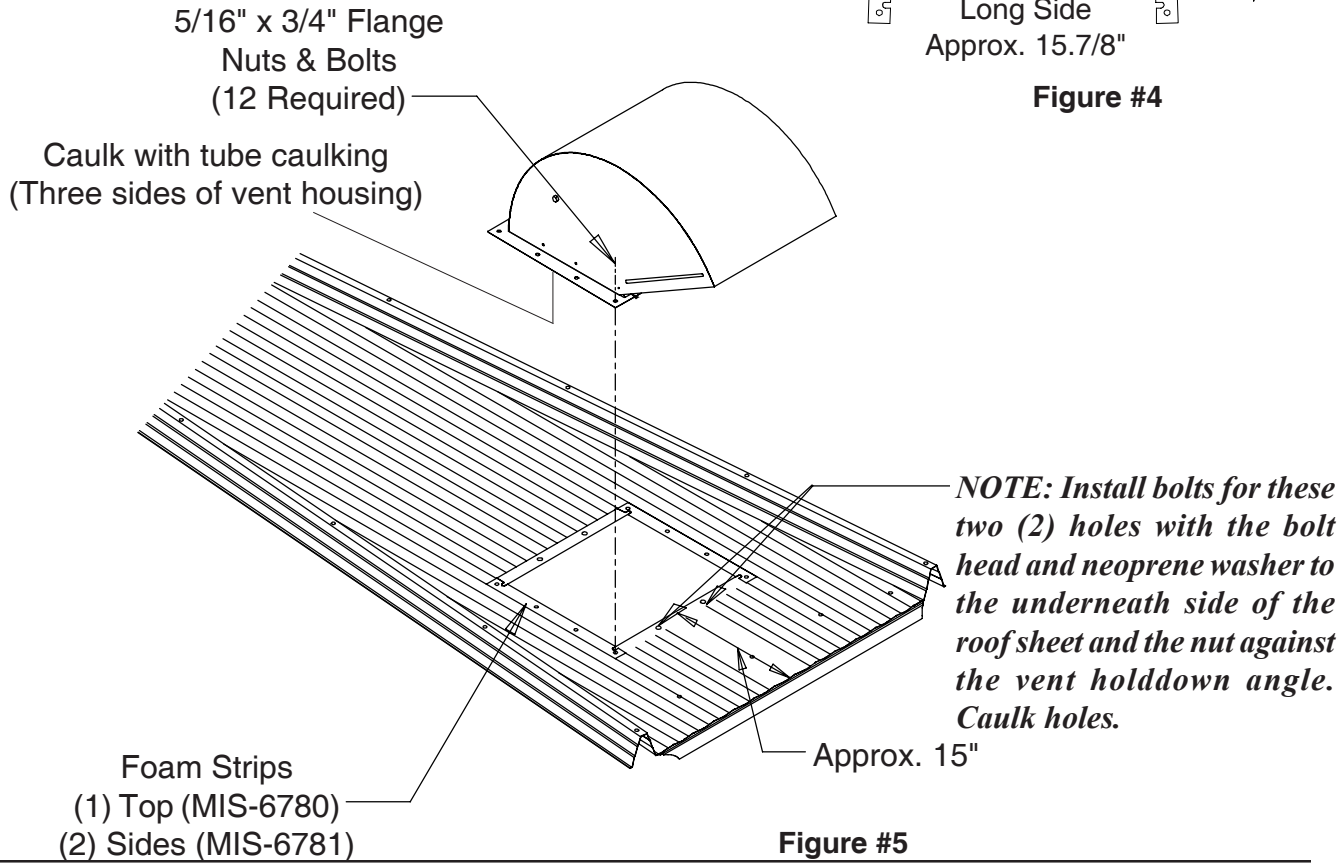
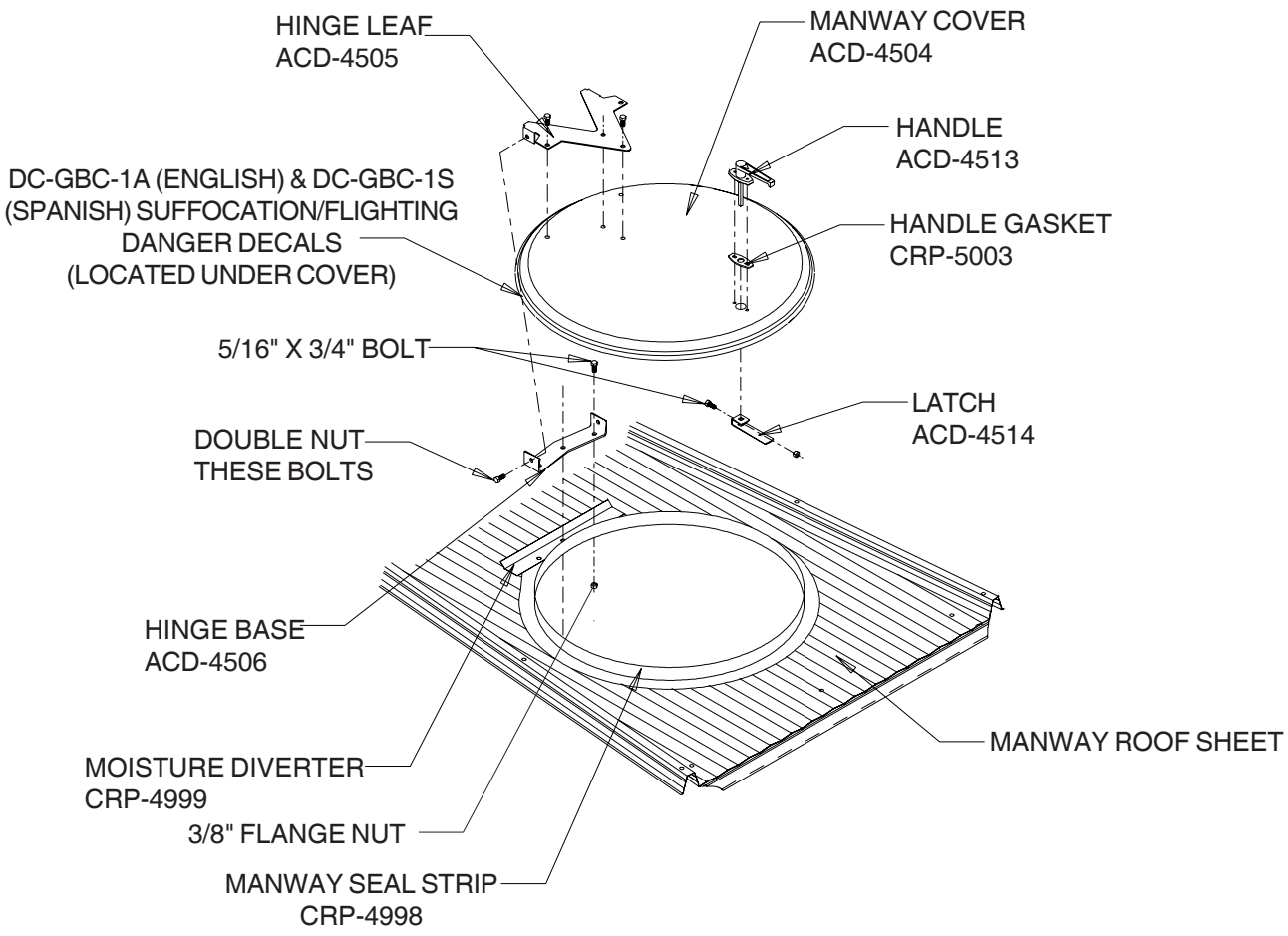


Figure #5

Manway Cover Assembly



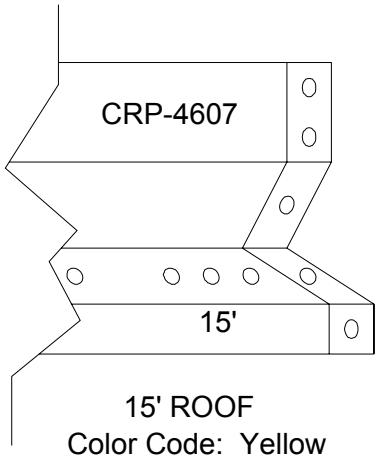
Apply caulking to underneath side of moisture diverter to seal between the corrugated roof sheet and diverter. Attach the moisture diverter and hinge base to manway roof sheet with 5/16" x 3/4" bolts and nuts. Place hinge leaf on manway cover and bolt both hinge parts together with 3/8" x 1" bolts and lock nuts. The handle is fastened on with two #10-24 x 5/8" long bolts and #10-24 lock nuts. Slip a 5/16" nut in the latch bar, thread on the shaft of handle, and adjust latch bar so it will catch the bottom side of the manway sheet. Snap the Manway Seal Strip to the manway seal.

Center Collar Details

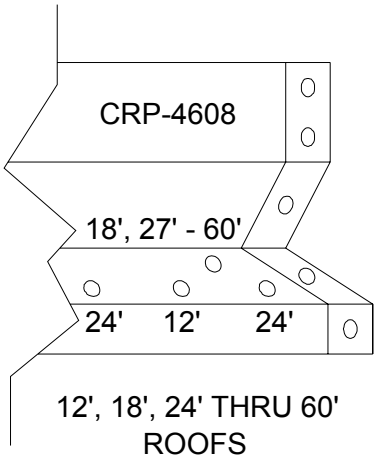
The standard roof with a dome cap lid will have a center collar assembled from three (3) pieces the dome cap will mount onto it as well as the flashing. The dome cap is standard on all 12'-48' bins and 54'-60' FCDL, WSL, and NSL series bins. A flat top is standard on all 39'-60' NCL & WCL commercial series bins.

For the 33' - 60' bins this will be the upper or "top" center collar. The lower or "Z" center collar details are given on the later pages.

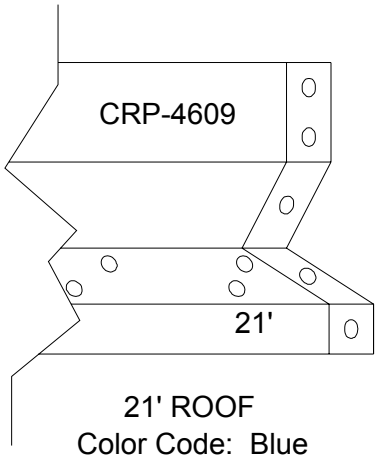
54' and larger bins or "flattop" bins in 33' and larger will not have the top center collar.



15' ROOF
Color Code: Yellow



12', 18', 24' THRU 60'
ROOFS
Color Code: Red

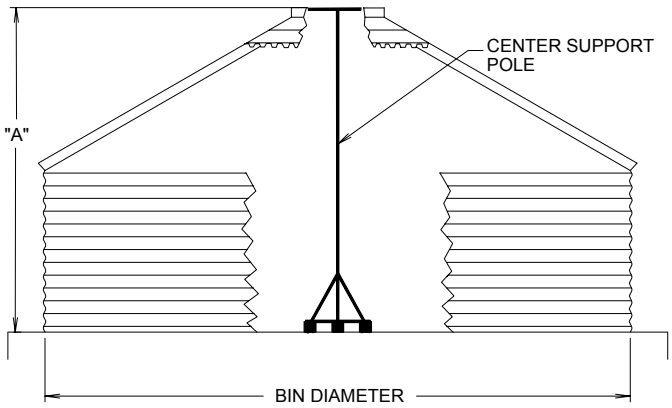


21' ROOF
Color Code: Blue

Farm Roof Assembly

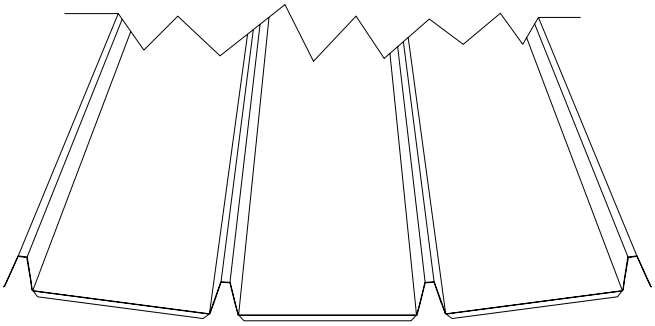
After completing the first sidewall ring, you are ready to begin construction. Begin with the center collar sections. For convenience in opening and closing the center cover, the roof ladder and manhole sheet should be placed directly opposite the two slide rod holes in the center collar. Next, build a roof center support to hold the peak in place at the proper height. A simple structure composed of a sturdy cross arm attached to a pole and supported by a platform or scaffolding will do. Stand the center support directly in the center of your bin. The following dimensions are approximate distances used in bin roof construction. Adjusting the center support height will ease roof erection. Place eave clips inside the bin wall to maintain an opening around the top of the sidewall. This allows condensation, which normally collects on the underneath side of the roof panels, to flow freely to the outside of the bin, thus avoiding possible grain spoilage.

	Use With One Ring Of 4.00" Corrugated Sidewall	Use With One Ring Of 2.66" Corrugated Sidewall	Use With Two Ring Of 2.66" Corrugated Sidewall
Bin Dia.	"A"	"A"	"A"
12'	6'-9"	5'-9"	8'-5"
15'	7'-7"	6'-7"	9'-3"
18'	8'-5"	7'-5"	10'-1"
21'	9'-4"	8'-4"	11'-0"
24'	10'-2"	9'-2"	11'-10"
27'	11"-0"	10'-0"	12'-8"
30'	11'-11"	10'-11"	13'-7"
33'	12'-2"	11'-2"	13'-10"
36'	13'-1"	12'-1"	14'-9"
39'	14'-4"	13'-4"	16'-0"
42'	14'-10"	13'-10"	16'-6"
45'	15'-6"	14'-6"	17'-2"
48'	16'-4"	15'-4"	18'-0"
54'	16'-9"	15'-9"	18'-5"
60'	18'-6"	17'-6"	20'-2"



For best results in erecting the roof, install two roof panels in four places as shown in Diagram A. When these eight panels are in place, your peak assembly should be centered. Next, add two or three panels at a time to each section making certain to lap them the same way, until all panels are in place. Be sure the panels are bolted loosely. DO NOT TIGHTEN BOLTS UNTIL THE ROOF IS COMPLETELY ASSEMBLED. When installing the roof panels, take into consideration the placement of the manway for ease of access to and from the sidewall and roof ladders. **On stiffened tanks, particularly on NCHT and FCHT series hopper tanks, location of the manway panel & roof ladder in relation to the stiffeners is crucial for proper installation of the ladder system. Refer to PNEG-1451 for detailed instructions on NCHT and FCHT manuals and Pneg-1420 for flat bottomed stiffened tanks (FCDL, NCL, WCL Series). These manuals are packaged with the ladder and safety cage packages.**

Fasten Roof Sheets To Eave Clips And Sidewall Sheets As You Assemble.



ROOF OVERLAY

NOTE: USE THE SAME OVERLAY PROCEDURE ON ALL ROOF SHEETS.

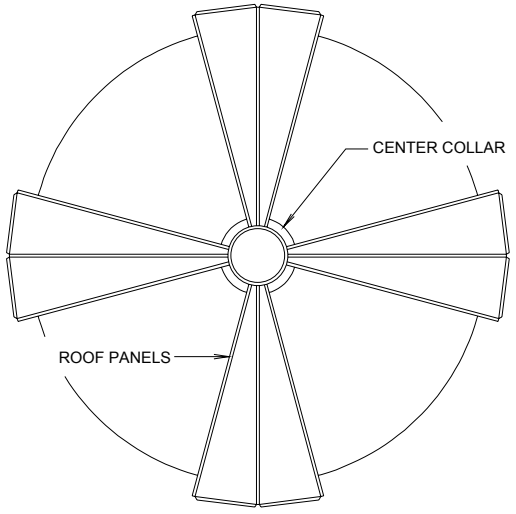
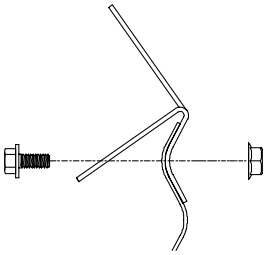


DIAGRAM A

Roof Assembly For 12' Thru 24' Bins

NOTE: Be sure to install ladder rungs and safety steps as you assemble roof panels. When assembling such pieces as roof ladder rungs, remove the neoprene washer from bolt and place between the roof and the piece you are adding. This will insure a more protective seal against moisture.



TYPICAL ALL EAVE CLIPS
5/16" X 3/4" BIN BOLT,
FLANGE NUT

CENTER COLLAR
CRP-4607 (3) 15' ROOF - YELLOW
CRP-4608 (3) 12',18',24' THRU 60' ROOF - RED
CRP-4609 (3) 21' ROOF - BLUE

5/16" X 3/4" BOLTS &
FLANGE NUTS

* Leave out top row of bolts along top edge of rib for collar flashing, to installed later.

APPLY A BEAD OF CAULKING
AROUND THE CENTER COLLAR

5/16" X 1.1/4" BOLTS & FLANGE NUTS

"A"

IMPORTANT:
START ROOF CHANNEL 2nd
HOLE FROM THE BOTTOM OF
ROOF RIB

TYPICAL ROOF DETAILS
ROOF CHANNELS,
2 REQUIRED UNDER ROOF
LADDER RIBS. POSITION
CHANNEL AS CLOSE TO EAVE
AS POSSIBLE. NONE REQUIRED
ON 12' & 15' ROOFS,
CRP-4694 18' ROOF CHANNEL
CRP-4693 21' & 24'
ROOF CHANNEL

ROOF STEP

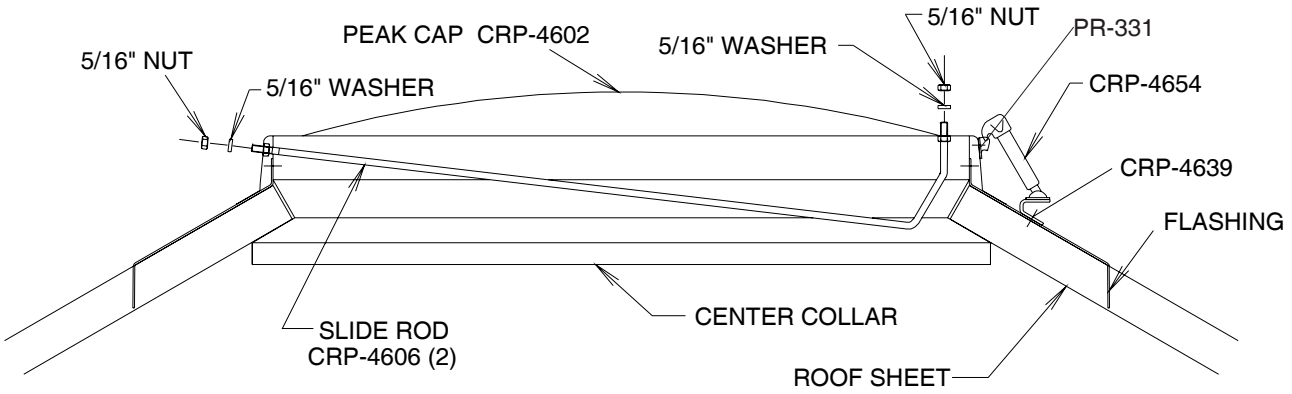
R-007 EAVE CLIP

R-411
INTERMEDIATE EAVE CLIP

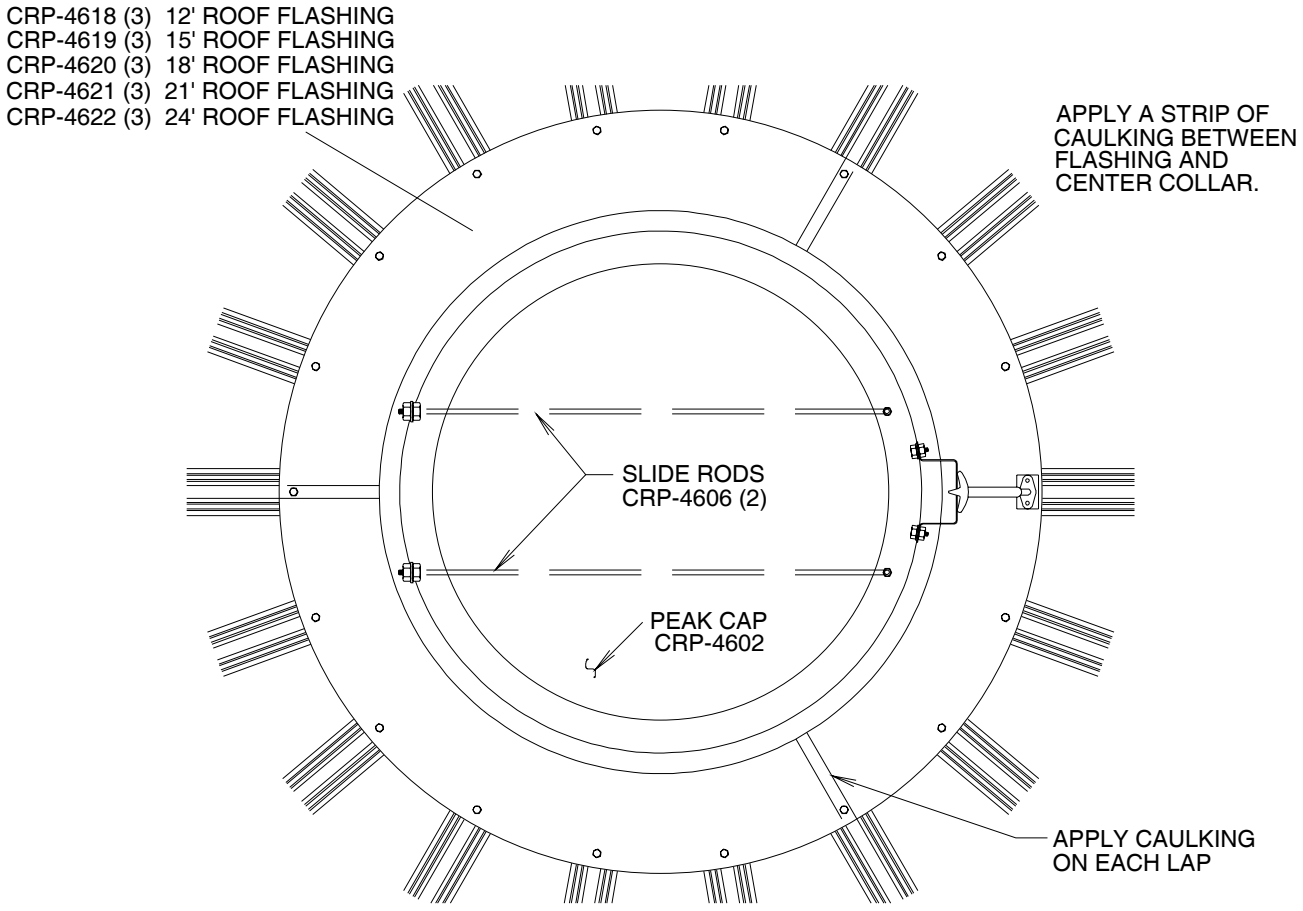
5/16" X 3/4" BOLTS &
FLANGE NUTS

12' Thru 24' Roofs (Continuation)

To assemble slide rods and cover, insert straight end of slide rod through the center collar and thread one 5/16" nut all the way down on the rod, followed with a washer. Then place rod through the cover and put a washer and nut on the outside. **DO NOT TIGHTEN!** Put a nut on the bent end of the rod, followed with a washer. Insert rod through the cover, then place washer and nut on the outside. **TIGHTEN!** Adjust and tighten nuts on straight end of rod. After tightening, it may be necessary to spread the rods slightly to make them parallel. (Maintain 10" between rods.)



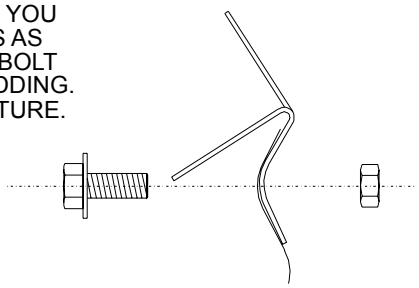
SECTION THRU CENTER COLLAR



TOP VIEW

Roof Assembly For 27' Thru 30' Bins

NOTE: BE SURE TO INSTALL LADDER RUNGS AND SAFETY STEPS AS YOU ASSEMBLE ROOF PANELS. WHEN ASSEMBLING SUCH PIECES AS ROOF LADDER RUNGS, REMOVE NEOPRENE WASHER FROM BOLT AND PLACE BETWEEN THE ROOF AND THE PIECE YOU ARE ADDING. THIS WILL INSURE A MORE PROTECTIVE SEAL AGAINST MOISTURE.

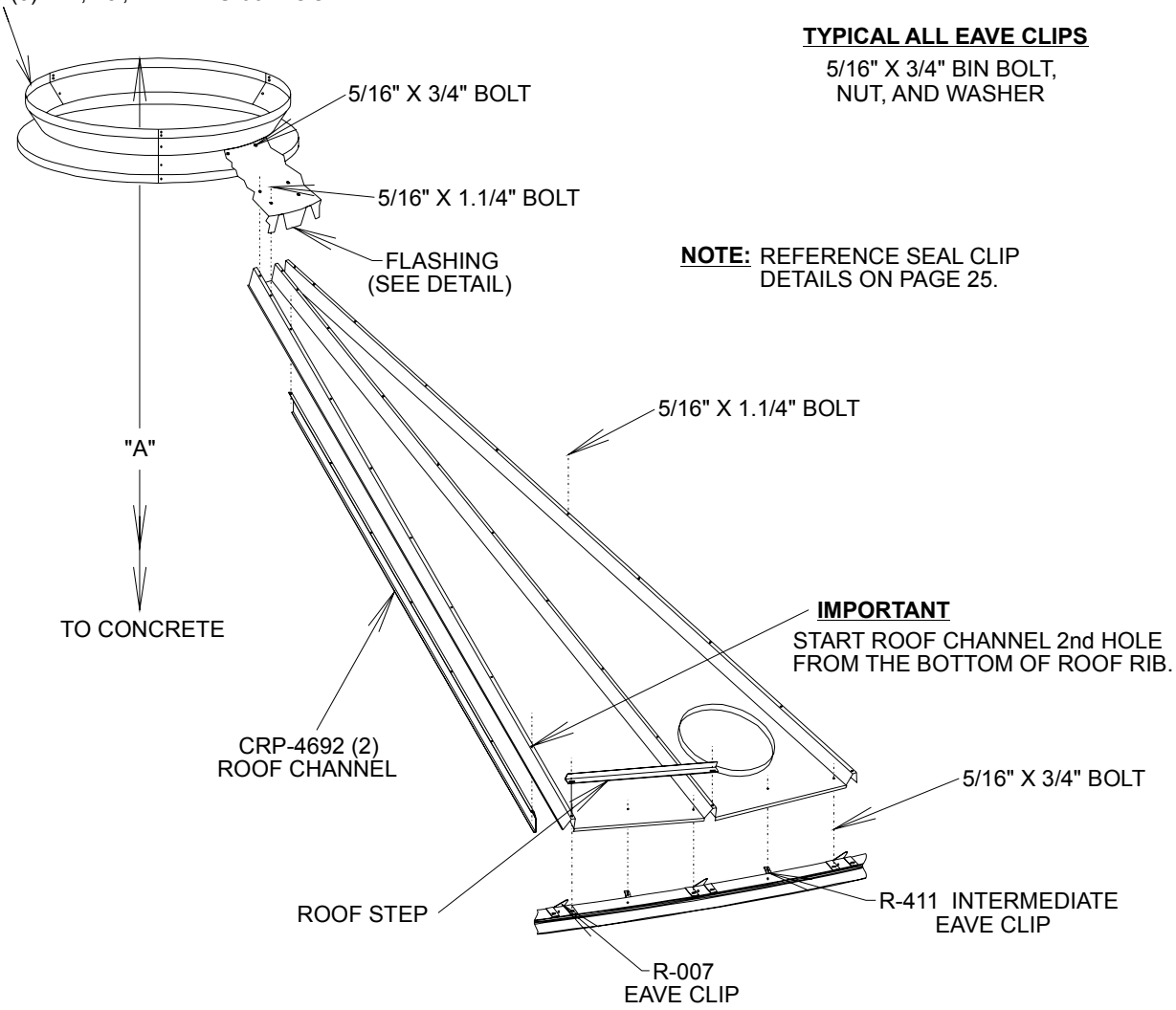


TYPICAL ALL EAVE CLIPS

5/16" X 3/4" BIN BOLT, NUT, AND WASHER

CENTER COLLAR

CRP-4608 (3) 12', 18', 24' THRU 60' ROOF - RED



NOTE: REFERENCE SEAL CLIP DETAILS ON PAGE 25.

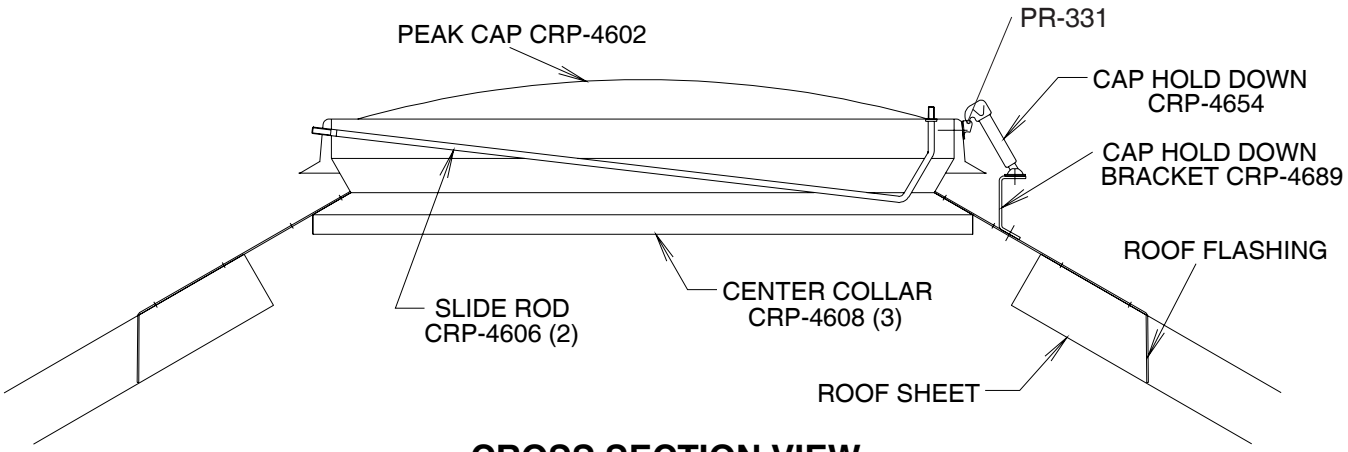
IMPORTANT

START ROOF CHANNEL 2nd HOLE FROM THE BOTTOM OF ROOF RIB.

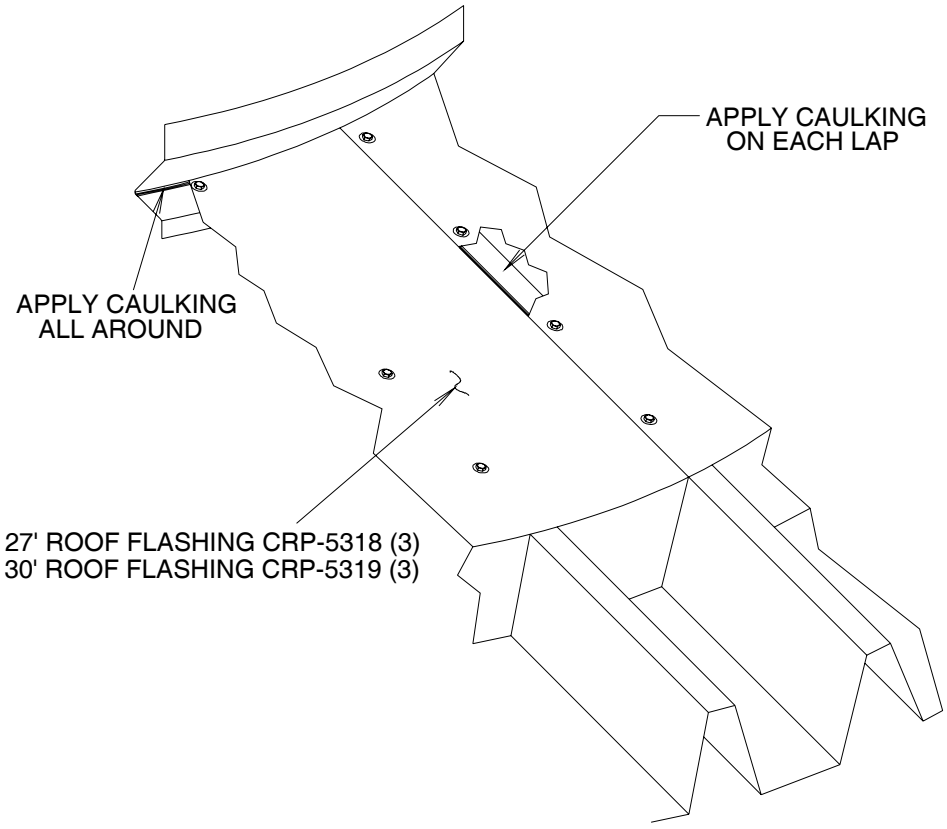
27' Thru 30' Roofs (Continuation)

NOTE: See previous pages for assembling the peak cap and slide rods

Prior to assembly of roof and center collar, you will need to position the flashing so the cap hold down is in line with roof ladder. Two holes per flashing section has been provided for the hold down bracket. Preassemble center collar and flashing pieces together before attaching roof panels to flashing. **TIGHTEN BOLTS, EXCEPT FOR THE 2 LOWER FLASHING SEAM BOLTS!**



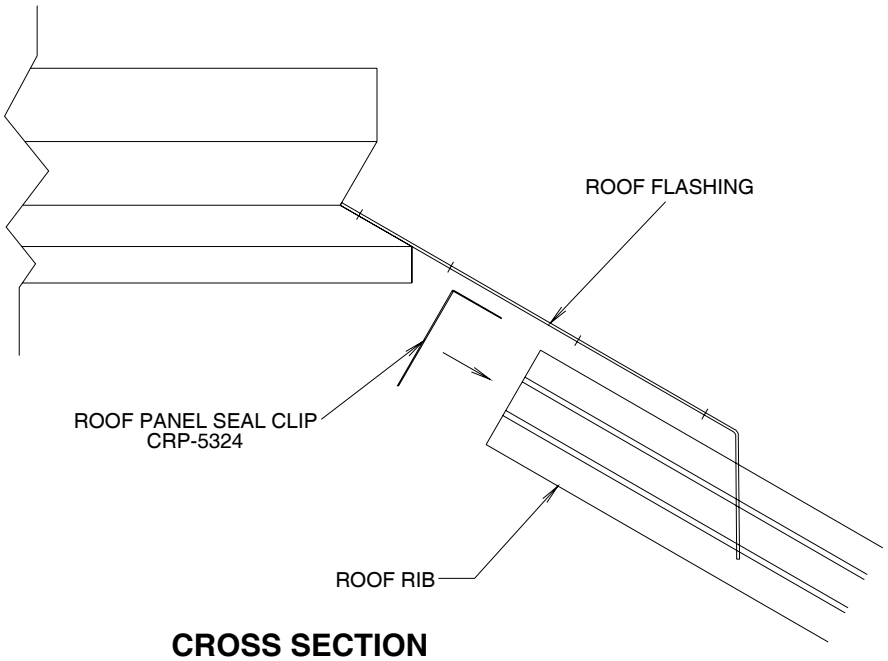
CROSS SECTION VIEW



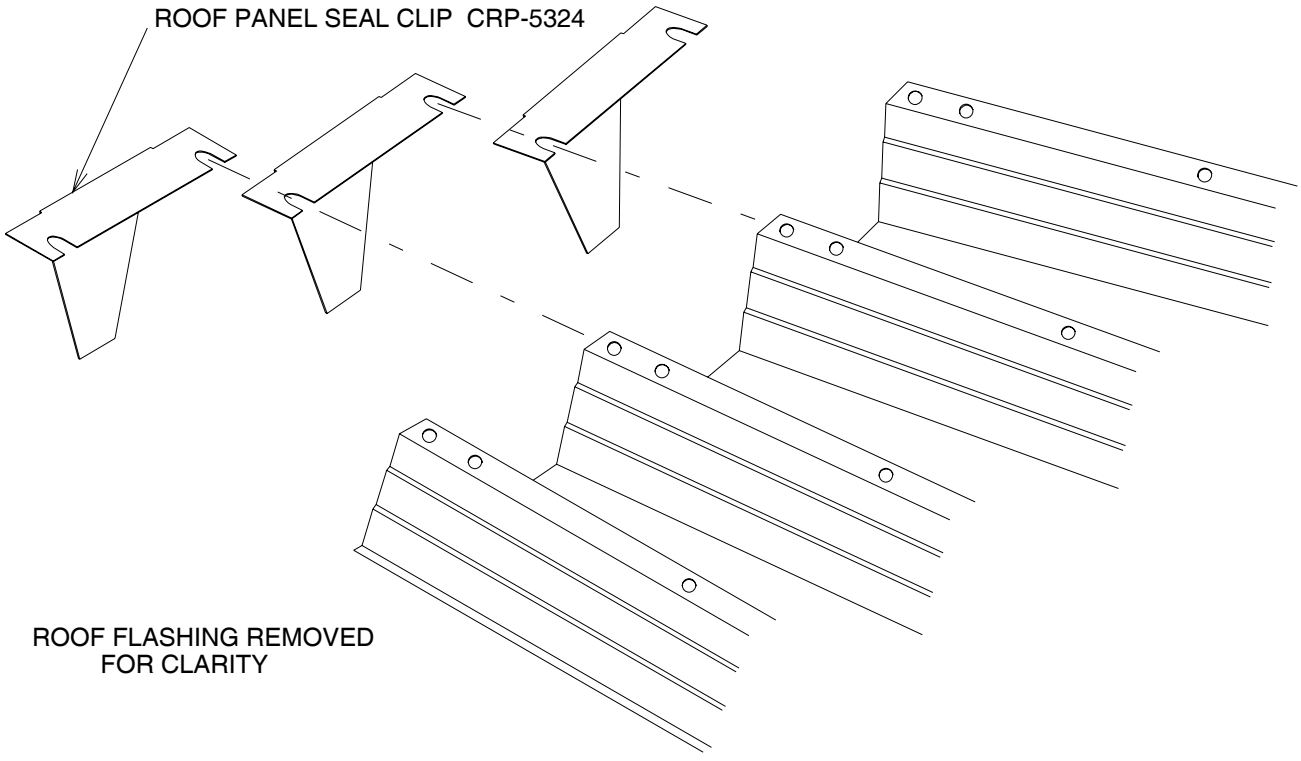
FLASHING DETAIL

27' Thru 30' Roofs (Continuation)

After all roof panels have been attached to the roof flashing, slip the roof panel seal clip between the bottom surface of the flashing and the top of the roof ribs. Be sure to push the clip in as far as possible for the best seal. Tighten all bolts and nuts after clips are pushed in.



CROSS SECTION



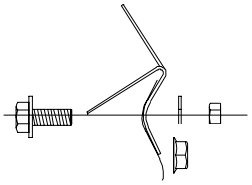
ISOMETRIC VIEW

Roof Assembly For 33' Thru 48' Roofs With Standard Peak Cap

NOTE: Additional instructions are given on the following pages for 42' diameter and larger farm bin and commercial bin roofs. For 36' diameter hopper tanks (NCHT) reference special instructions included in the 36' NCHT manual.

After assembling the lower center collar "Z" ring, build a roof center support to hold it in place at the proper height (Dimension A, as shown in table and diagram on page20). A simple structure composed of a sturdy cross-arm attached to a pole and supported by a platform or scaffolding in the center of the bin will be sufficient. Place eave clips inside the bin wall to maintain an opening around the top of the sidewall. This allows condensation, which normally collects on the underneath side of the roof panels, to flow freely to the outside of the bin, thus avoiding possible grain spoilage. Now you are ready to place the first group of roof sheets in place as shown in Diagram A, page 20. The eight panels will keep your peak assembly centered. Continue placing roof sheets (with a consistent lap pattern) at intervals around the bin to distribute the weight evenly. **DO NOT TIGHTEN BOLTS UNTIL THE ROOF IS COMPLETELY ASSEMBLED**. Once all roof sheets are in place and the bolts are tightened, the center ring and flashing assembly may be put on top of the panels. Place a flashing seam over a "Z" collar seam to insure correct alignment (Reference page 27). The peak cap and slide rods may then be put in place to finish the roof. **On stiffened tanks, particularly on NCHT series hopper tanks, location of the manway panel and roof ladder in relation to the stiffeners is crucial for proper installation of the ladder systems. Refer to PNEG-1451 for detailed instructions on the NCHT series and PNEG-1420 for flat bottomed stiffened tanks (FCDL, NCL & WCL series). These manauls are included with the ladder and safety cage packages.**

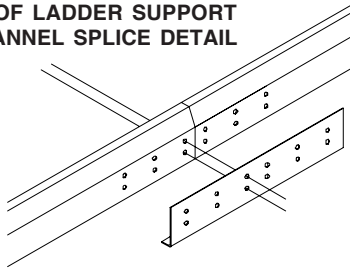
NOTE: BE SURE TO INSTALL LADDER RUNGS AND SAFETY STEPS AS YOU ASSEMBLE ROOF PANELS. WHEN ASSEMBLING SUCH PIECES AS ROOF LADDERS, REMOVE NEOPRENE WASHER FROM BOLT AND PLACE BETWEEN THE ROOF AND THE PIECE YOU ARE ADDING. THIS WILL INSURE A MORE PROTECTIVE SEAL AGAINST MOISTURE.



TYPICAL ALL EAVE CLIPS
5/16" X 3/4" BIN BOLT & FLANGE NUT

INTERMEDIATE CENTER COLLAR
CRP-4687 (3) 33'-36' ROOF (GREEN)
CRP-5815 (3) 39' ROOF (ORANGE)
CRP-4688 (3) 42'-48' ROOF (BLACK)
CRP-5013 (3) 45' ROOF (PURPLE)

ROOF LADDER SUPPORT CHANNEL SPLICE DETAIL

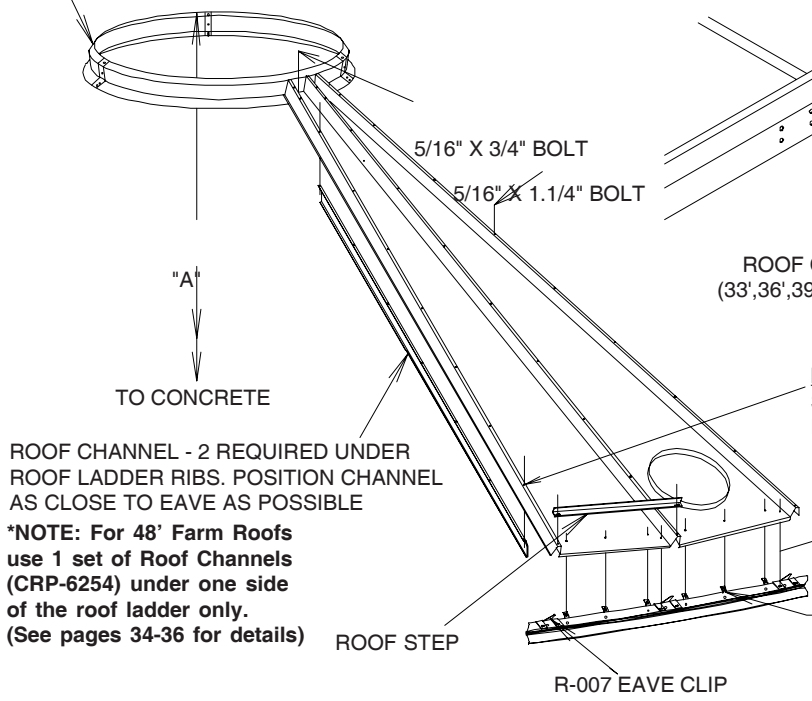


CRP-4793 33,36,39 & 42' ROOF LADDER SUPPORT CHANNELS

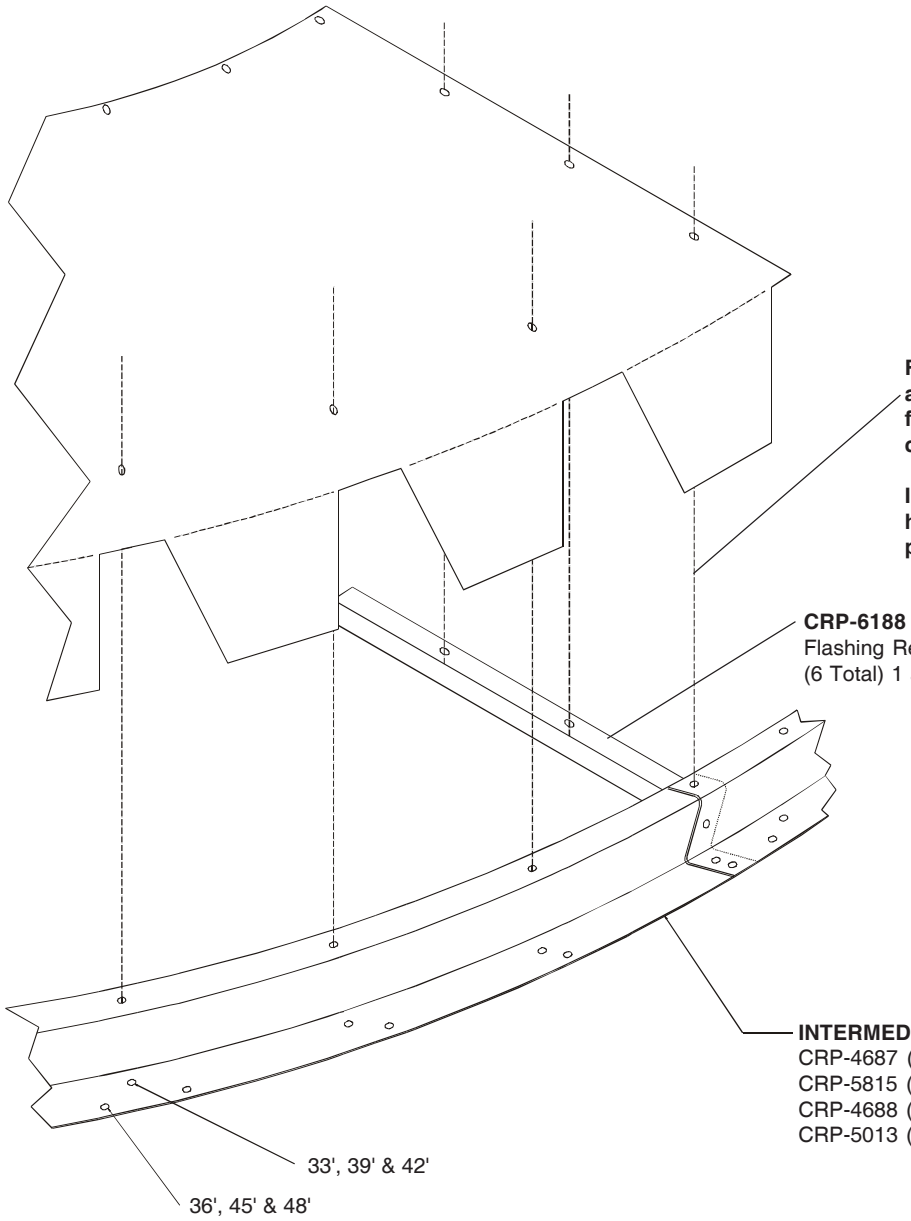
CRP-4809 48' ROOF LADDER SUPPORT CHANNELS

USE 5/16" X 3/4" BOLTS AND FLANGE NUTS

CRP-5262
ROOF CHANNEL SPLICE
(33',36',39',42',48',75',78' & 90')



IMPORTANT



For proper center collar flashing assembly, you must start the flashing seam directly above the center "Z" collar seam.

Improper placement will result in holes and notches not aligned properly.

CRP-6188
Flashing Reinforcement Angle
(6 Total) 1 at each flashing splice.

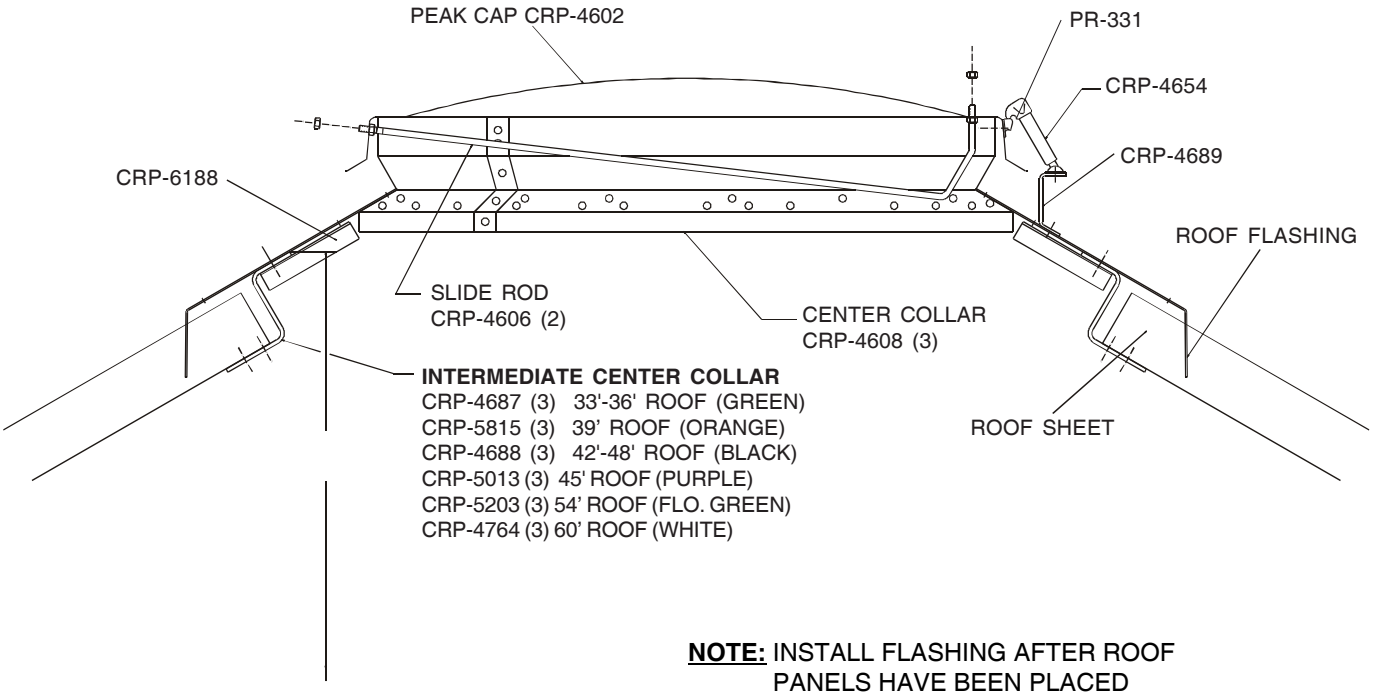
INTERMEDIATE CENTER COLLAR
CRP-4687 (3) 33'-36' ROOF (GREEN)
CRP-5815 (3) 39' ROOF (ORANGE)
CRP-4688 (3) 42'-48' ROOF (BLACK)
CRP-5013 (3) 45' ROOF (PURPLE)

33', 39' & 42'

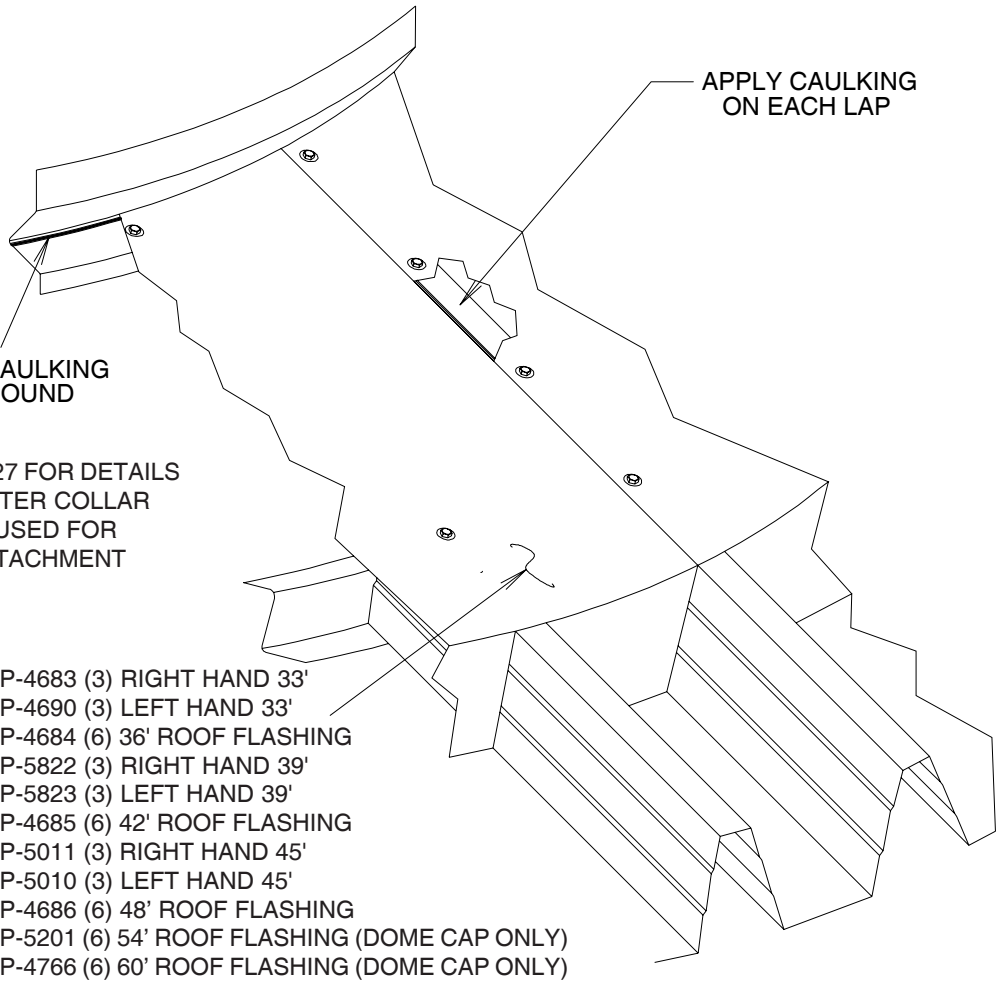
36', 45' & 48'

33' Thru 48' Roofs (Continuation)

NOTE: See previous pages for assembling the peak cap and slide rods.



NOTE: INSTALL FLASHING AFTER ROOF PANELS HAVE BEEN PLACED



NOTE: SEE PAGE 27 FOR DETAILS ON WHICH CENTER COLLAR HOLES ARE USED FOR FLASHING ATTACHMENT

CRP-4683 (3) RIGHT HAND 33'
CRP-4690 (3) LEFT HAND 33'
CRP-4684 (6) 36' ROOF FLASHING
CRP-5822 (3) RIGHT HAND 39'
CRP-5823 (3) LEFT HAND 39'
CRP-4685 (6) 42' ROOF FLASHING
CRP-5011 (3) RIGHT HAND 45'
CRP-5010 (3) LEFT HAND 45'
CRP-4686 (6) 48' ROOF FLASHING
CRP-5201 (6) 54' ROOF FLASHING (DOME CAP ONLY)
CRP-4766 (6) 60' ROOF FLASHING (DOME CAP ONLY)

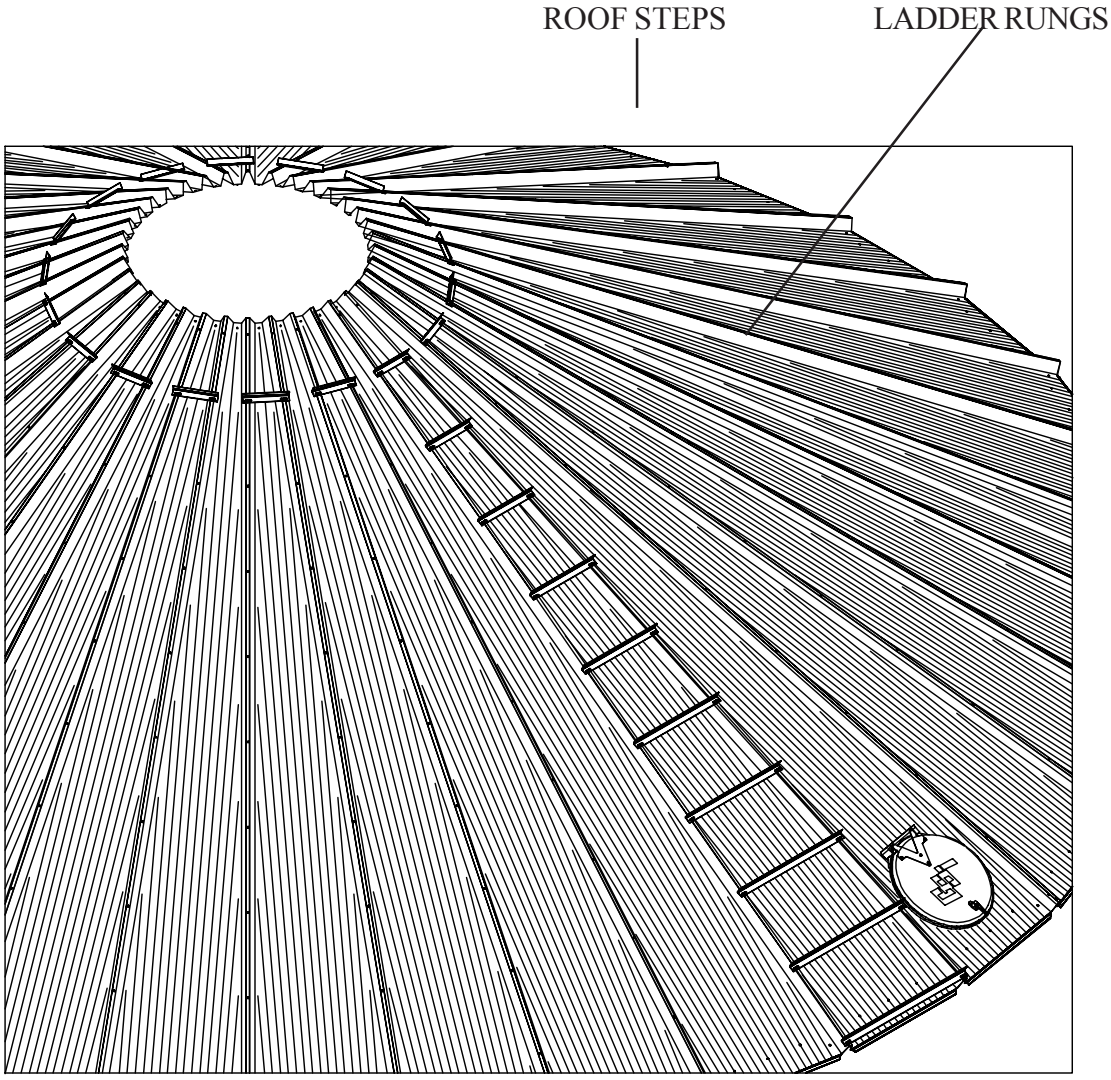
Be sure to install ladder rungs and safety steps as you assemble roof panels (see drawing below). At this point you will have completed assembly of the roof. Do not tighten bolts yet. Optional equipment and accessories should now be installed.

NOTE: When assembling such pieces as roof ladder rungs, remove neoprene washer from bolt and place between the roof and the piece you are adding. This will insure a more protective seal against moisture.

IMPORTANT: Maximum weight to be supported and/or suspended from the roof is to be 6,000 pounds for 12' thru 48' (non-trussed) ONLY.

IMPORTANT: Maximum weight to be supported and/or suspended from the roof is 10,000 lbs for commercial (trussed roof) 39'-60' flattop roof bins. Roof loads should be supported from the flattop or at the second lower "Z" collar.

WARNING!: DO NOT OVERFILL BIN! Stored grain, although heaped in the center should be no higher than the roof eaves at the outer edge. Filling the bin above this point creates excessive internal pressure and may cause swelling and eventual failure of the roof.



ROOF SUPPORT RING INSTRUCTIONS 30 DEGREE ROOF

Roof support rings are standard on all bins up to 48' diameter. A single support ring is standard for 15' diameter bins. Two support rings are standard for 18'-48' diameter bins. All support rings will be placed on the outside of the roof panels.

To determine the location of the support rings start at the narrow or peak of the roof panel and count each hole separately. Having counted down the required distance, install the appropriate brackets. See chart below for proper support ring location.

Expansion bolts should be fully contracted when assembling support rings. When you have completely assembled both rings, (**but before expanding**) tighten all roof bolts including eave clip bolts. Now extend expansion bolts by running the nut out on the threads. This procedure should be continued evenly around the roof until the ring raises the roof to show a slight crown.

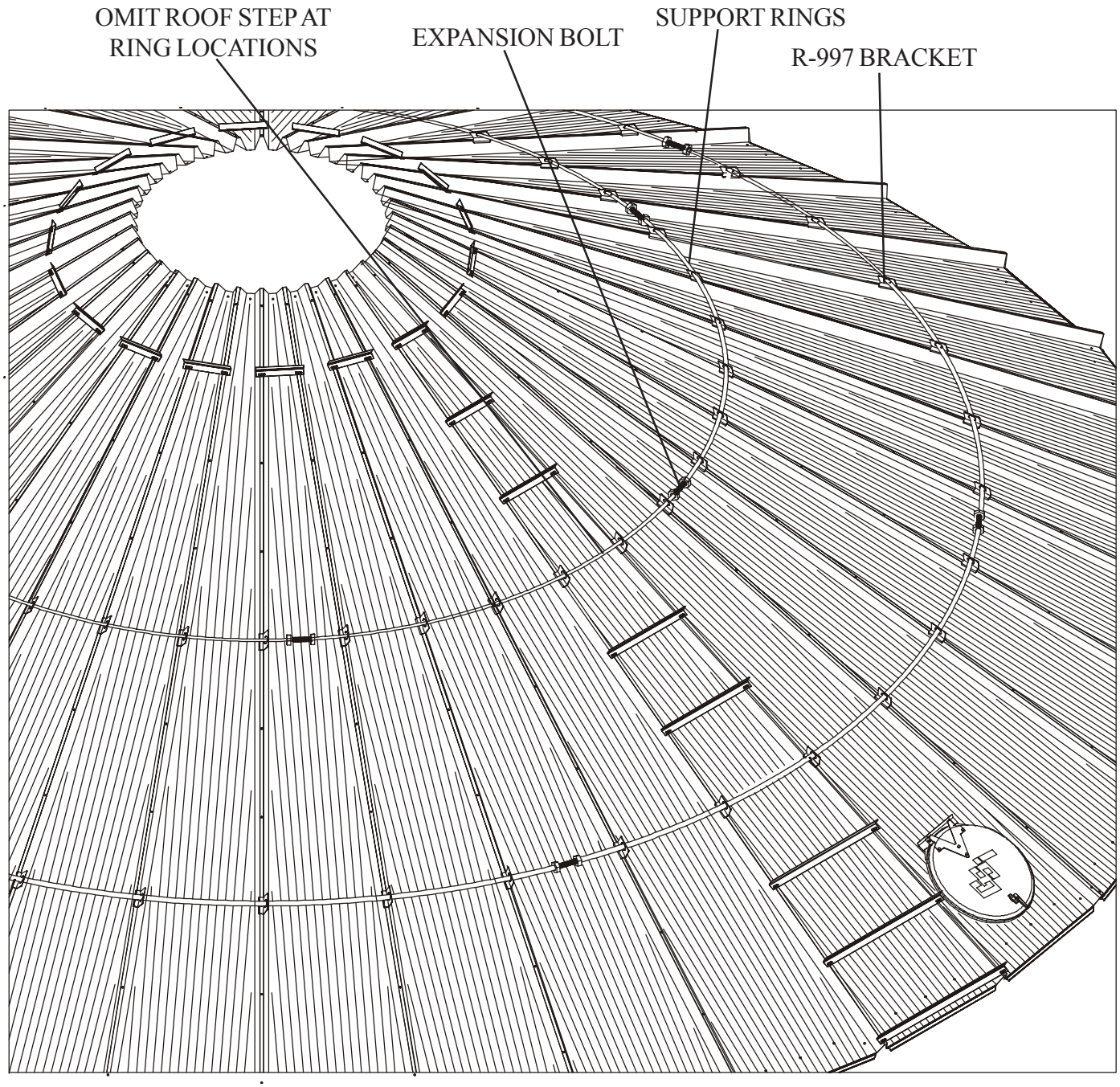
It is possible for the support ring expansion bolts to become dislodged from the ring during high winds or when the inside pressure of your bin is too great. If one expansion bolt is dislodged, the entire ring will become useless. To remedy this situation, holes must be drilled through the support ring and expansion bolt after the rings have been installed and expanded to the correct size. A cotter pin or bolt should be inserted through each hole.

Note: Welding of the expansion nuts to the pipe and expansion bolts or staking the expansion bolt threads to prevent the movement of the jam nut may be done as an option to drilling and pinning.

BIN DIA. SUPPORT RING LOC.	SUPPORT RING LOCATION FROM CENTER	SUPPORT RING COLOR CODE	NUMBER OF PIPES PER RING
15 (T)	3RD HOLE	YELLOW/WHITE	3
18 (T)	3RD HOLE	YELLOW/WHITE	3
18 (B)	4TH HOLE	BLUE/WHITE	4
21 (T)	3RD HOLE	YELLOW/WHITE	3
21 (B)	5TH HOLE	RED/WHITE	5
24 (T)	3RD HOLE	YELLOW/WHITE	3
24 (B)	5TH HOLE	RED/WHITE	5
27 (T)	5TH HOLE	BLUE/WHITE	4
27 (B)	7TH HOLE	OCHRE	6
30 (T)	5TH HOLE	BLUE/WHITE	4
30 (B)	8TH HOLE	LIGHT BLUE	7
33 (T)	3RD HOLE	BLUE/WHITE	4
33(B)	7TH HOLE	GOLD	8
36 (T)	3RD HOLE	BLUE/WHITE	4
36 (B)	7TH HOLE	GOLD	8
39 (T)	7TH HOLE	BROWN/YELLOW	8
39 (B)	10TH HOLE	GOLD/RED	11
42 (T)	7TH HOLE	FL GREEN/BROWN	8
42 (B)	10TH HOLE	FL GREEN/GOLD	11
48 (T)	7TH HOLE	FL GREEN/BROWN	8
48 (B)	11TH HOLE	FL GREEN/PINK	12

See page 32 for safety ring placement on 42' and larger commercial roofs.

NOTE: Last support ring pipe must be cut to length.



Safety Rings as shown on page 33 are optional equipment. Safety rings are optional for 54'-105' diameter tanks and 42'-48' tanks with a commercial roof.

To determine the location of the safety and bridging rings, start at the narrow or peak of the roof panel and count each hole separately. Having counted down the required distance, install the appropriate brackets. See chart below for proper location.

Expansion bolts should be fully contracted when assembling safety and bridging rings. When you have completely assembled both rings, (but before expanding) tighten all roof bolts including eave clip bolts. Now extend expansion bolts by running nut out on threads. This procedure should be continued evenly around the roof until the ring raises the roof to show a slight crown.

SAFETY SUGGESTION: It is possible for safety and bridging ring Expansion Bolts to become dislodged from the ring during high winds or when the inside pressure of your bin is too great. If one Expansion Bolt is dislodged, the entire ring will become useless. To remedy this situation, holes must be drilled through the safety ring and Expansion Bolts after the rings have been installed and expanded to the correct size. A cotter pin or bolt should then be inserted through each hole.

NOTE: *Welding of Expansion Nuts to the pipe and Expansion Bolt may be done as an option to drilling and pinning.*

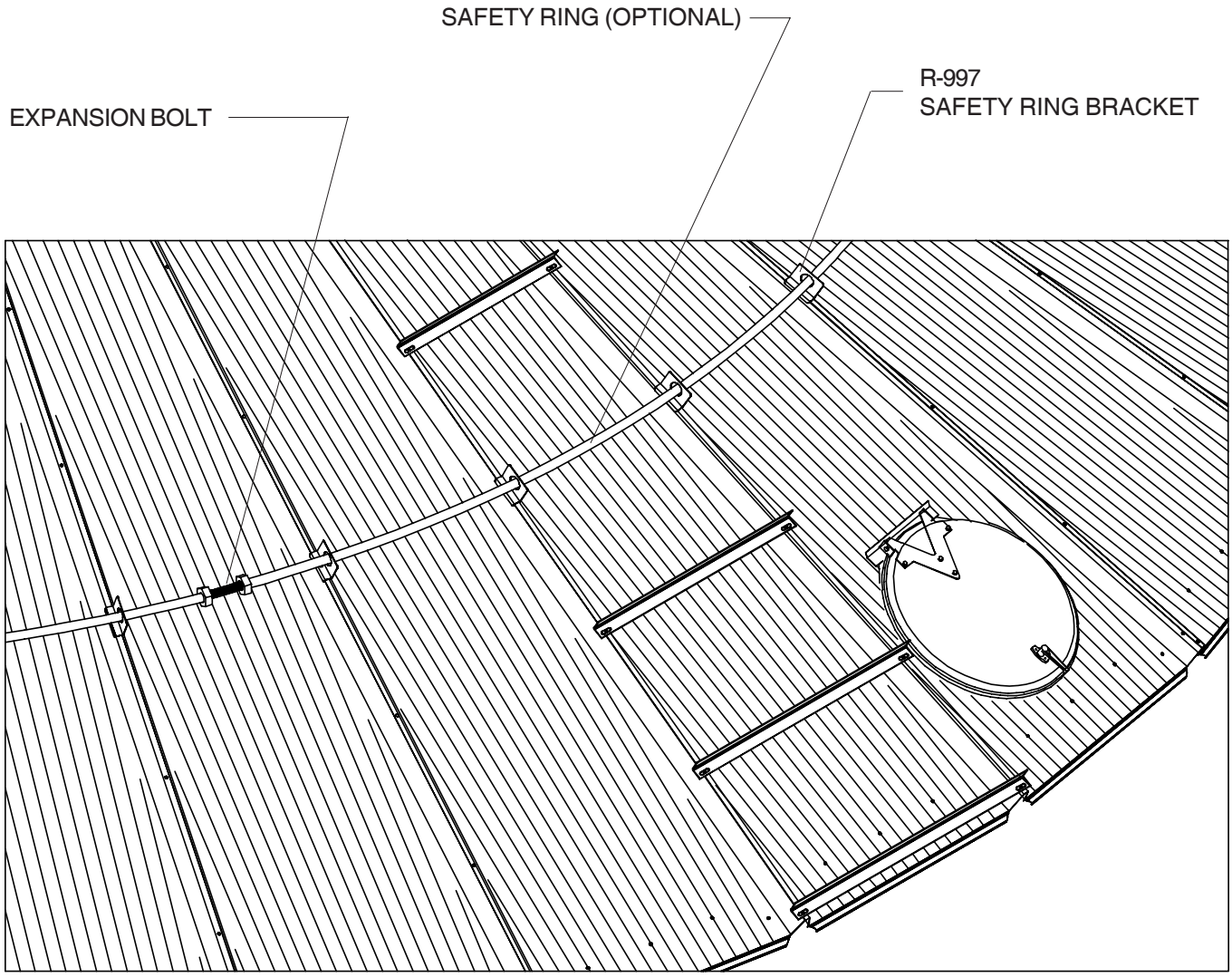
42 FT - 60 FT. DIA. TANKS

BIN DIA.	SAFETY RING LOCATION FROM CENTER	SAFETY RING COLOR CODE	PART NUMBER	COMPLETE SAFETY RING	HARDWARE
42 FT.*	8th HOLE	BLACK	CRP-4752	CRP-4754	PLS-40233
45 FT.*	8th HOLE	BLACK	CRP-4752	CRP-5846	PLS-41943
48 FT.*	9th HOLE	PINK	CRP-4753	CRP-4755	PLS-40234
54 FT.	9th HOLE	PINK	CRP-4753	CRP-5847	PLS-41944
60 FT.	9th HOLE	PINK	CRP-4753	CRP-4799	PLS-40380

*** Commercial Roof Only**. See page 30 for farm roof ring placement.

72 FT - 105 FT. DIA. TANKS

BIN DIA.	SAFETY RING LOCATION FROM BOTTOM OF PANEL	SAFETY RING COLOR CODE	PART NUMBER	COMPLETE SAFETY RING	HARDWARE
72 FT.	5th HOLE UP	PURPLE	CRP-4888	CRP-5717	PLS-41815
75 FT.	6th HOLE UP	PURPLE	CRP-4888	CRP-4890	PLS-40411
78 FT.	6th HOLE UP	PURPLE	CRP-4888	CRP-5174	PLS-40980
90 FT.	8th HOLE UP	BEIGE	CRP-4889	CRP-4891	PLS-40412
105 FT.	10th HOLE UP	ORANGE	CRP-4996	CRP-4997	PLS-40432

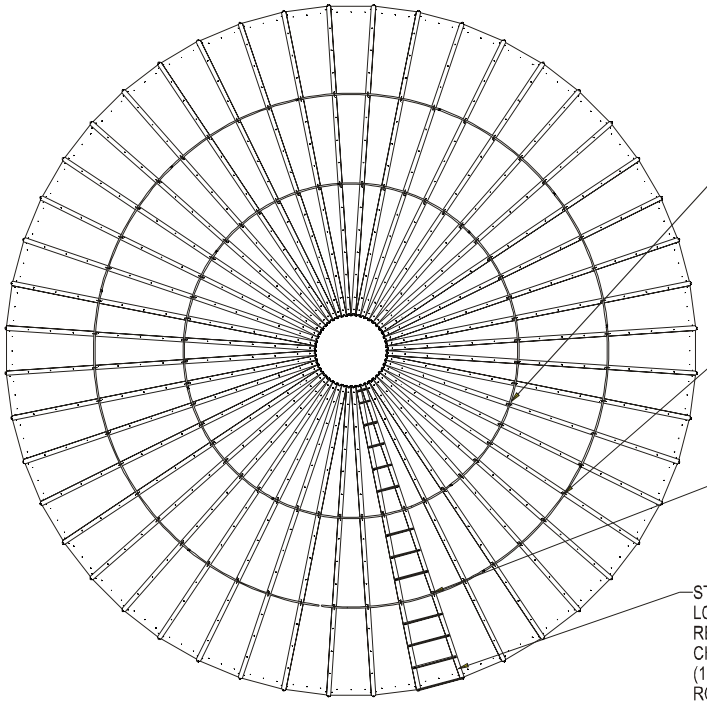


NOTE: Last safety ring/bridging ring pipe will need to be cut to length.

48' Farm Roof Support Instructions

It is recommended to start construction of the roof at the roof ladder sheet and install roof reinforcement channels. Then quarter the roof sheets and fill evenly.

Overhead View



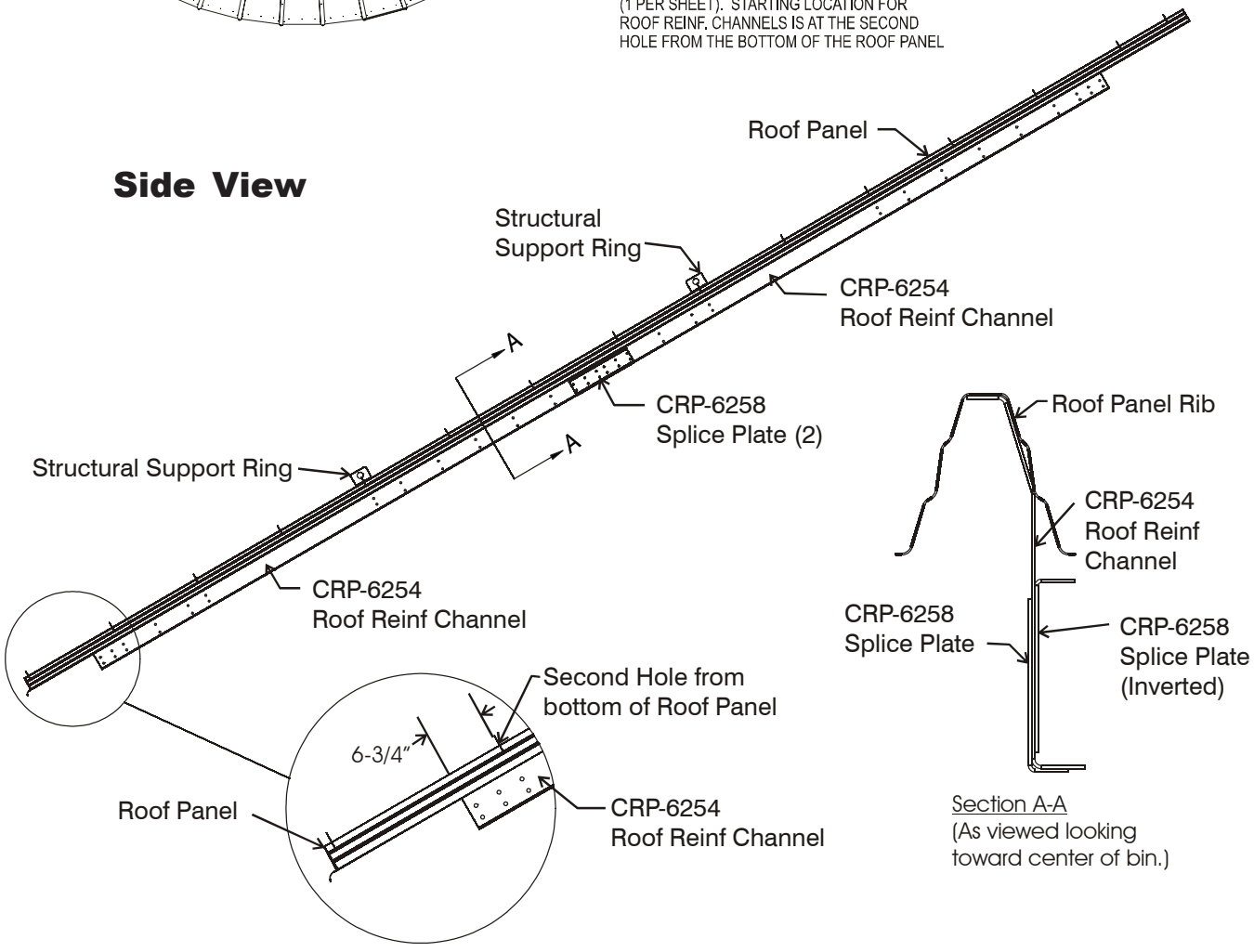
CRP-6158 UPPER SUPPORT RING
8 PIECES REQUIRED COLOR
CODE FL GREEN/ BROWN. RING
LOCATED AT 7TH HOLE FROM TOP

CRP-6189 LOWER SUPPORT RING
(12 PIECES REQUIRED) COLOR
CODE FL GREEN /PINK. RING
LOCATED AT 11TH HOLE FROM TOP

OMIT ROOF LADDER STEPS AT THE
SUPPORT RING LOCATIONS OMIT 30.75"
STEP AT LOWER RING LOCATION AND
20.25" STEP AT UPPER RING LOCATION

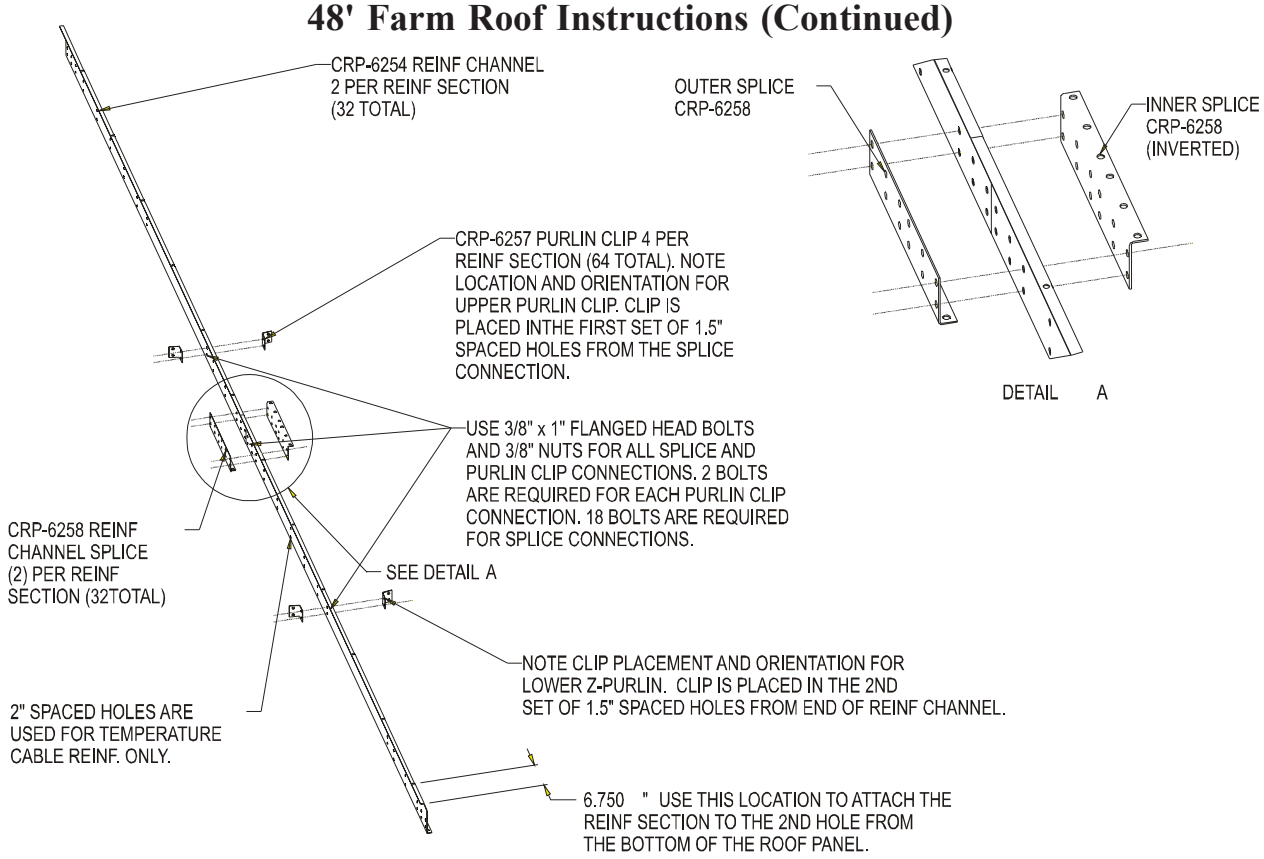
START ROOF REINF. CHANNELS AT ROOF STEP
LOCATION. ROOF LADDER CHANNELS ARE NOT
REQUIRED WITH 48' 6K ROOF. ROOF REINF.
CHANNELS ARE PLACED AT EVERY THIRD RIB
(1 PER SHEET). STARTING LOCATION FOR
ROOF REINF. CHANNELS IS AT THE SECOND
HOLE FROM THE BOTTOM OF THE ROOF PANEL

Side View

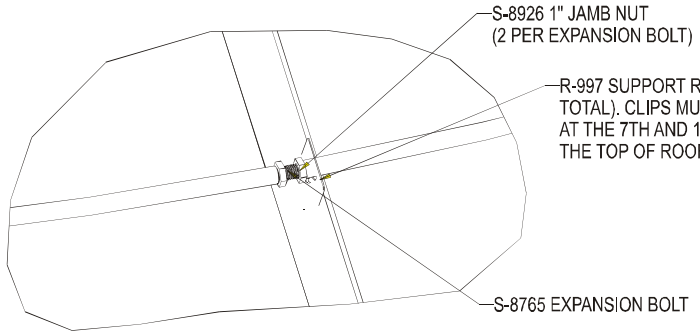


Section A-A
(As viewed looking
toward center of bin.)

48' Farm Roof Instructions (Continued)

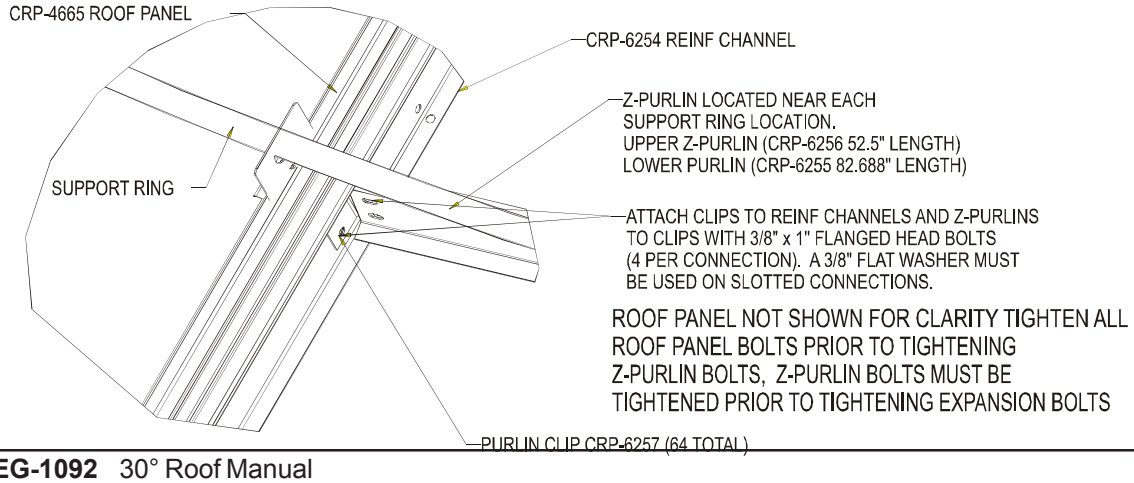


EXPLODED REINF. CHANNEL DETAILS



EXPANSION BOLT DETAIL

TIGHTEN ALL ROOF STRUCTURE BOLTS PRIOR TO TIGHTENING EXPANSION BOLTS. TIGHTEN EXPANSION BOLTS EVENLY ON BOTH RINGS UNTIL ROOF SHOWS A SLIGHT CROWN.



ROOF PANEL NOT SHOWN FOR CLARITY TIGHTEN ALL ROOF PANEL BOLTS PRIOR TO TIGHTENING Z-PURLIN BOLTS, Z-PURLIN BOLTS MUST BE TIGHTENED PRIOR TO TIGHTENING EXPANSION BOLTS

1. Begin roof construction after assembling the two top sidewall rings. Be sure the sidewall rings are round.

2. Attach the top stiffeners and a one ring stiffener as shown on pages (37-40) NCL or pages (41-42) WCL. The top stiffener bolts should be left loose. The roof stiffener bracket fits inside the wall stiffeners.

3. Install the eave clips as shown on Page 46. Every third clip should be located at a roof stiffener. The eave clip bolt and nut must be reversed (bolt head on the inside) at the top stiffener for clearance.

4. Roof trusses should be assembled into complete rafters for installation. This should include the roof truss sections, roof splices, truss channel brackets and roof stiffener clips. Tighten all splice bolts with trusses positioned to create a straight truss (straight truss assemblies with tight connections will prevent possible problems in later construction).

5. After placing the "Z" collar at the correct center height, begin installation of the truss assemblies. Attach a roof truss assembly to a roof stiffener bracket with a partially tightened bolt. Raise the top of the truss assembly and bolt to the "Z" collar using 5/16" x 1 1/4" bolts (do not tighten the bolts at this time). Be sure to use 5/16" washers on the slots in the truss clip. Complete bolting to the roof stiffener bracket. The truss assembly must be stabilized at this point.

6. Place two roof sheets on the truss assembly, one on each side of the rafter. The 5/16" x 1 1/4" bolts in the "Z" collar must be removed and replaced through each roof sheet as they are positioned. Use 5/16" x 1 1/4" bolts to connect the roof sheet ribs to the truss assembly. Be sure at least two 5/16" x 1 1/4" bolts are placed in each roof sheet at the eave clip connections. These roof sheets will stabilize the roof truss and center "Z" collar assembly.

7. Repeat steps 5 and 6 on the opposite side of the bin and then at the one quarter position around the bin until four rafter assemblies are erected with two roof sheets each at four equally spaced positions.

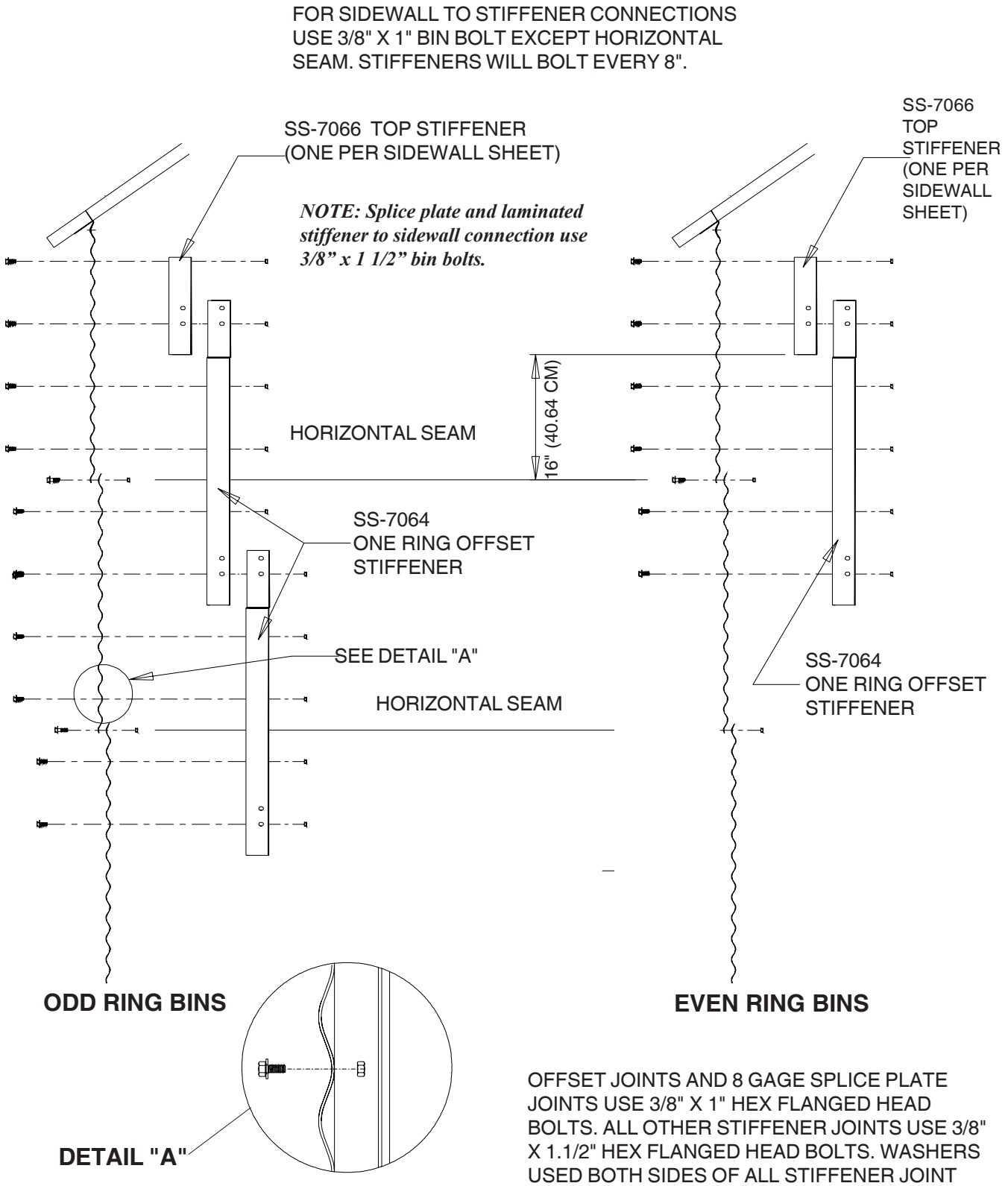
8. Connect the remaining rafter assemblies. Truss channels should be installed with each additional rafter assembly. Tighten the bolts on one end of the channel with the channel positioned as close as possible to the roof rafter splice. This will stabilize the truss assembly and hold it in a vertical position. The screw jack (supplied with the 60' roof) or similar device may be needed to install the final truss channels. Install the tension rods as shown in Pages 46.

9. After completing the rafter system with all truss channels installed, the remaining roof sheets may be bolted on the trusses. Be sure to install all roof ladder steps, intermediate eave clips and any other necessary accessories.

10. Install the flattop as shown on page 47. For bins with a dome cap option (which includes FCDL tanks), the small center collar, roof flashing, and roof cap assembly can be installed as a complete unit. See details on page 28. Be sure to tighten all connections in the roof rafter system and related parts.

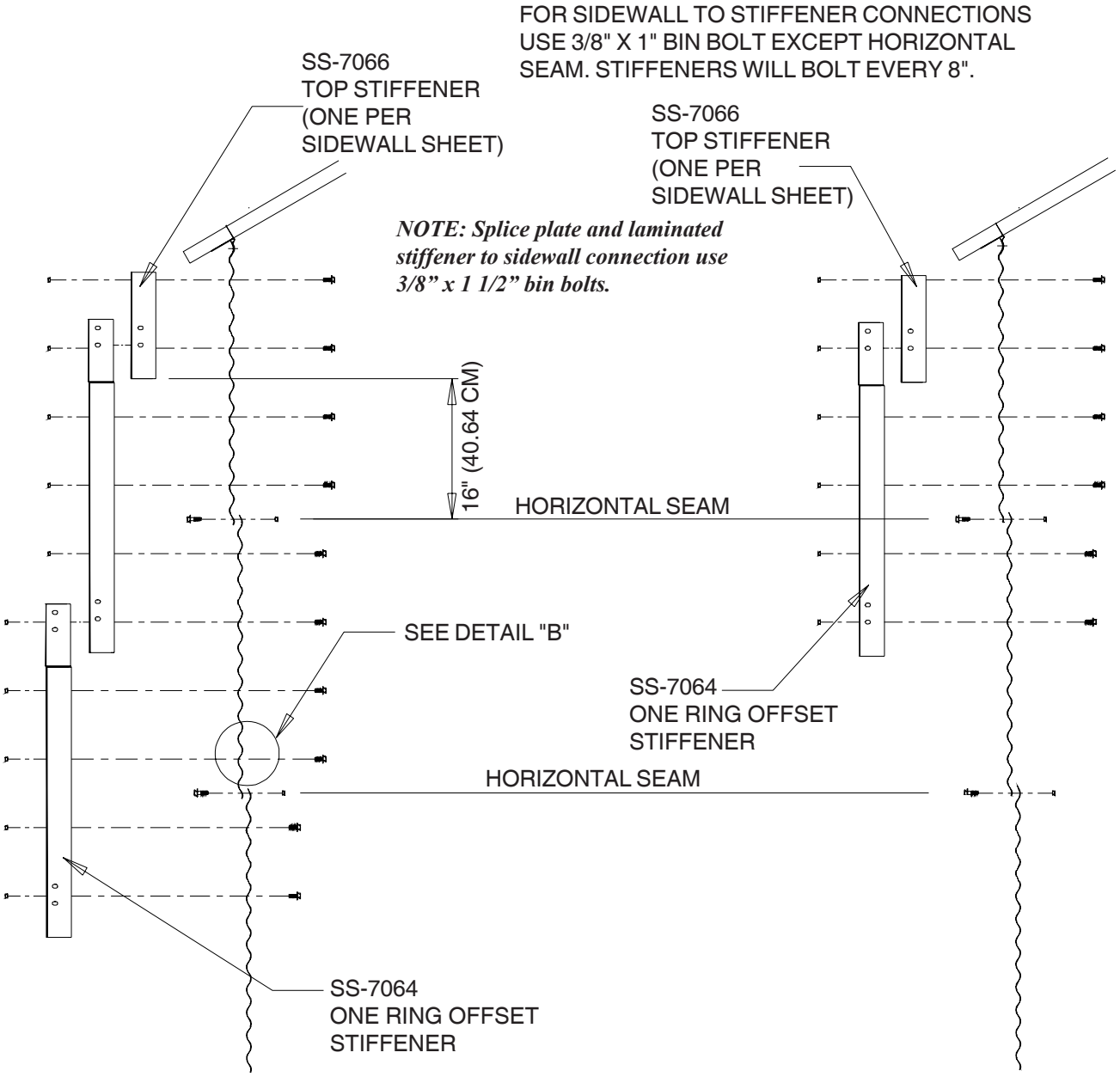
11. Apply the peak load on the flattop on the 2nd, lower "Z" collar.

3 Stiffeners Per Sidewall Sheet Commercial Stiffener Starting Location - 39' Dia. To 105' Dia. 2.66" Corrugation Inside Stiffener Only

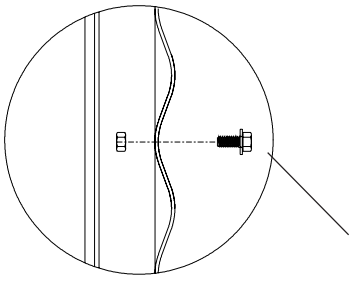


OFFSET JOINTS AND 8 GAGE SPLICE PLATE JOINTS USE 3/8" X 1" HEX FLANGED HEAD BOLTS. ALL OTHER STIFFENER JOINTS USE 3/8" X 1.1/2" HEX FLANGED HEAD BOLTS. WASHERS USED BOTH SIDES OF ALL STIFFENER JOINT CONNECTIONS.

3 Stiffeners Per Sidewall Sheet
Commercial Stiffener Starting Location - 39' To 105' Dia.
2.66" Reverse Corrugation Outside Stiffener Only



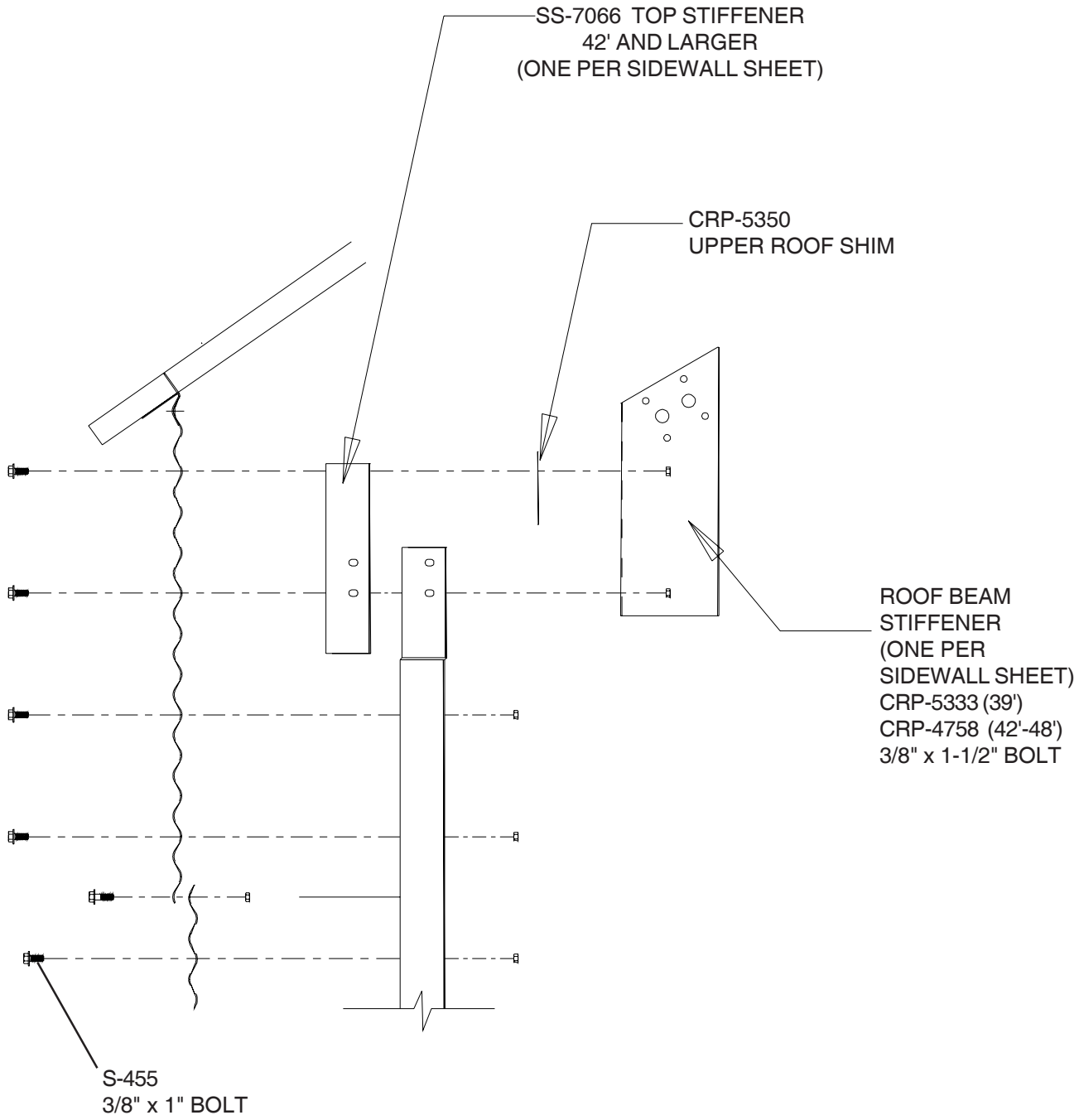
ODD RING BINS **EVEN RING BINS**



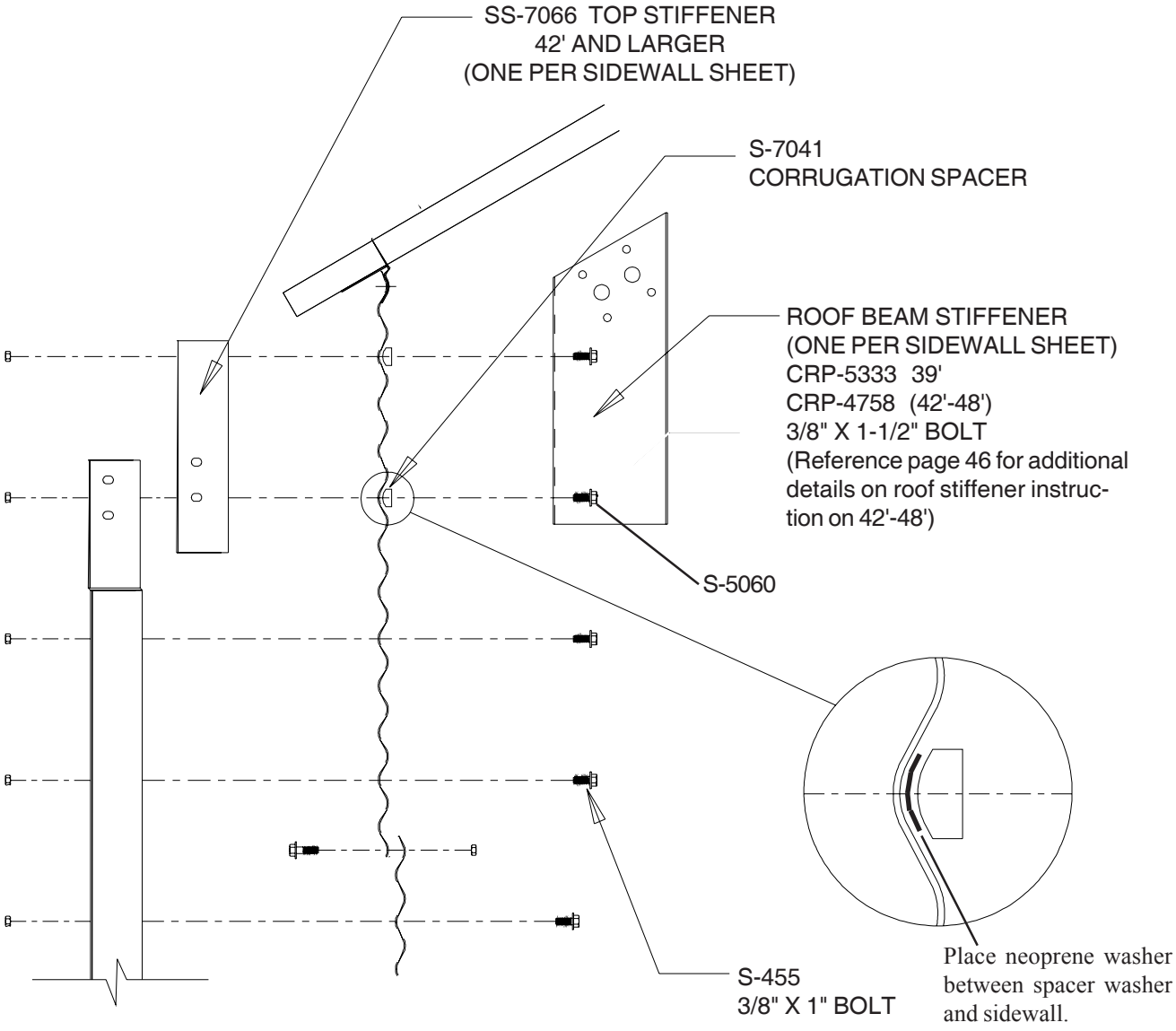
DETAIL "B"

OFFSET JOINTS AND 8 GAGE SPLICE PLATE JOINTS USE 3/8" X 1" HEX FLANGED HEAD BOLTS. ALL OTHER STIFFENER JOINTS USE 3/8" X 1.1/2" HEX FLANGED HEAD BOLTS. WASHERS USED BOTH SIDES OF ALL STIFFENER JOINT CONNECTIONS.

39' Thru 48' Standard Roof Stiffener Detail
2.66" Corrugation Inside Stiffener Only



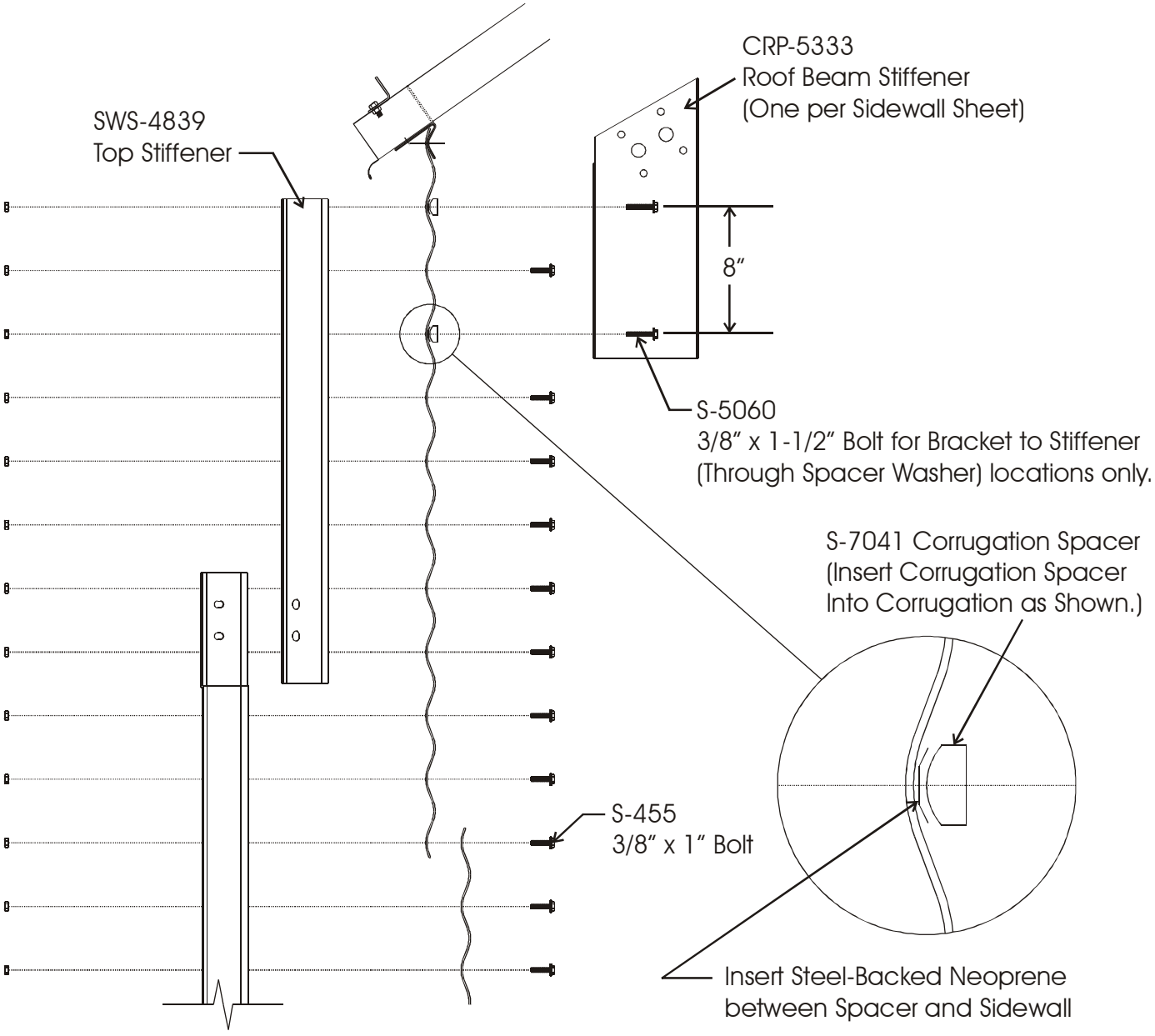
39' Thru 48' Standard Roof Stiffener Detail
2.66" Corrugation Outside Stiffener Only



NOTE: Insert corrugation spacer (S-7041) into corrugation.

39’ Dia. Standard Roof Standard Roof Stiffener Detail
4” Corrugation - Outside Stiffened

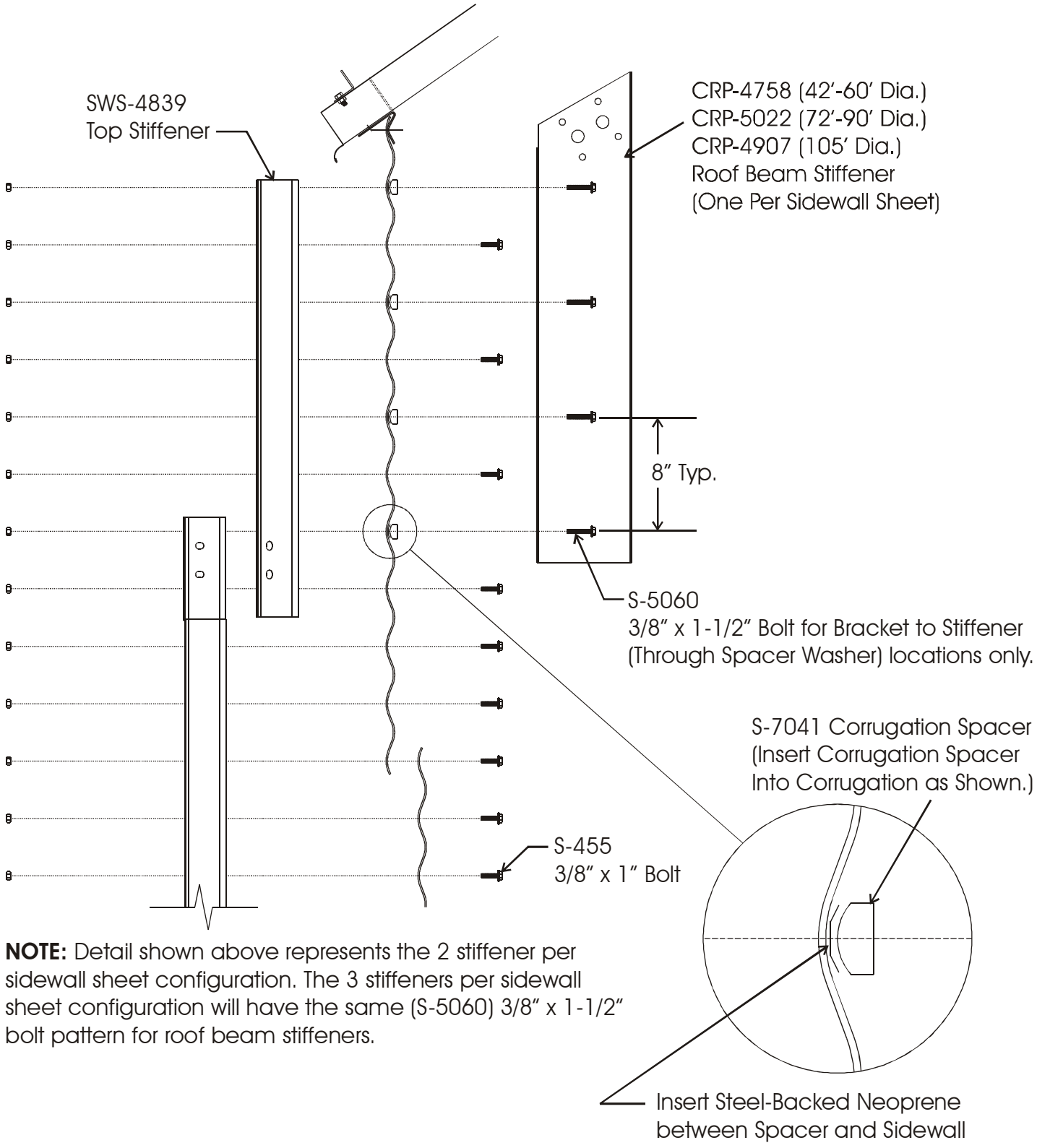
NOTE: All tanks are stiffened to the eave.



NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8” x 1-1/2” bolt pattern for roof beam stiffeners.

42' Thru 105' Dia. Standard Commercial Roof Standard Roof Stiffener Detail
4" Corrugation - Outside Stiffened
10,000 Lb. Peak Load Roof

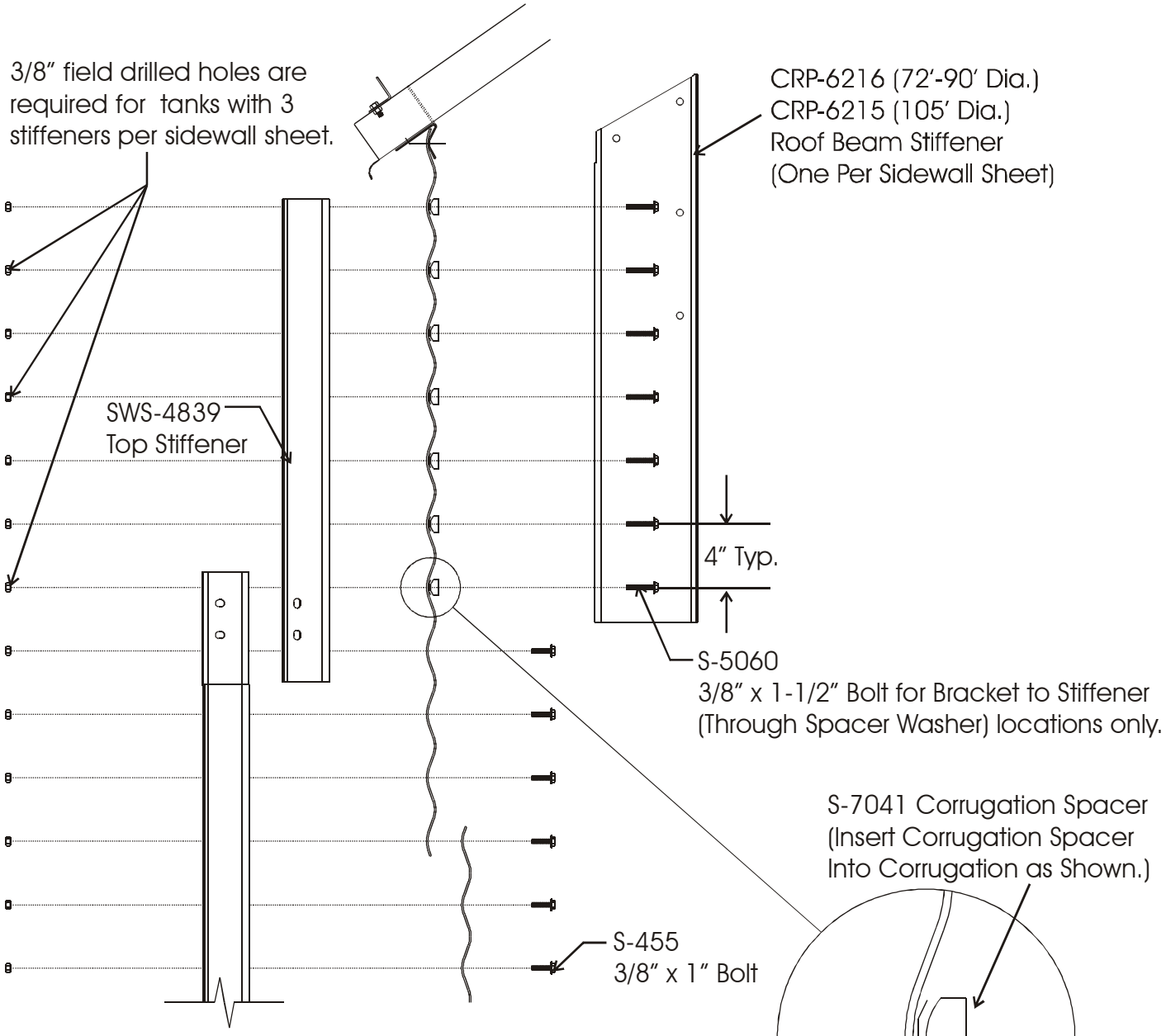
NOTE: All tanks are stiffened to the eave. See Farm Roof instructions for FCDL tanks without a commercial roof (11 rings and shorter).



NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8" x 1-1/2" bolt pattern for roof beam stiffeners.

72' Thru 105' Dia. Standard Roof Standard Roof Stiffener Detail
4" Corrugation - Outside Stiffened
20,000 Lb. Peak Load Roof

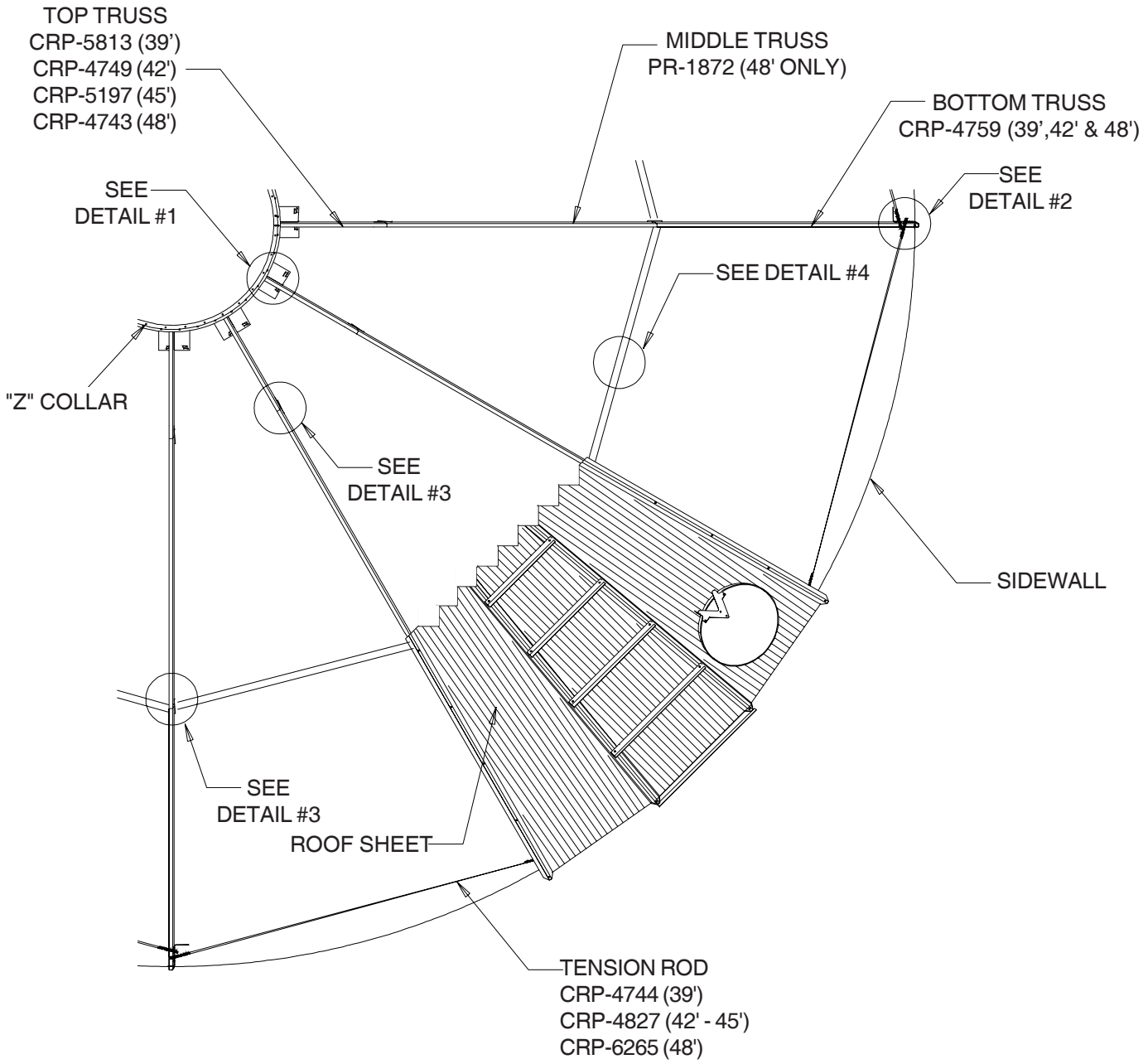
NOTE: All tanks are stiffened to the eave.



NOTE: Detail shown above represents the 2 stiffener per sidewall sheet configuration. The 3 stiffeners per sidewall sheet configuration will have the same (S-5060) 3/8" x 1-1/2" bolt pattern for roof beam stiffeners.

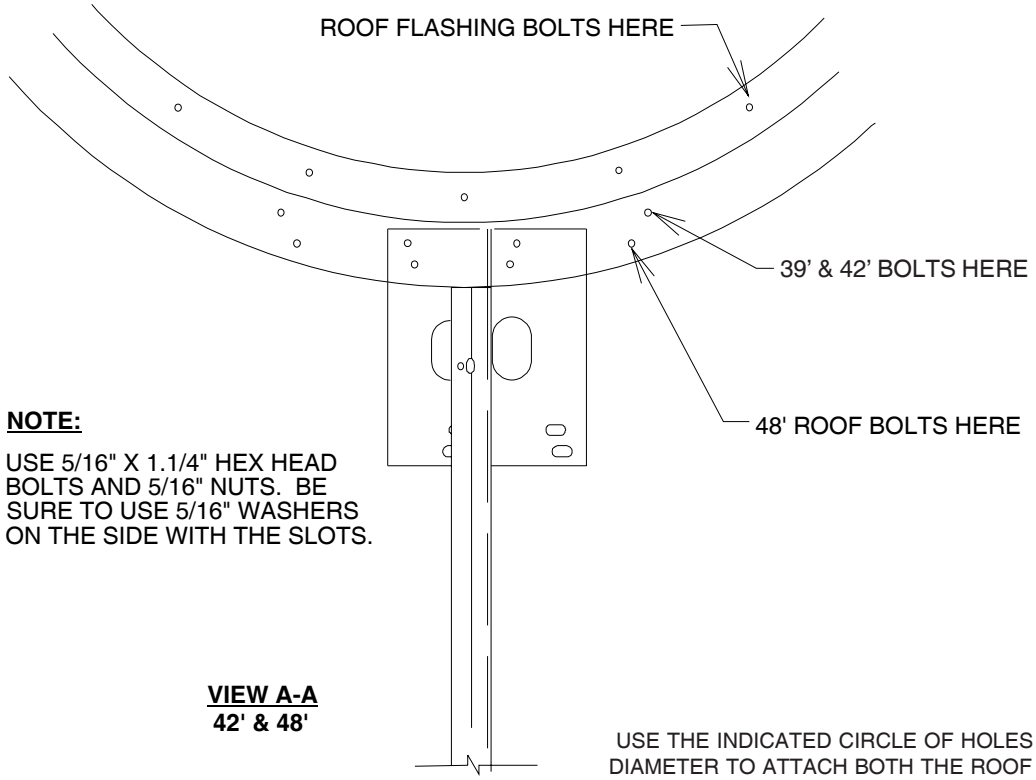
39', 42', 45' & 48' Commercial Roof Assembly Instructions

2 Sections per rafter on 39' diameter bins.
2 Sections per rafter on 42' diameter bins.
2 Sections per rafter on 45' diameter bins.
3 Sections per rafter on 48' diameter bins.



39',42',45' & 48' Roof Truss Assembly

DETAIL #1

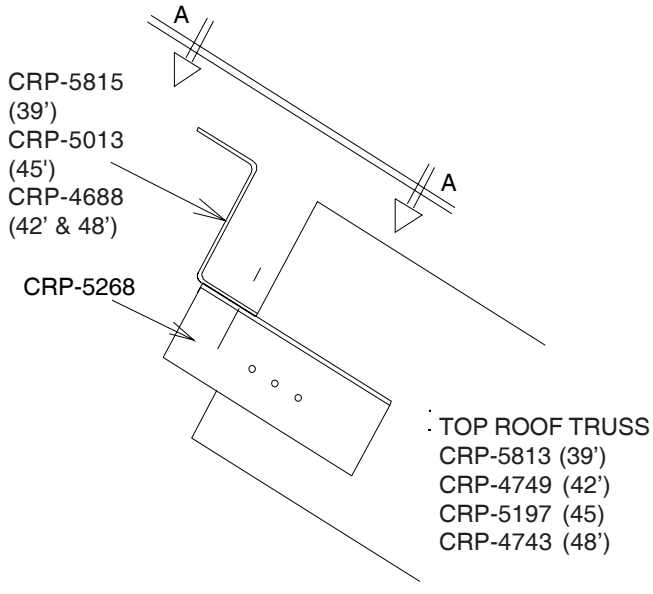


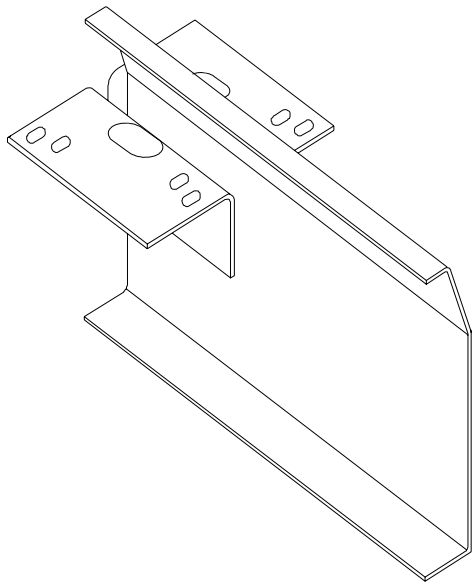
NOTE:

USE 5/16" X 1.1/4" HEX HEAD BOLTS AND 5/16" NUTS. BE SURE TO USE 5/16" WASHERS ON THE SIDE WITH THE SLOTS.

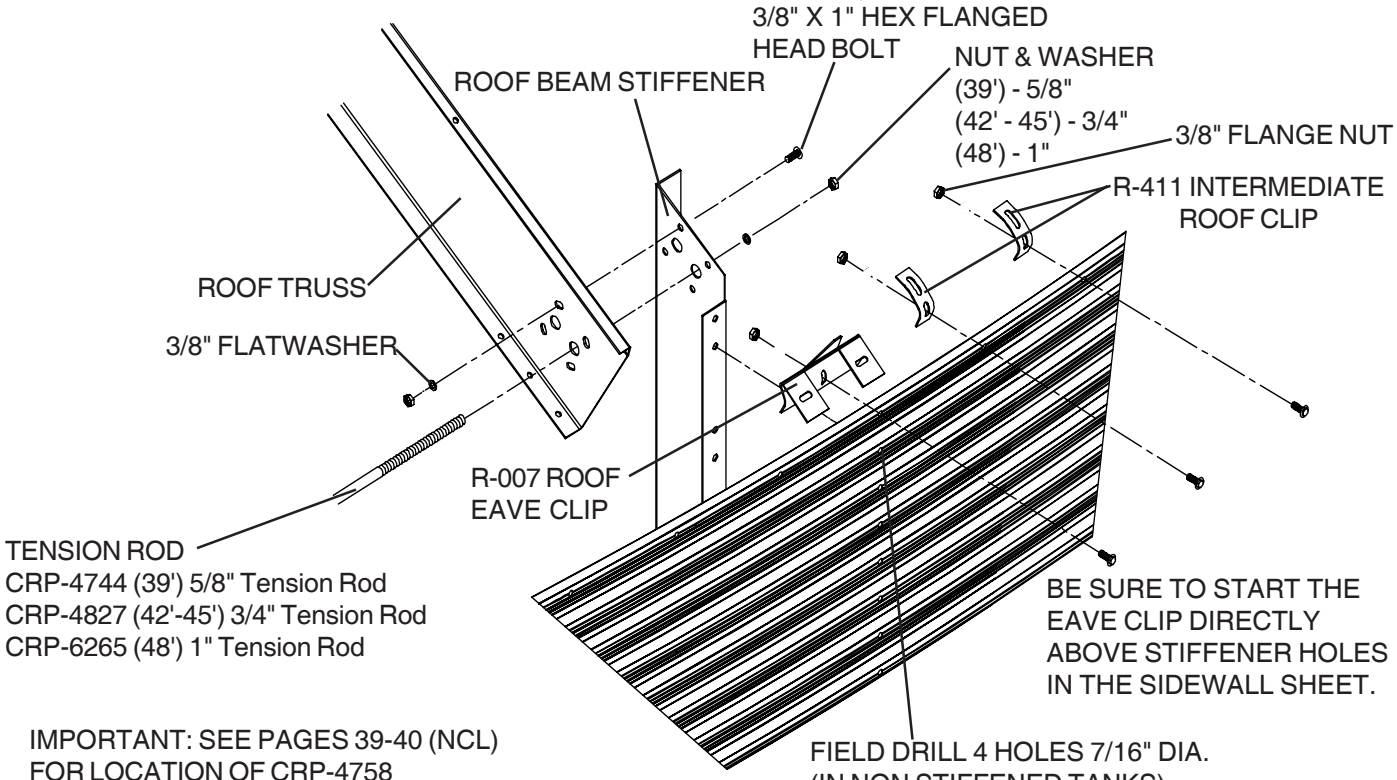
VIEW A-A
42' & 48'

USE THE INDICATED CIRCLE OF HOLES FOR YOUR DIAMETER TO ATTACH BOTH THE ROOF PANEL AND TRUSS CLIPS TO THE CENTER COLLAR. REFERENCE NOTE 5 OF THE WRITTEN INSTRUCTIONS ON PAGE 36





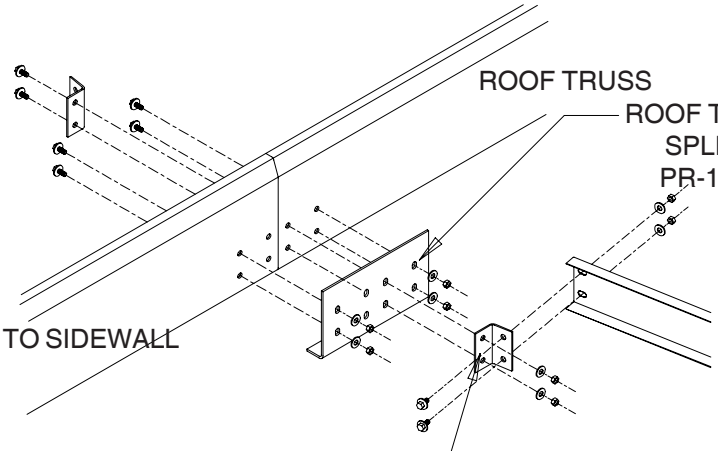
39', 42, 45' & 48' Roof Truss Assembly (Continuation)



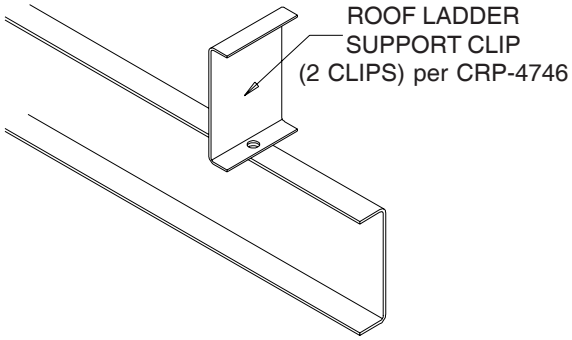
DETAIL #2

ADJUST TENSION RODS TO SLIGHT TENSION **(DO NOT OVERTIGHTEN)** BEFORE REMOVING CENTER SUPPORT JACK.

3/8" X 1.1/2" (2) HEX FLANGED HEAD BOLTS TO ATTACH TRUSS CHANNEL BRACKET TO ROOF TRUSS. 3/8" X 1" HEX FLANGED HEAD BOLTS FOR TRUSS SPLICE, TRUSS CHANNEL CONNECTIONS (14) 2 FLATWASHERS FOR ALL CONNECTIONS.



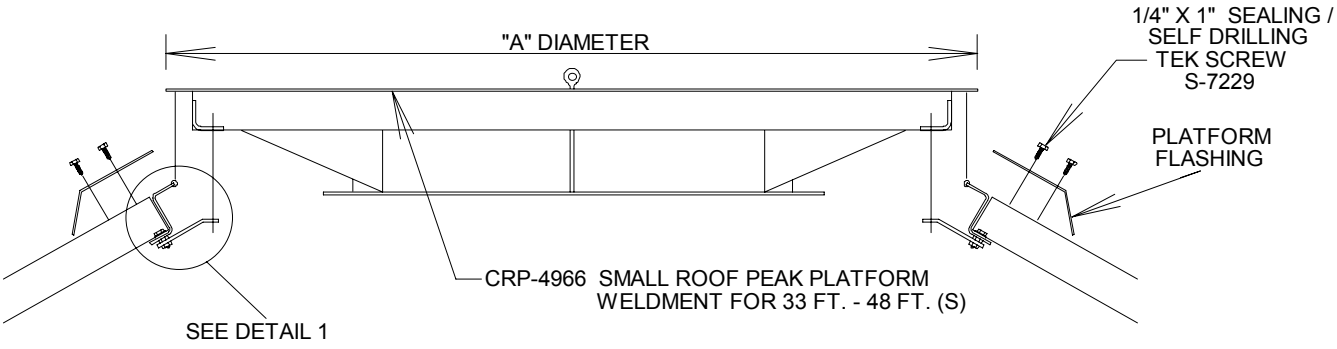
DETAIL #3



DETAIL #4

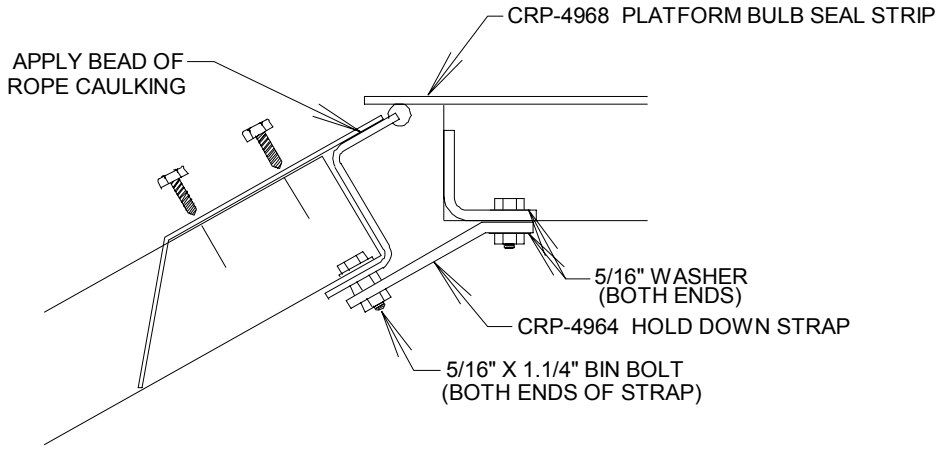
NOTE: Clip fits up into roof rib under the roof ladder

33'-48' Flat Top instructions



"A" DIAMETER:
SMALL = 61.25" (155.6 cm)

* NOTE: ON 33 FT. (10.06 M) AND 42 FT. (12.80 M) ROOFS, THE ROOF NOSE BOLT CANNOT BE SHARED WITH THE PLATFORM HOLD DOWN STRAP. LOCATE 6 EQUALLY SPACED BOLTS IN THE BOTTOM ROW OF THE 6 FT. (1.83 M) "Z" COLLAR TO ACCEPT THIS STRAP ON THESE ROOFS. DOUBLE NUT THE 6 BOLT LOCATIONS AS SHOWN IN DETAIL 1.



DETAIL #3

54'-60' Commercial Roof Written instructions

1. Reference 54'-60' Commercial Roof Assembly instructions on the following pages. Begin roof construction after assembling the two top sidewall rings. Be sure the sidewall rings are round.

2. Attach the top stiffeners and a one ring stiffener as shown on Page 51-52 (NCL) and pages 42 (WCL). The top stiffener bolts should be left loose. The roof stiffener bracket fits inside the wall stiffeners on inside stiffened tanks.

3. Install the eave clips as shown on Page 55. Every third clip should be located at a roof stiffener. The eave clip bolt and nut must be reversed (bolt head on the inside) at the top stiffener for clearance.

4. Roof trusses should be assembled into complete rafters for installation. This should include the roof truss sections, roof splices, truss channel brackets and roof stiffener clips reference Pages 50, 54-57. Tighten all splice bolts with trusses positioned to create a straight truss (straight truss assemblies with tight connections will prevent possible problems in later construction).

5. After placing the peak ring weldment [CRP-6096 (60') & CRP-6120 (54')] at the correct center height, begin installation of the truss assemblies. Attach a roof truss assembly to a roof stiffener bracket with a partially tightened bolt. Raise the top of the truss assembly and bolt to the peak ring weldment using 3/8" x 1 1/2" bolts (do not tighten the bolts at this time). Be sure to use 3/8" washers on the slots in the attachment clip. Finish bolting the truss assembly to the roof stiffener bracket. The truss assembly must be stabilized at this point. Attach the "Z" collar supports to the peak ring at this time. The "Z" collar is to be loosely attached to the "Z" collar supports. It may be necessary to field drill these holes to allow proper alignment of roof sheets. Reference page 54.

6. Place two roof sheets on the truss assembly, one on each side of the rafter. Use 5/16" x 1 1/4" bolts to connect the roof sheet ribs to the truss assembly. Be sure at least two 5/16" x 1 1/4" bolts are placed in each roof sheet at the eave clip connections. These roof sheets will stabilize the roof truss and center "Z" collar assembly. It is important that the roof sheets are properly aligned with the "Z" collar. It may be necessary to rotate the "Z" collar slightly to allow proper alignment of the roof sheets.

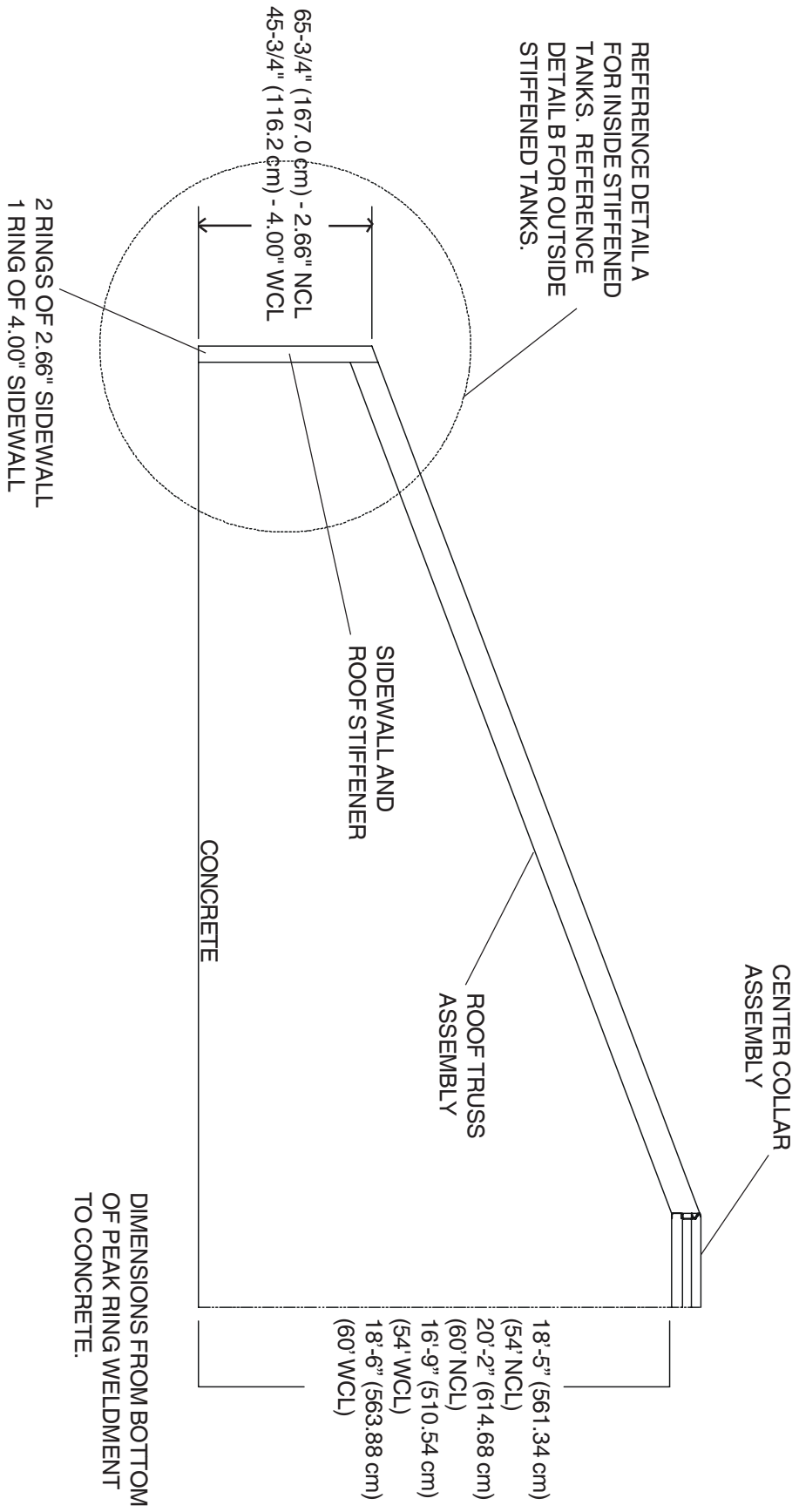
7. Repeat steps 5 and 6 on the opposite side of the bin and then at the one quarter position around the bin until four rafter assemblies are erected with two roof sheets each at four equally spaced positions.

8. Connect the remaining rafter assemblies. Truss channels should be installed with each additional rafter assembly. Tighten the bolts on one end of the channel with the channel positioned as close as possible to the roof rafter splice. This will stabilize the truss assembly and hold it in a vertical position. Place rib support clips under roof panel ribs and bolt to slot in truss channel. The screw jack (supplied with the 60' roof) or similar device may be needed to install the final truss channels. Install the 3/4" tension rods as shown in page 55.

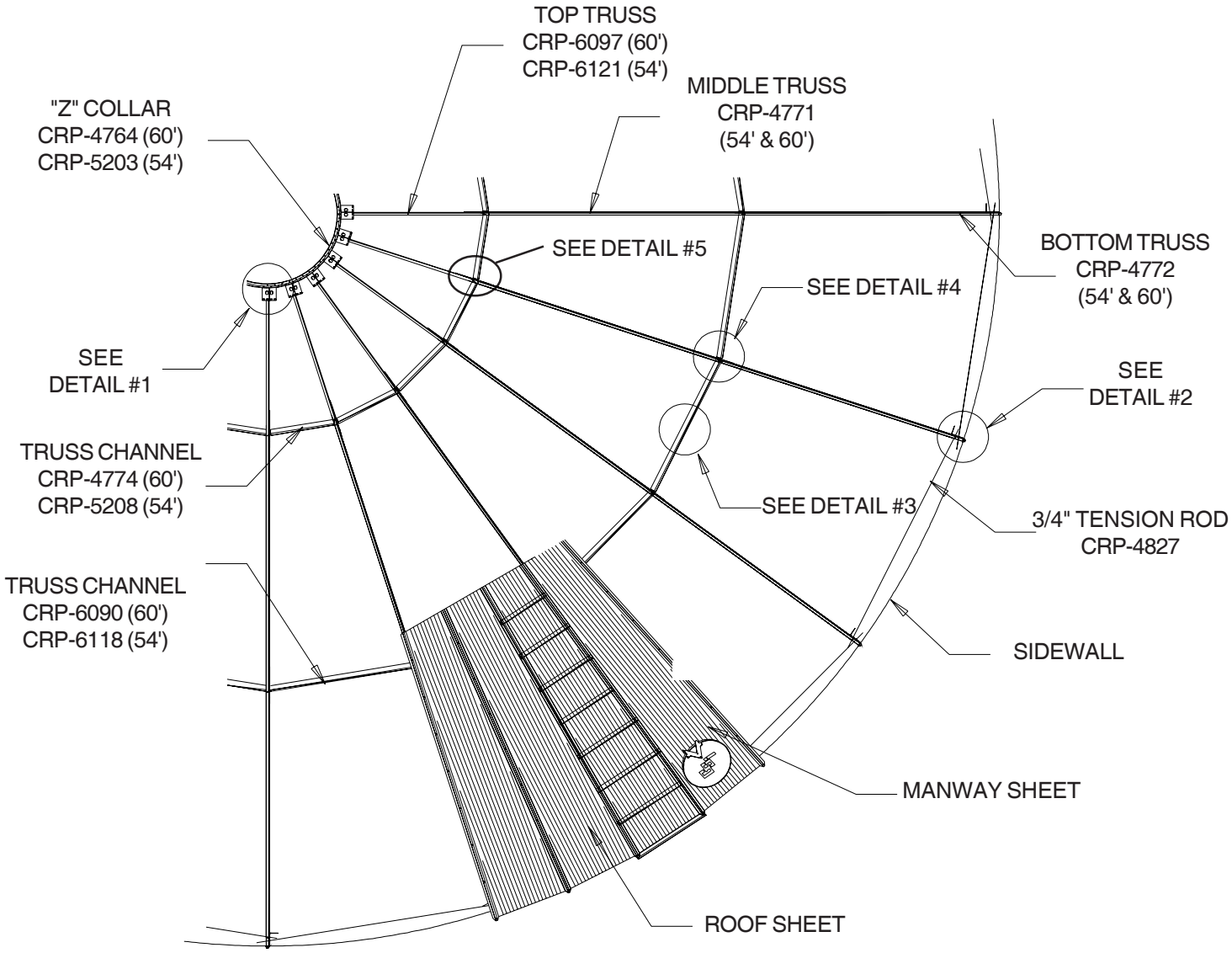
9. After completing the rafter system with all truss channels installed, the remaining roof sheets may be bolted on the trusses. Be sure to install all roof ladder steps, intermediate eave clips and any other necessary accessories. Tighten all roof panel bolts at this time.

10. The roof peak platform weldment (CRP-4967) can be installed at this time. Reference page 58 for platform and flashing installation.

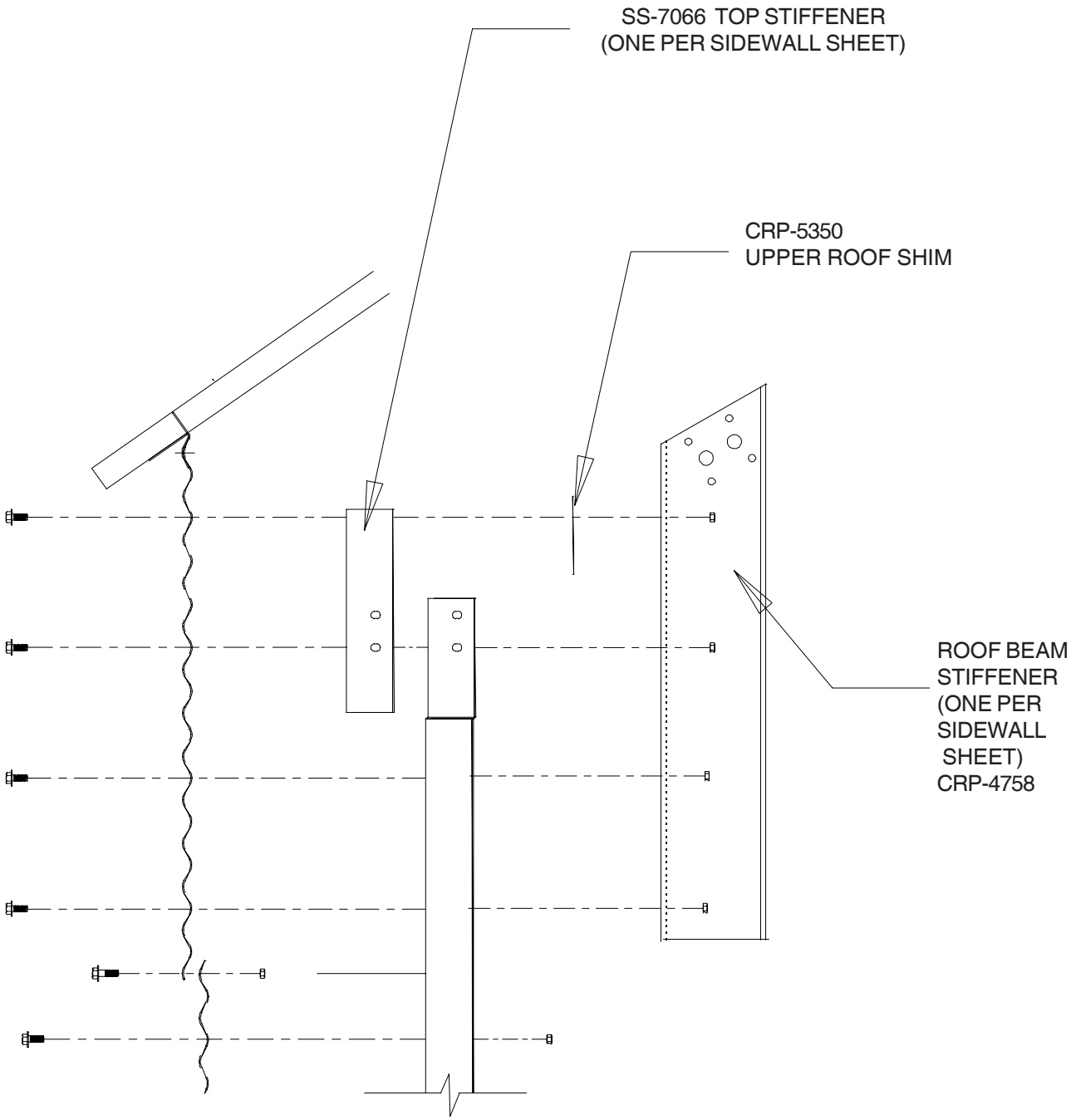
11. If a dome cap is to be installed instead of the peak platform weldment, reference page 28 for dome cap installation details.


REFERENCE DETAIL A
FOR INSIDE STIFFENED
TANKS. REFERENCE
DETAIL B FOR OUTSIDE
STIFFENED TANKS.
65-3/4" (167.0 cm) - 2.66" NCL
45-3/4" (116.2 cm) - 4.00" WCL
2 RINGS OF 2.66" SIDEWALL
1 RING OF 4.00" SIDEWALL
SIDEWALL AND
ROOF STIFFENER
CONCRETE
ROOF TRUSS
ASSEMBLY
CENTER COLLAR
ASSEMBLY
18'-5" (561.34 cm)
(54' NCL)
20'-2" (614.68 cm)
(60' NCL)
16'-9" (510.54 cm)
(54' WCL)
18'-6" (563.88 cm)
(60' WCL)
DIMENSIONS FROM BOTTOM
OF PEAK RING WELDMENT
TO CONCRETE.

54', & 60' Commercial Roof Assembly Instructions

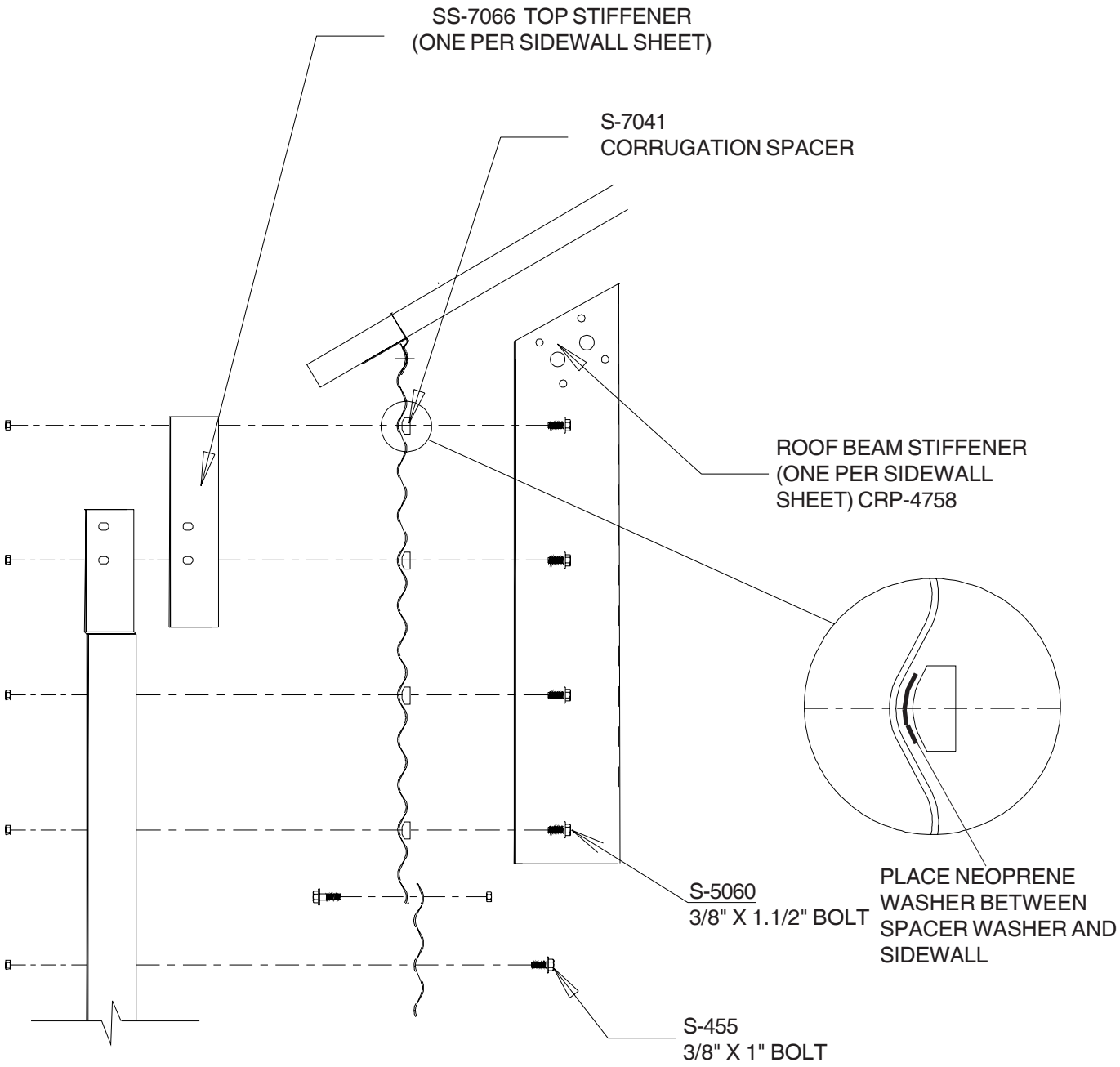


54’-60' Dia. Roof Stiffener Detail
2.66" Corrugation Inside Stiffener Only



DETAIL A

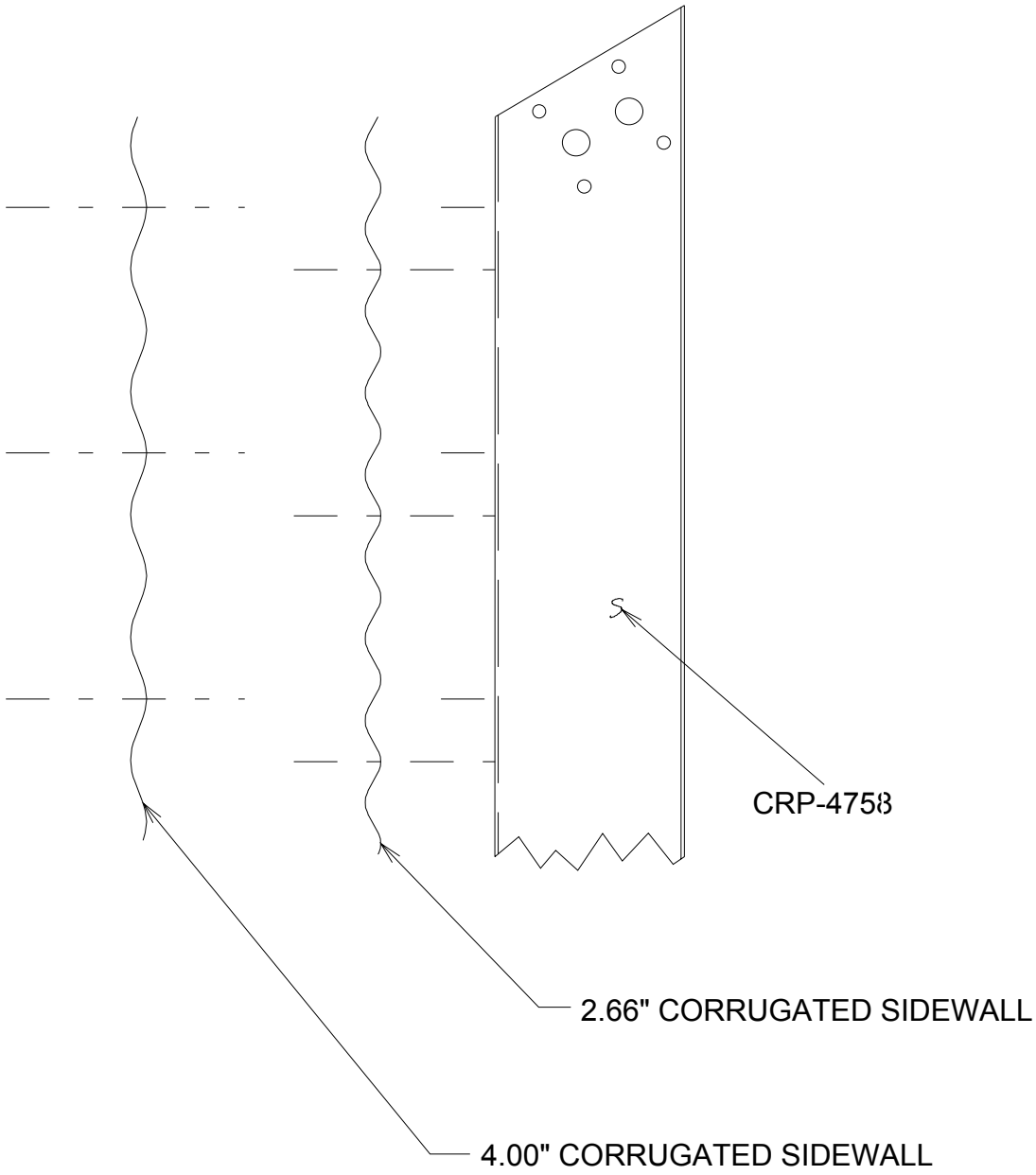
54’-60' Dia. Roof Stiffener Detail
2.66" Corrugation Outside Stiffener Only



NOTE: Insert corrugation spacer (S-7041) into corrugation.

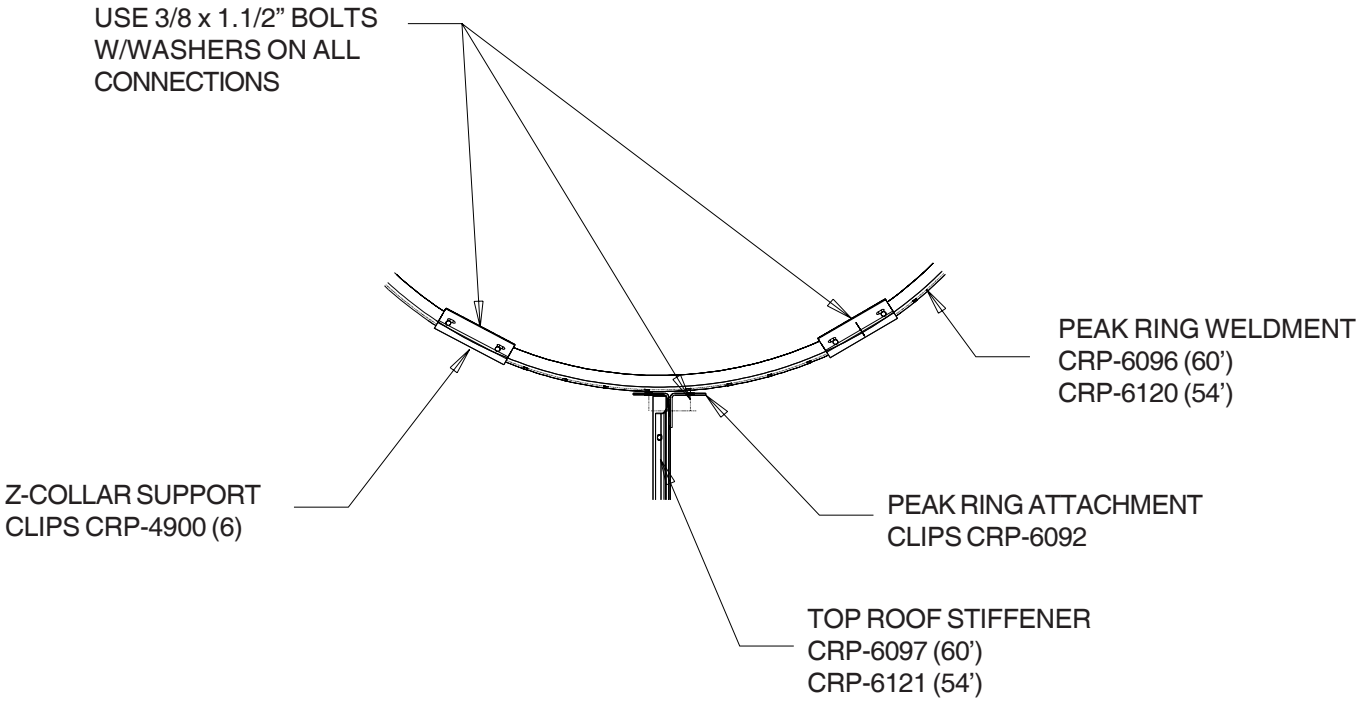
DETAIL B

54'-60'Roof Beam Stiffener Detail for Unstiffened 2.66" and 4.00" Bins.

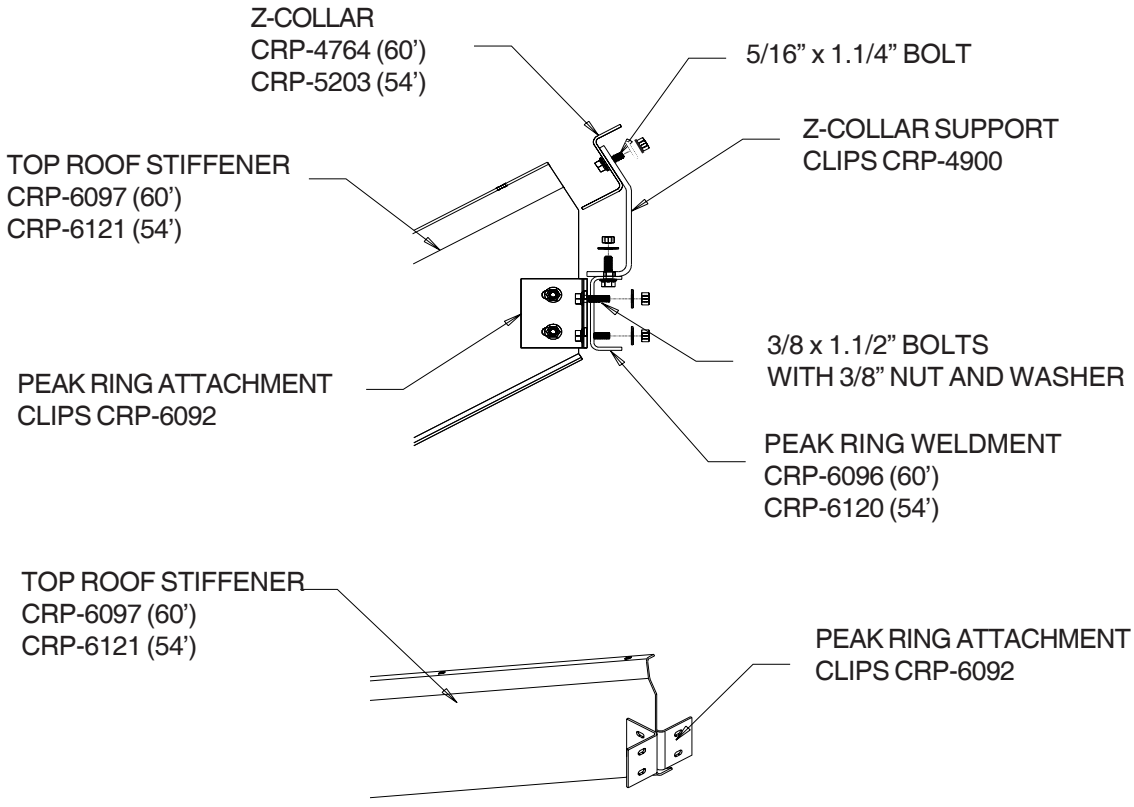


Detail #2A

For proper location of the roof beam stiffener (CRP-4758) in relation to 2.66" or 4.00" corrugation refer to the diagram above. Roof beam stiffener has a double set of holes on the side that bolts to sidewall. Use top hole of each set of holes with the 4.00" corrugated sidewall. Use the first inside hill on the 4.00" corrugated sidewall to locate stiffener properly. Use bottom hole of the set of holes for 2.66" corrugated sidewall. Start with the second inside hill on 2.66" corrugated sidewall to locate stiffener properly. Field drill holes for roof beam stiffeners on non-stiffened bins.

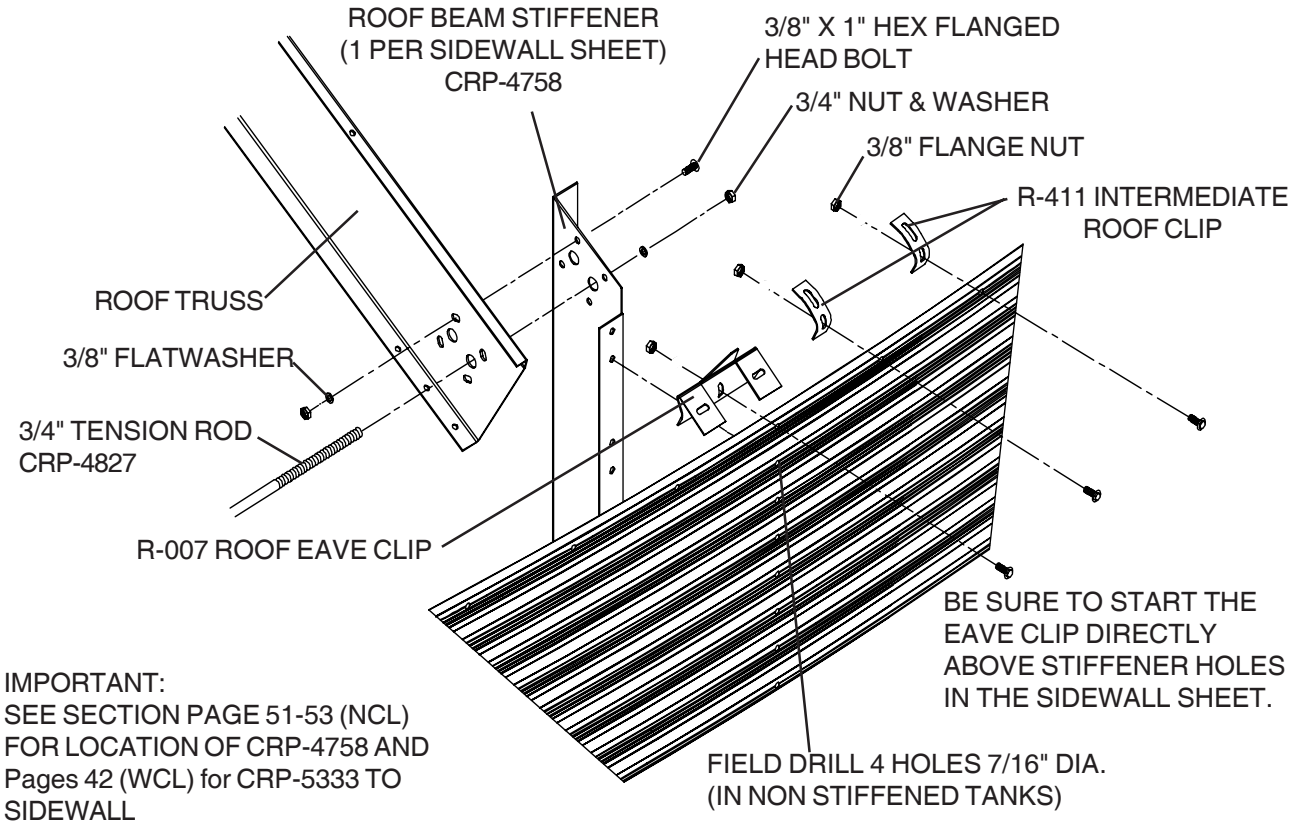


DETAIL #1



DETAIL #1A

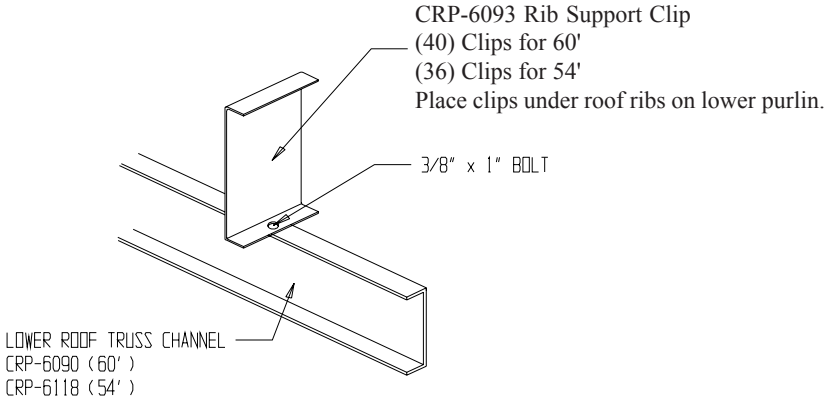
54', 60' Roof Truss Assembly (Continuation)



DETAIL #2

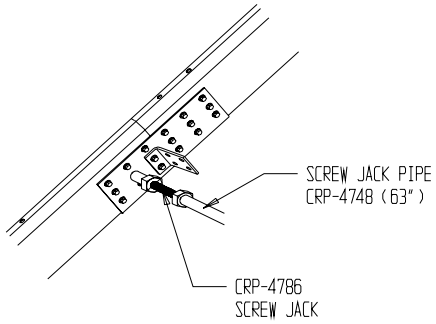
ADJUST TENSION RODS TO SLIGHT TENSION (**DO NOT OVERTIGHTEN**) BEFORE REMOVING CENTER SUPPORT JACK.

54’-60' Lower Roof Truss Assembly



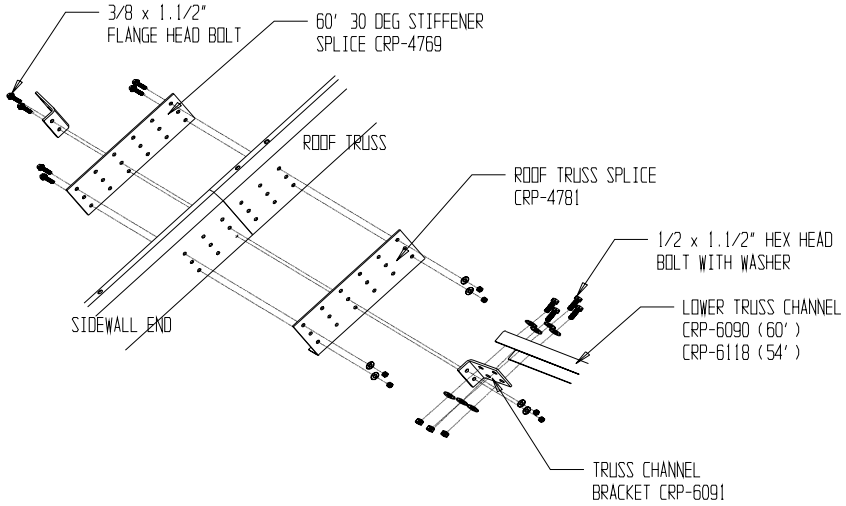
DETAIL 3

TWO (2) RIB SUPPORT CLIPS PER TRUSS CHANNEL FIT UP INTO THE ROOF RIBS AND THEN BOLT INTO A SLOT ON THE TRUSS CHANNEL. SEE DETAIL #3.

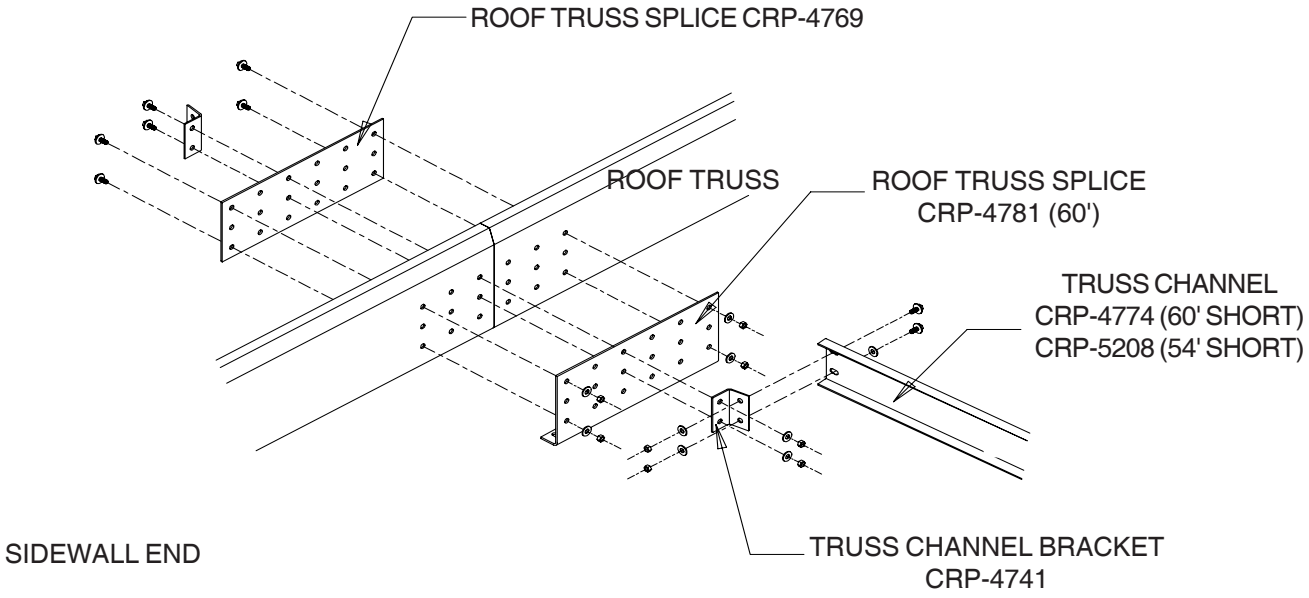


IF NECESSARY USE SCREW JACK PIPE TO INSTALL FINAL ROOF PULINS. SCREW JACKS STANDARD ON 60' ROOFS ONLY.

DETAIL 4

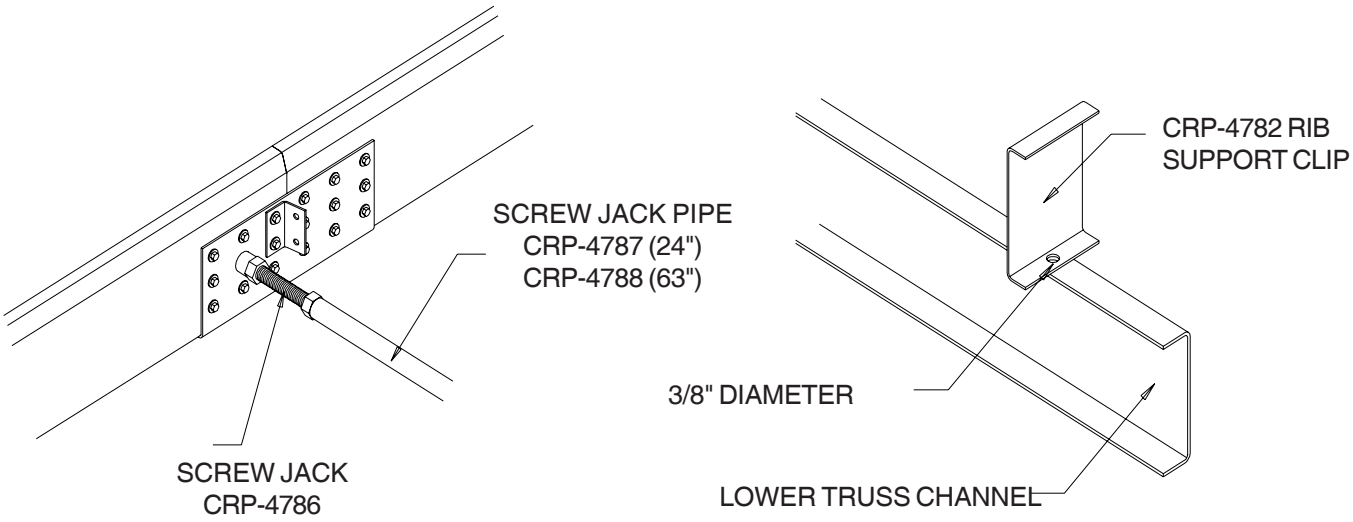


54’-60' Upper Roof Truss Assembly



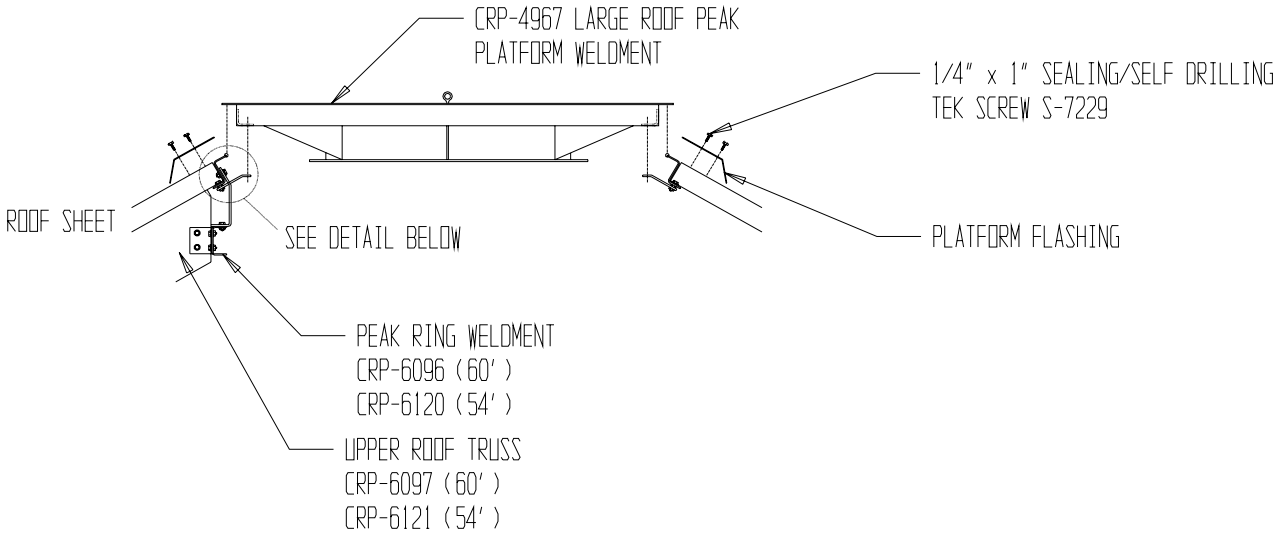
3/8" X 1" hex flanged head bolts to attach truss channel bracket to truss channel. 3/8” x 1 1/2” hex flanged head bolts for rafter splices, attaching the truss channel bracket to the rafter. Two (2) flatwashers for all connections.

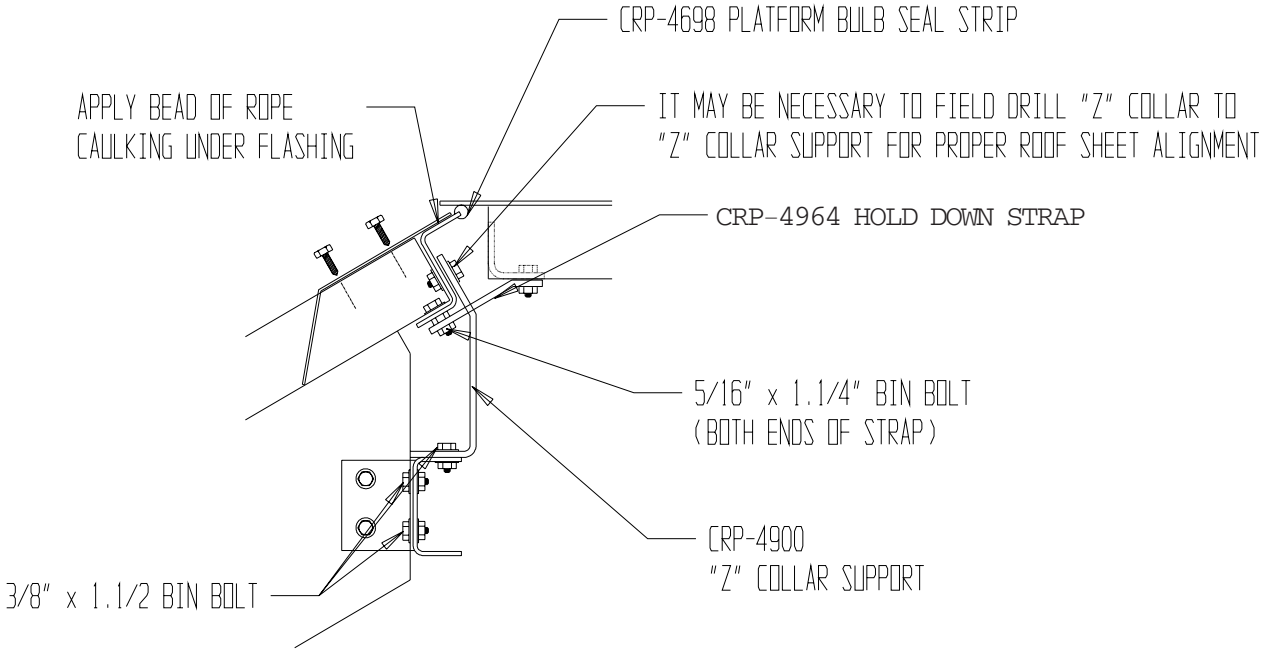
DETAIL #4



NOTE: Jack supplied on 60’ diameter only

54'-60' Flat Top Instructions





Temperature Cable Support Packages
For Eave Heights Greater Than 40'-5" (12.32 m)
Written Installation Instructions

CRP-5287 thru CRP-5290 (27 ft.-36 ft. (8.23-10.97 m) Support System)

1.) All 27 ft. & 30 ft. (8.23 M & 9.14 M) packages shall span 1 roof panel as shown in Detail #1A. All 33 ft. & 36 ft. (10.05 M & 10.97 M) packages shall span 3 roof panels as shown in Detail #1B.

2.) A rafter support system (included in each package) will be necessary for temperature cable installation in commercial tanks 27 ft. to 36 ft. (8.23 M to 10.97 M) in diameters that have an eave height of greater than 40'-4" (12.29 M).

3.) One package should be provided for each cable in the tank with the exception of the center cable.

4.) All packages include hanging angles and a cable support channel.

5.) Each set of rafters should carry only one temperature cable.

6.) Each kit will contain two rafter sections which when spliced will reach from the center collar to the bin wall. The bottom rafter section (CRP-4759) will bolt into the stiffener bracket (CRP-5333).

7.) The rafter packages will utilize the standard (PR-1874) splice plate but will have no purlins.

8.) The upper rafter sections [CRP-5418 (27') (8.23 M), CRP-5373 (30') (9.14 M), CRP-5306 (33') (10.06 M), and CRP-5274 (36') (10.97 M)] will be bolted into the center collar by use of the clips provided.

9.) Once the rafters are in place, field drill the holes to bolt the support angles (CRP-5786 or CRP-5787) into the roof rafter (see Detail #2) and attach with 3/8" dia. bolts.

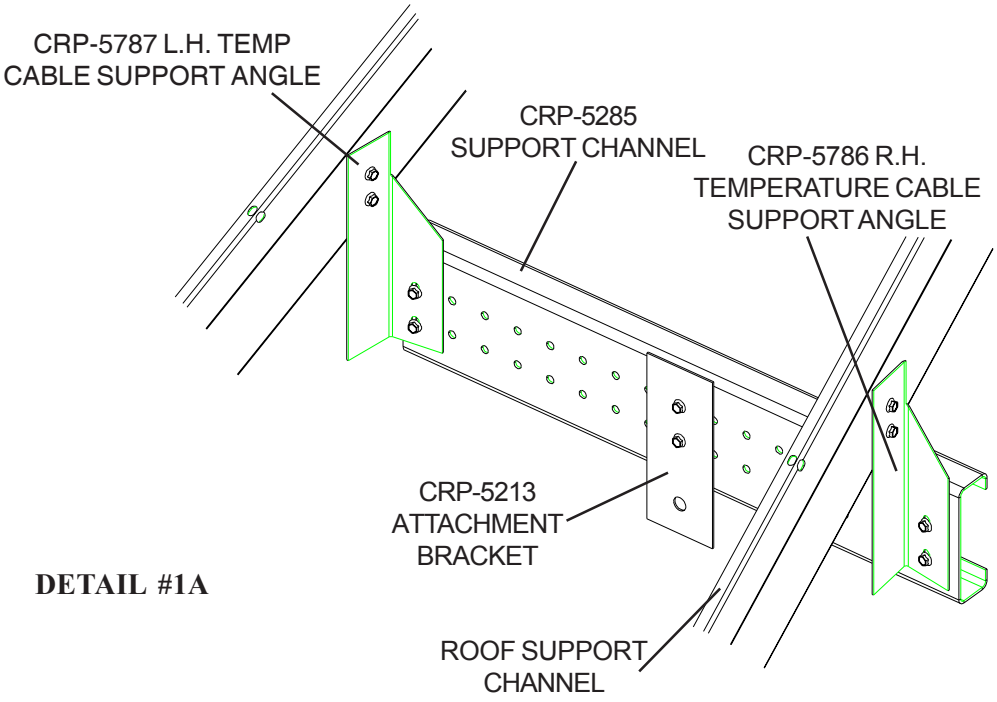
10.) Attach the cable attachment bracket (CRP-5213) in the center of the support channel (CRP-5419 or CRP-5285) as illustrated in Detail #3, and hang the cable.

11.) If it is desired to support the cable from the flange of the support channel (CRP-5419), it will be necessary to reinforce the flange with a 12" section of 3" x 3" x 3/16" angle.

12.) No more than one cable should be supported from a pair of roof rafters.

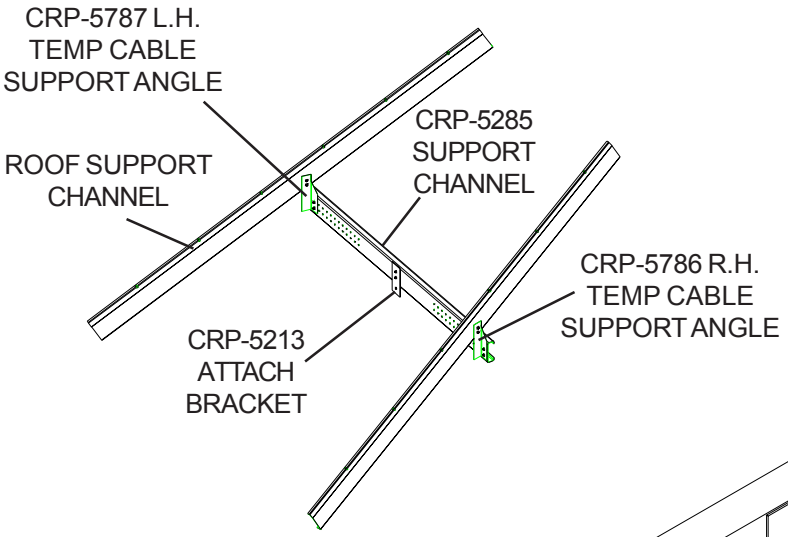
13.) This package will allow a maximum radius of: (27' equals 11.84') (8.23 m equals 3.61 m), (30' equals 13.15') (9.14 m equals 4.01 m), (33' equals 13.31') (10.06 m equals 4.06 m), (36' equals 14.49') (10.97 m equals 4.42 m). These radii represent the maximum radius that the cross members will span. These are not recommended installation locations. Install according to the temperature cable manufacturers recommendations. For a greater radius, the recommendation shown in this manual for temperature cable installation must be used (using field cut, hot rolled sections), however a rafter support package must still be used.

27 Ft. - 30 Ft. Roof Truss Details

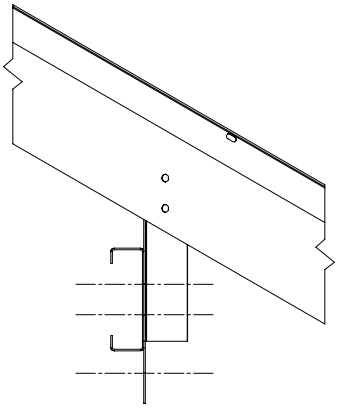


DETAIL #1A

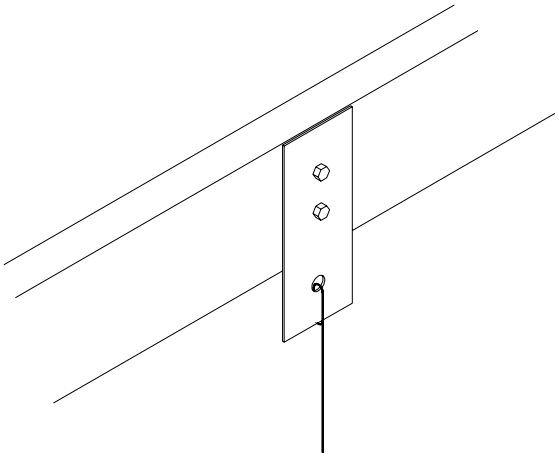
33 Ft. - 36 Ft. Roof Truss Details



DETAIL #1B

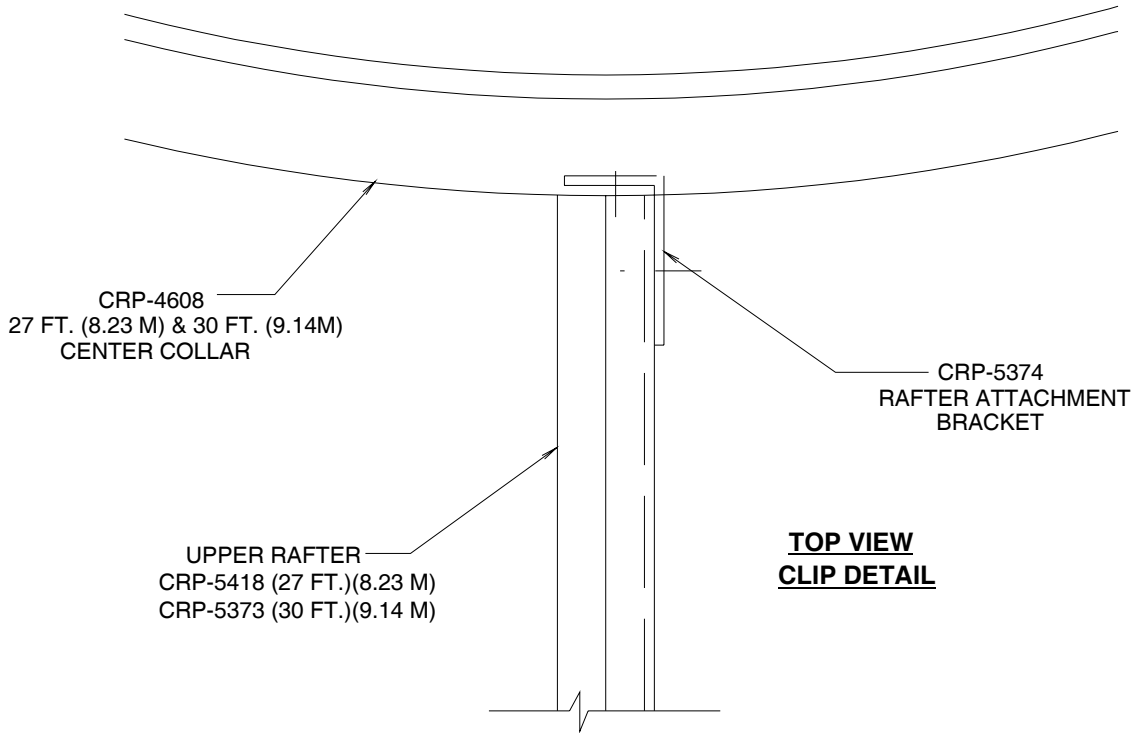


DETAIL #2

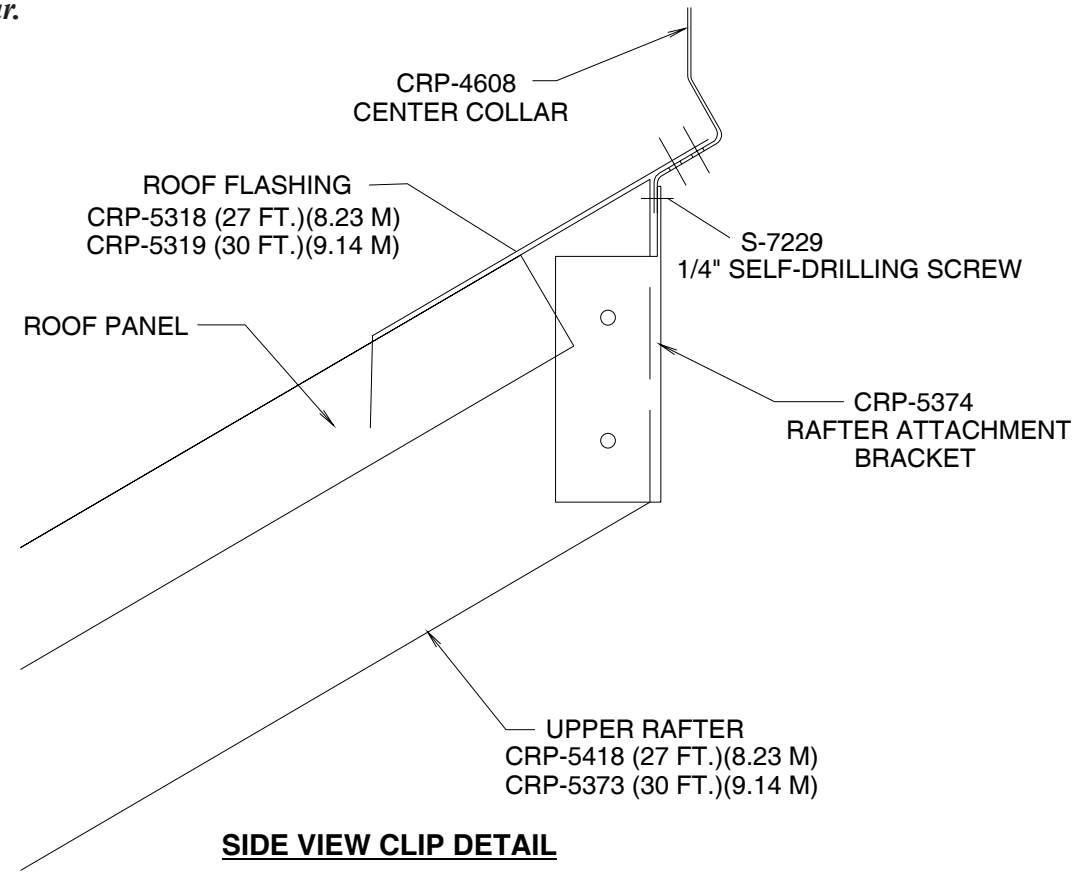


DETAIL #3

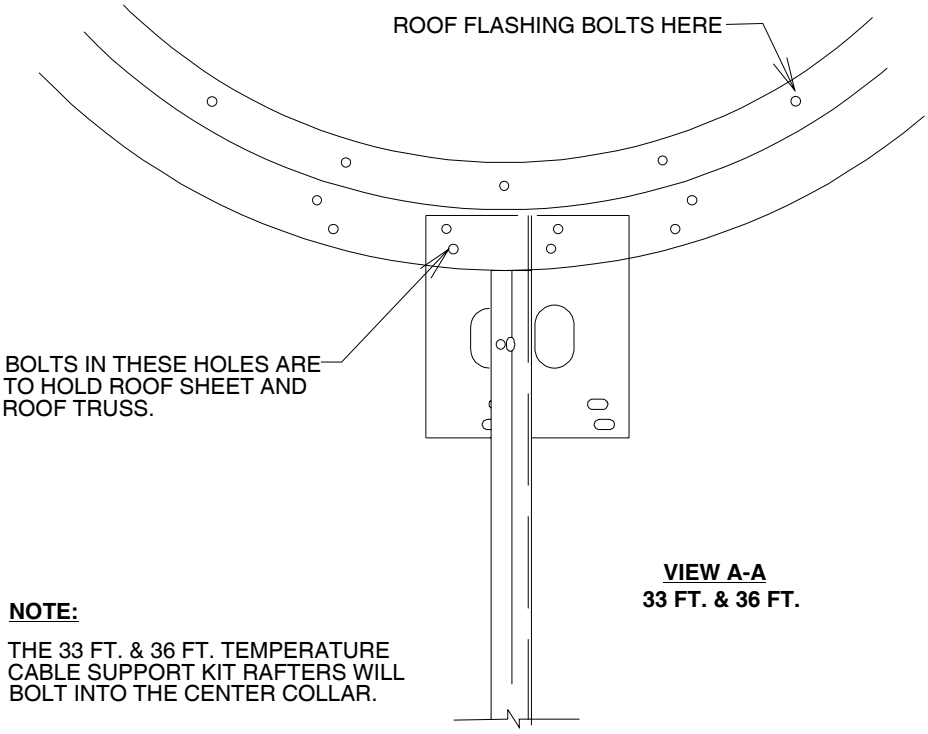
27 Ft. & 30 Ft. Rafter To Center Collar Connection



NOTE: The 27 ft. (8.23 M) & 30 ft. (9.14 M) temperature cable support kit rafters will bolt into the center collar.



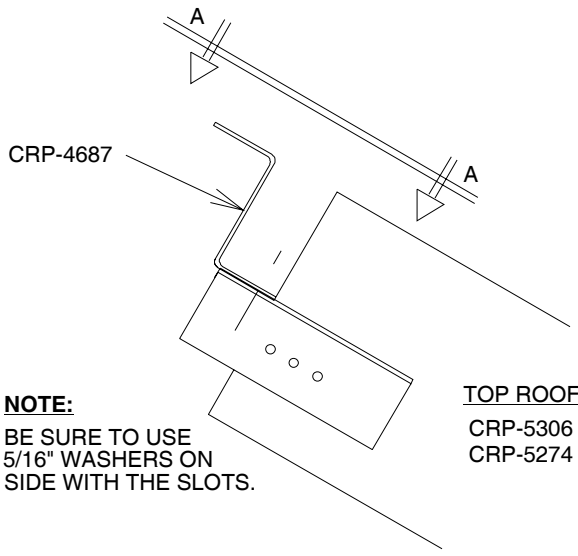
For Eave Height Greater Than 40'-5"
33 Ft. & 36 Ft. Temperature Cable Support Packages To Center Roof Rafter Collar Attachment Instruction



VIEW A-A
33 FT. & 36 FT.

NOTE:

THE 33 FT. & 36 FT. TEMPERATURE CABLE SUPPORT KIT RAFTERS WILL BOLT INTO THE CENTER COLLAR.

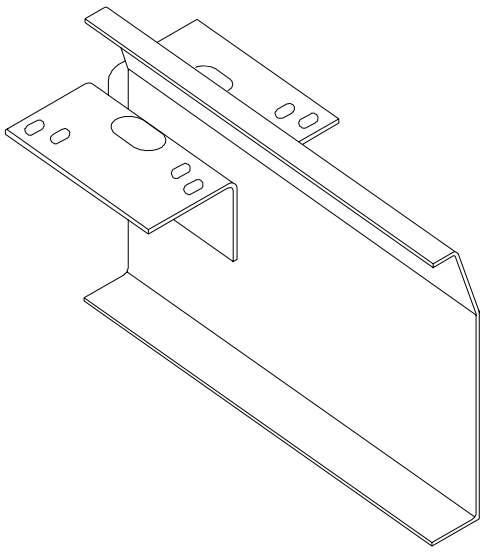


NOTE:

BE SURE TO USE 5/16" WASHERS ON SIDE WITH THE SLOTS.

TOP ROOF TRUSS

CRP-5306 (33 FT.)
CRP-5274 (36 FT.)



CRP-5286 (39ft.-48ft. (11.89m-14.63 m) Support System)
CRP-5421 (54 ft.-60 ft. (16.46m-18.29 m) Support System)

1.) All packages (39 ft.-60ft. (11.89-18.29 M)) shall span 3 roof panel as shown in Detail #4.

2.) One package should be provided for each cable in the tank with the exception of the center cable.

3.) The 39'-48' package includes bracing angles for the roof rafters, hanging angles and a cable support channel. The 54'-60' package includes the hanging angles and cable support channel.

4.) Each set of rafters should carry only one temperature cable.

5.) Once the commercial roof system has been installed, installation of the cable support packages may proceed as follows.

6.) For 39'-48' bins, center the support angles and drill the holes to bolt the support angles [CRP-5185 (39 ft. & 48 ft.) (11.89 M & 14.63 M)] into the roof rafter (See Detail #5 (39 ft. & 48 ft.) (11.89 M & 14.63 M) to locate which holes to drill) and attach with 3/8" dia. bolts. Support angles may be installed on the outer surface as indicated in Detail #5. 54'-60' diameter bins do not use support angles.

7.) Should the angle location be such that the rafter splices coincide with angle placement, the angle (CRP-5185) should be slid one way enough to align the angle holes with the splice bolts or miss the splice bolts.

8.) Slight adjustments of the radius may be necessary to insure that the channel support angle holes and cable support channel holes will correspond. Field drill the holes in the roof rafter for the hanging of the channel, as is illustrated in Detail #7.

9.) Once the rafters are in place, field drill the holes to bolt the support angles CRP-5786 or CRP-5787 into the roof rafter (See Detail #7) and fasten with 3/8" bolt.

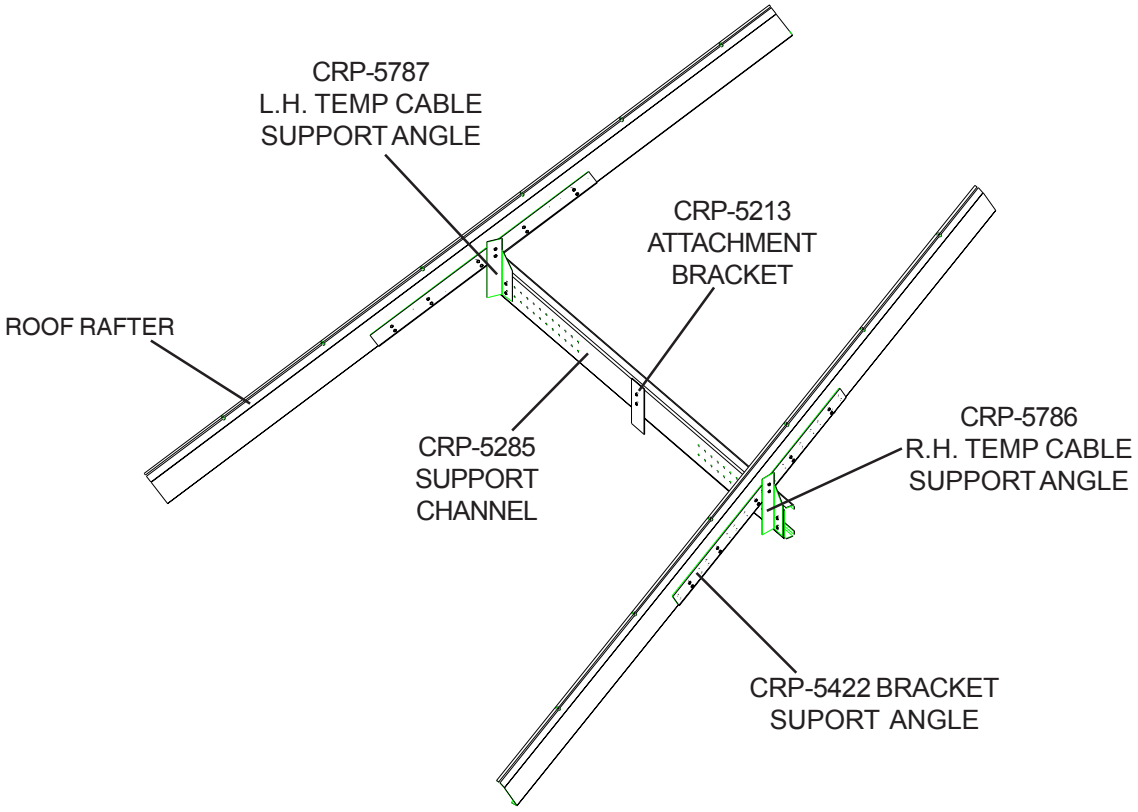
10.) Attach the cable attachment bracket (CRP-5213) in the center of the support channel (CRP-5285) as illustrated in Detail #8, and hang the cable.

11.) If it is desired to support the cable from the flange of the support channel (CRP-5285), it will be necessary to reinforce the flange with a 12" section of 3" x 3" x 3/16" angle.

12.) No more than one cable should be supported from a pair of roof rafters.

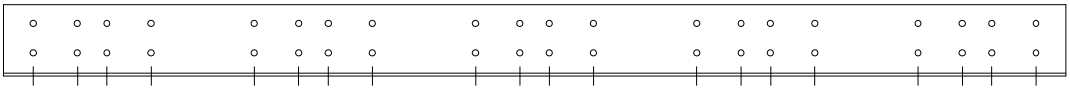
13.) This package will allow a maximum radius of: (39' & 42' equals 16.86') (12.80 M equals 5.14 M), (48' equals 19.22') (14.63 M equals 5.86 M), (60' equals 23.97') (18.29 M equals 7.31 M). These radii represent the maximum radius that the cross members will span. These are not recommended installation locations. Install according to the temperature cable manufacturers recommendations. For a greater radius, the recommendation shown in this manual for temperature cable installation must be used (using field cut, hot rolled sections), however a rafter support package must be used.

39 Ft. - 60 Ft. Roof Truss Details



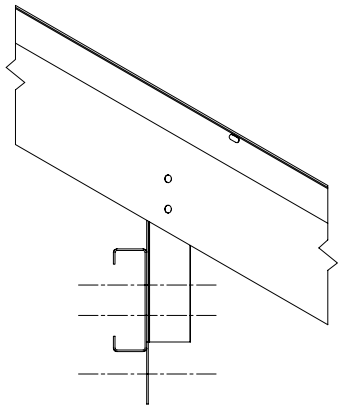
DETAIL #4

CRP-5185 ROOF RAFTER SUPPORT ANGLE (39'-48')

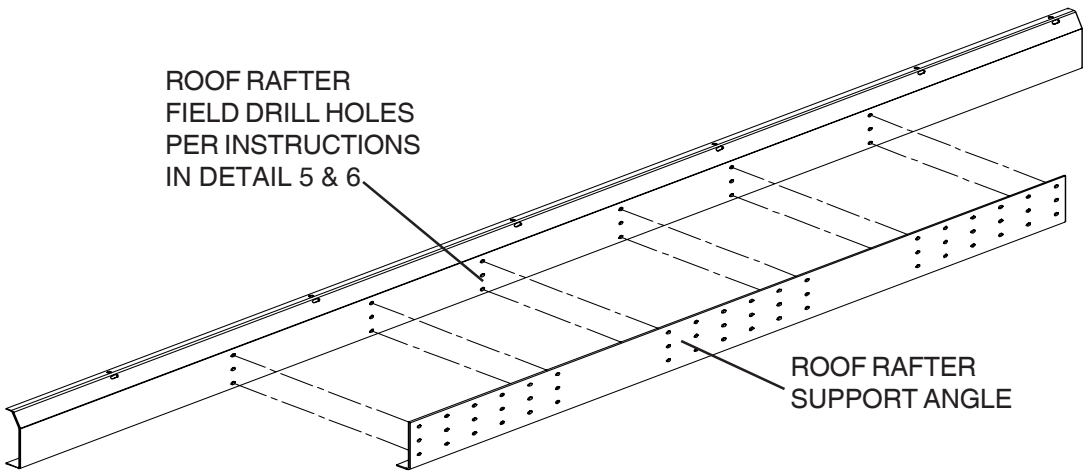


FIELD DRILL 8 HOLES IN THE WEB AND 4 HOLES IN THE FLANGE
EVENLY DISTRIBUTED OVER THE LENGTH OF THE PART IN ADDITION
TO ANY SPLICE BOLTS THAT ARE USED.

NOTE: THE 54' AND 60' TEMPERATURE CABLE SUPPORT SYSTEMS INCLUDE ONLY THE SUPPORT CHANNEL (CRP-5285) , RIGHT AND LEFT HAND SUPPORT ANGLES (CRP-5243 & CRP-5187) AND THE CABLE ATTACHMENT BRACKET (CRP-5213). FIELD DRILL HOLES AND BOLT THE LEFT AND RIGHT HAND SUPPORT ANGLES TO THE ROOF RAFTERS AND ATTACH THE SUPPORT CHANNEL (CRP-5285). ONE TEMPERATURE CABLE PER SET OF ROOF RAFTERS.

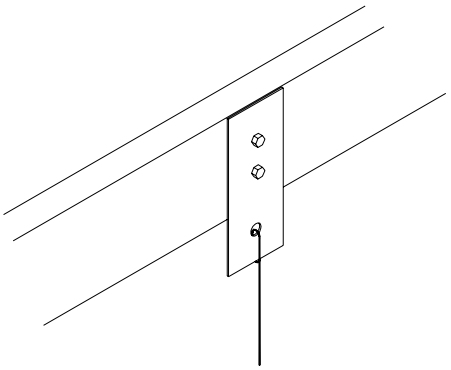


DETAIL #7



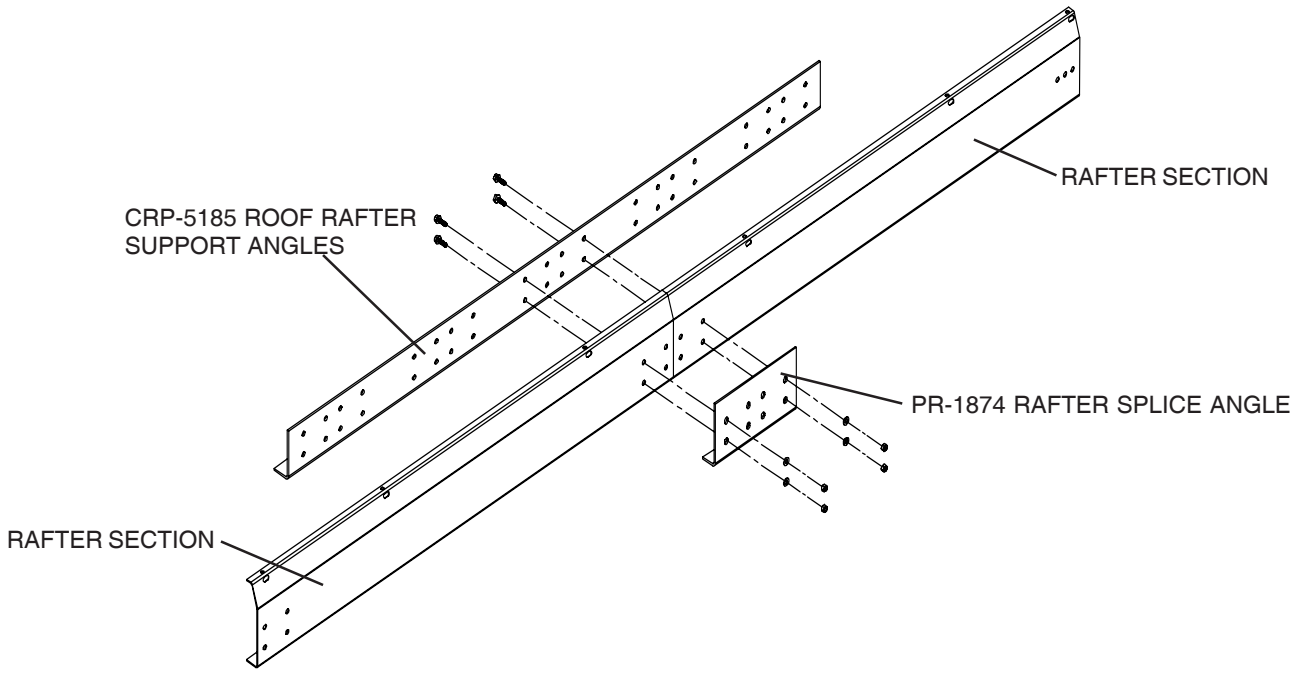
NOTE:
LOCATE SUPPORT ANGLE ALONG
RAFTER IN LOCATION SPECFIED BY
TEMPERTURE CABLE MANUFACTURER

DETAIL #7A



DETAIL #8

42 Ft. & 48 Ft. Rafter / Splice / Support Intersection Detail



NOTE: Field drill 8 holes in the web & 4 holes in the flange evenly distributed over the length of the part in addition to any splice bolts that are used.

Temperature Cable Support Packages For Eave Heights Of 40'-5" Or Less (12.32m) Written Installation Instructions

CRP-5423 (27 ft. -33 ft. (8.23 M-10.06 M) Support System) & CRP-5424 (36 ft.-42 ft. (10.97 M-12.80 M) Support System)

1.) All 27 ft.-42 ft. (8.23 M-12.80 M) packages shall span 1 roof panel as shown in Detail #9.

2.) A rafter support system (included in each package) will be necessary for temperature cable installation in farm tanks 27 ft. (8.23 M) to 42 ft. (12.80 M) in diameters that have an eave height less than 40'-4" (12.29 M).

3.) One package should be provided for each cable in the tank with the exception of the center cable.

4.) All packages include hanging angles and a cable support channel.

5.) Each set of rafters should carry only one temperature cable.

6.) Kit CRP-5424 contains two rafter sections which splice together with CRP-5262. Kit CRP-5423 contains only 1 rafter section.

7.) (CRP-5424 ONLY) Center the support angles on the outside of the rafter and field drill the holes to bolt the support angle (CRP-5422 (36 ft.-42 ft. (10.97 M-12.80 M)) to the roof rafter (See Detail #12 to locate which holes to drill) and attach with 3/8" dia. bolts.

8.) (CRP-5424 ONLY) Should the angle location be such that the rafter splice coincides with angle placement, the angle should be slid one way enough to align the angle holes with the splice bolts or miss the splice bolts. (If angle is to be bolted over splice, remove splice plate before installing angle.)

9.) Once the rafters are in place, field drill the holes to bolt the support angles (CRP-5786 or CRP-5787) into the roof rafter (see Detail #10) and attach with 3/8" dia. bolts.

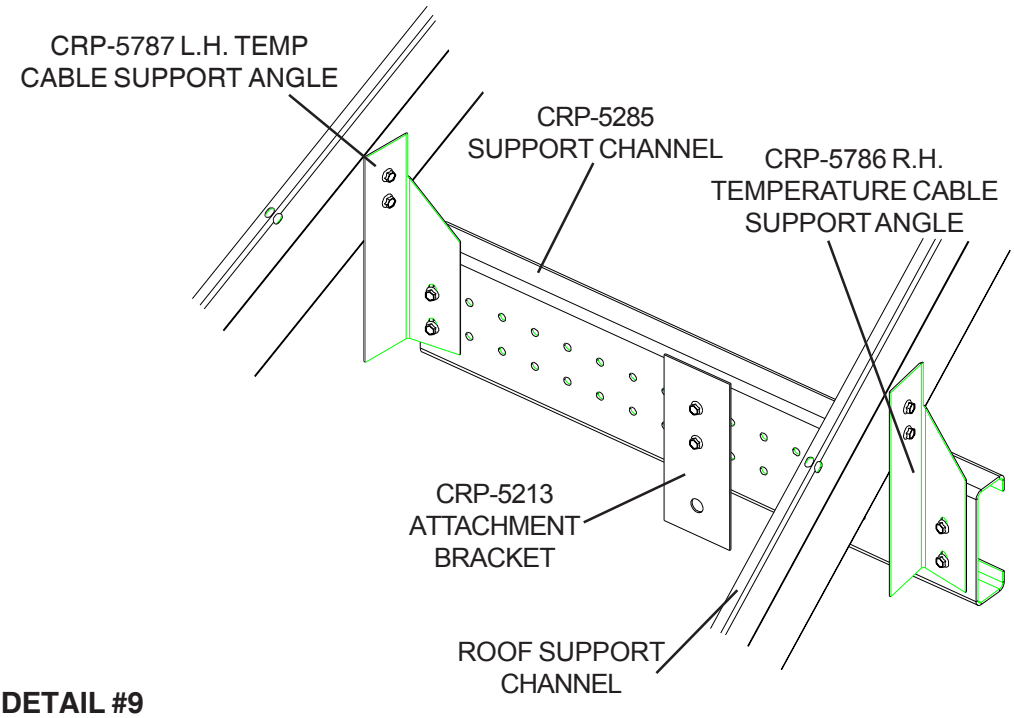
10.) Attach the cable attachment bracket (CRP-5213) in the center of the support channel (CRP-5419) as illustrated in Details #9 & #11, and hang the cable.

11.) If it is desired to support the cable from the flange of the support channel (CRP-5419), it will be necessary to reinforce the flange with a 12" section of 3" x 3" x 3/16" angle.

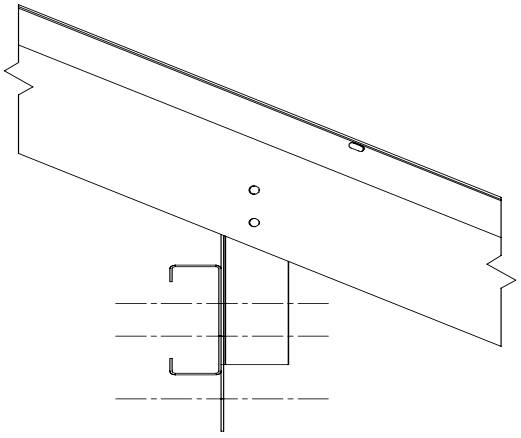
12.) No more than one cable should be supported from a pair of roof rafters.

13.) This package will allow a maximum radius of: (27' equals 11.84') (8.23M equals 3.61 M), (30' equals 13.15') (9.14 M equals 4.01 M), (33' equals 14.00') (10.06 M equals 4.27 M), (36' equals 15.29') (10.97 M equals 4.66 M), (42' equals 17.84') (12.80 M equals 5.44M). These radii represent the maximum radius that the cross members will span. These are not recommended installation locations. Install according to the temperature cable manufacturers recommendations. For a greater radius, the recommendation shown in this manual for temperature cable installation must be used (using field cut, hot rolled sections), however a rafter support package must still be used.

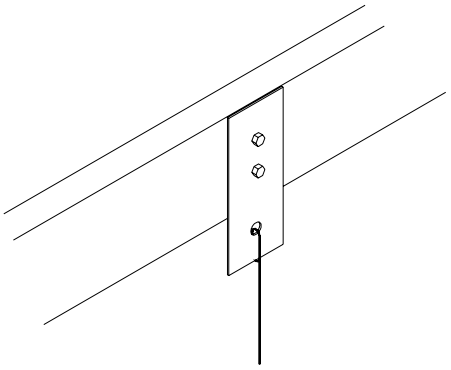
27 Ft. - 42 Ft. Roof Truss Details



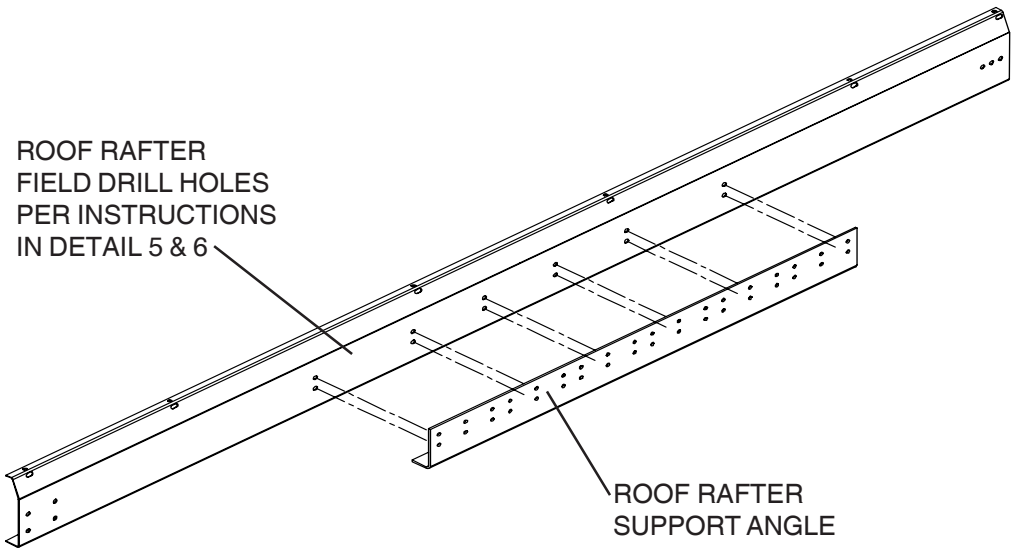
DETAIL #9



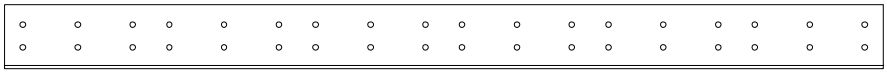
DETAIL #10



DETAIL #11



DETAIL #12A



FIELD DRILL 12 HOLES IN THE WEB EVENLY DISTRIBUTED OVER THE LENGTH OF THE PART IN ADDITION TO ANY SPLICE BOLTS THAT ARE USED.

DETAIL #12

(36' AND 42' ROOF ONLY)

CRP-6263 (48 ft. (14.63 M) Support System)
Eave Height Less Than 40'-5"

1.) All 48 ft. (14.63 M) packages shall span 3 roof panels as shown in Detail #13.

2.) One package should be provided for each cable in the tank with the exception of the center cable.

3.) The package includes bracing z-channels for the roof rafters, hanging angles and cable support channel.

4.) Each set of rafters should carry only one temperature cable.

5.) Once the farm roof system has been installed, installation of the cable support packages may proceed as follows.

6.) Remove outer splice (CRP-6258) & replace it with CRP-6262 (Z-channel Reinf). Use 3/8" x 1" bolts & 3/8" nuts for all connections.

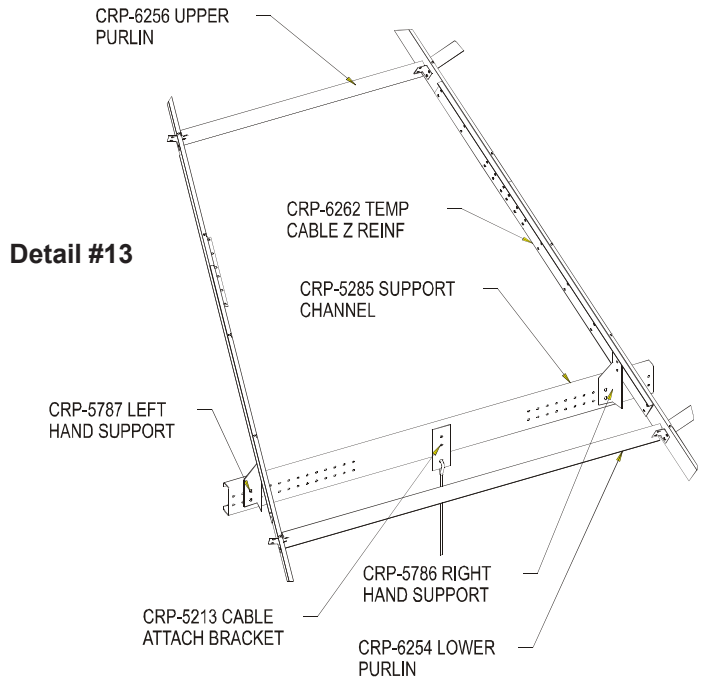
7.) Attach left & right hand angles to roof reinf channel. Field drill if necessary to obtain proper location.

8.) Attach the cable attachment bracket (CRP-5213) in the center of the support channel (CRP-5285) as illustrated in Details #13 & #16, and hang the cable.

9.) If it is desired to support the cable from the flange of the support channel (CRP-5285), it will be necessary to reinforce the flange with a 12" section of 3" x 3" x 3/16" angle.

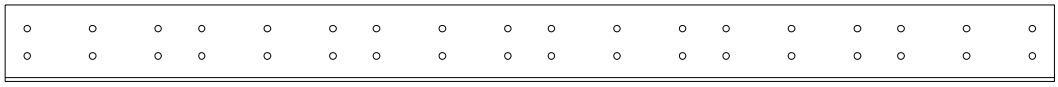
10.) No more than one cable should be supported from a pair of roof rafters.

11.) This package will allow a maximum radius of: (48' equals 19.22') (14.63 M equals 5.86 M). This radius represents the maximum radius that the cross member will span. This is not a recommended installation location. Install according to the temperature cable manufacturers recommendations. For a greater radius, the recommendation shown in this manual for temperature cable installation must be used (using field cut, hot rolled sections), however a rafter support package must still be used.



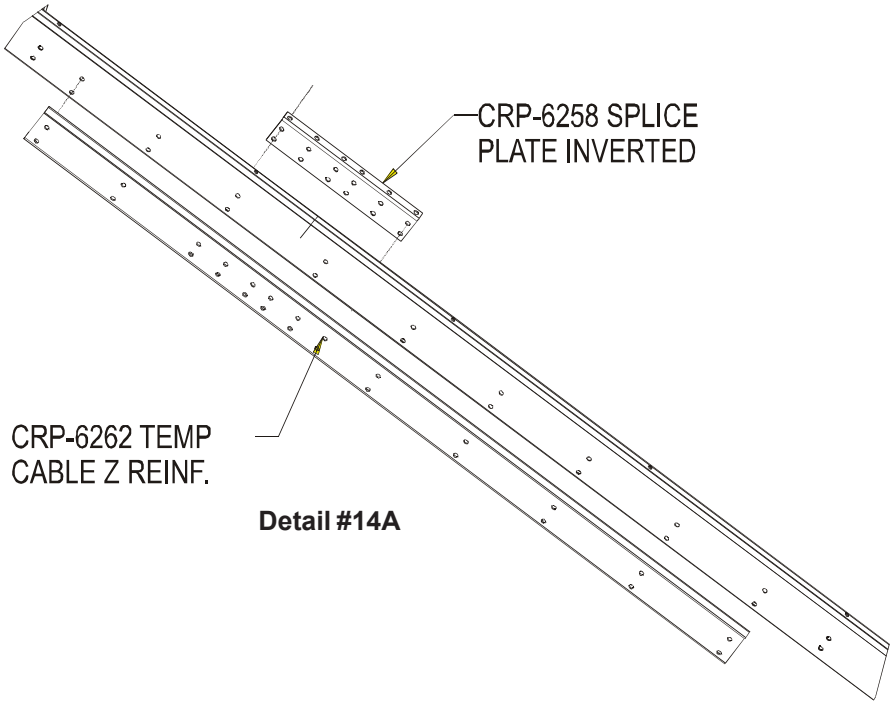
Detail #13

TEMP CABLE DTL 1

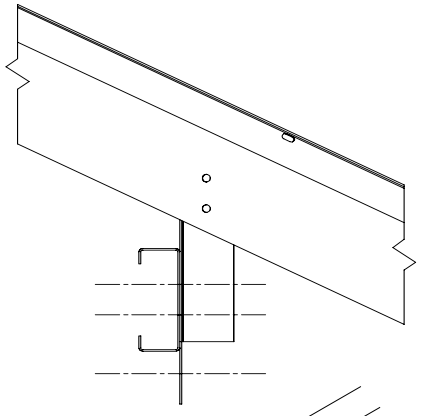


FIELD DRILL 12 HOLES IN THE WEB EVENLY DISTRIBUTED OVER THE LENGTH OF THE PART

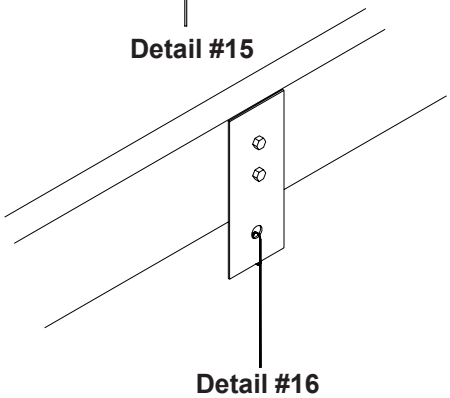
Detail #14



Detail #14A



Detail #15

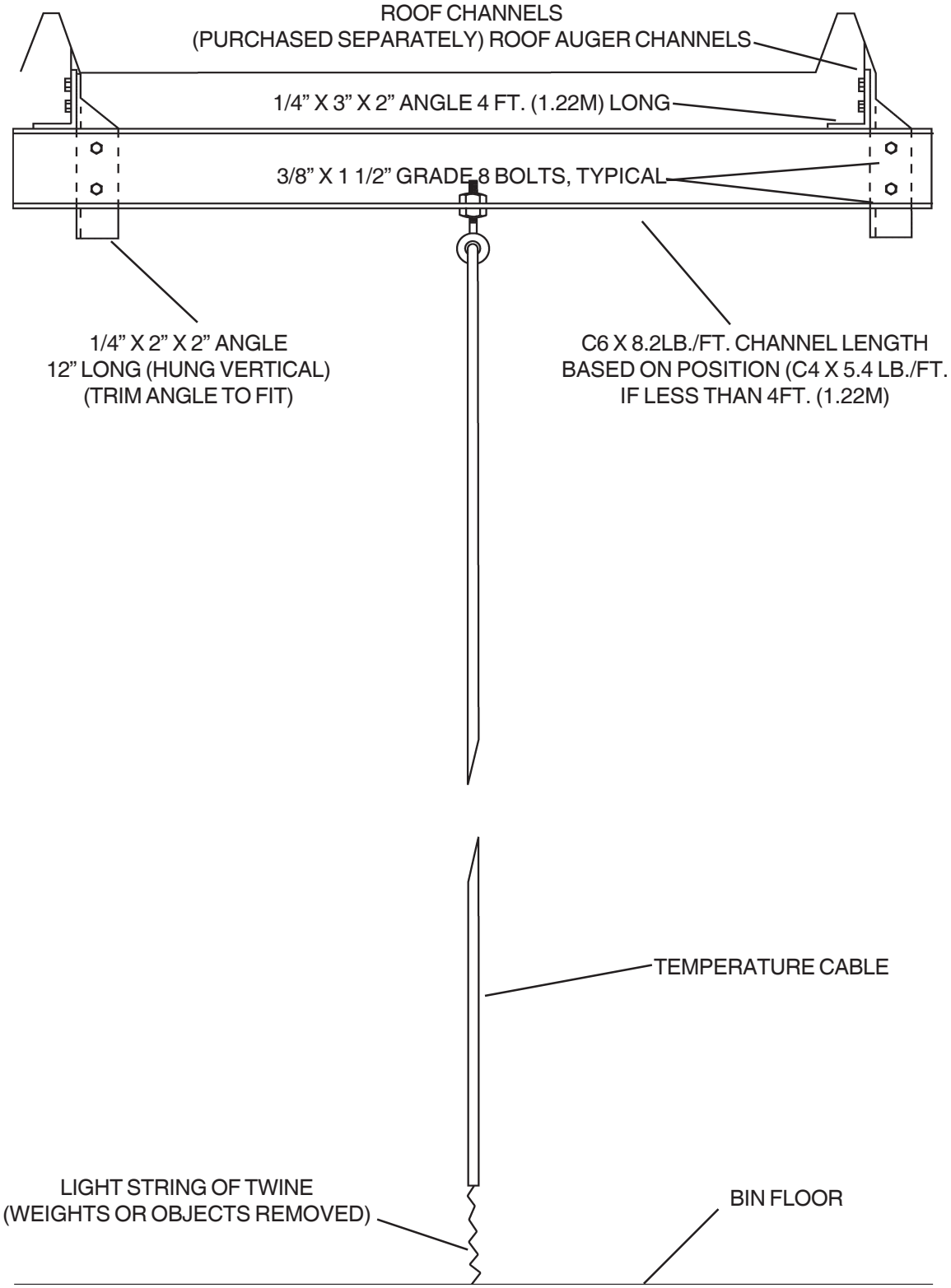


Detail #16

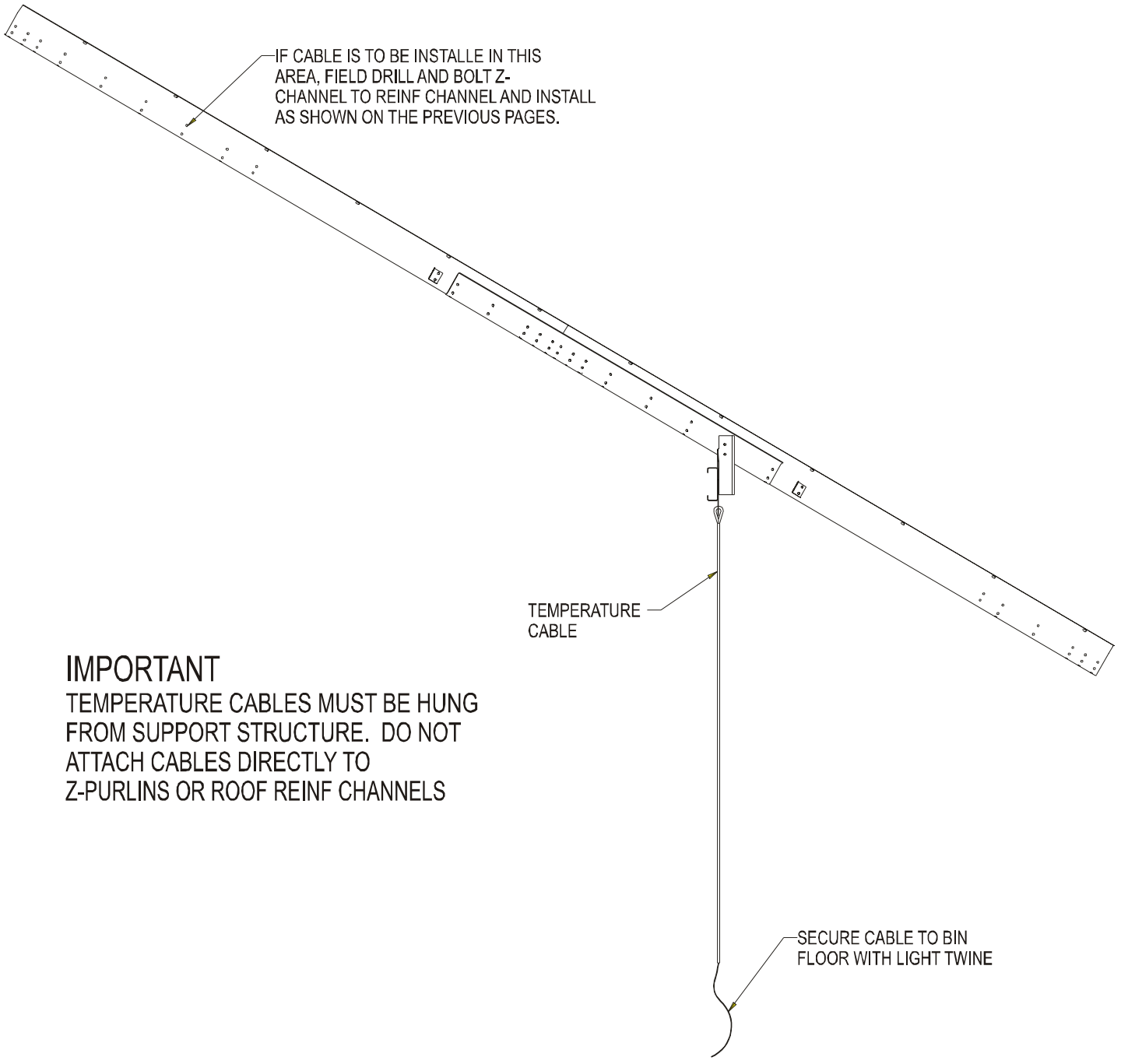
Field Fabricated Temperature Cable Support Attachment Recommendation

30 Degree Non-Commercial Roof

(42 ft. (12.80 m) & Smaller Bins)



Field Fabricated
Temperature Cable Support Attachment Recommendation
30 Degree Non-Commercial Roof
(48 ft. (14.63 M) Diameter Bin)



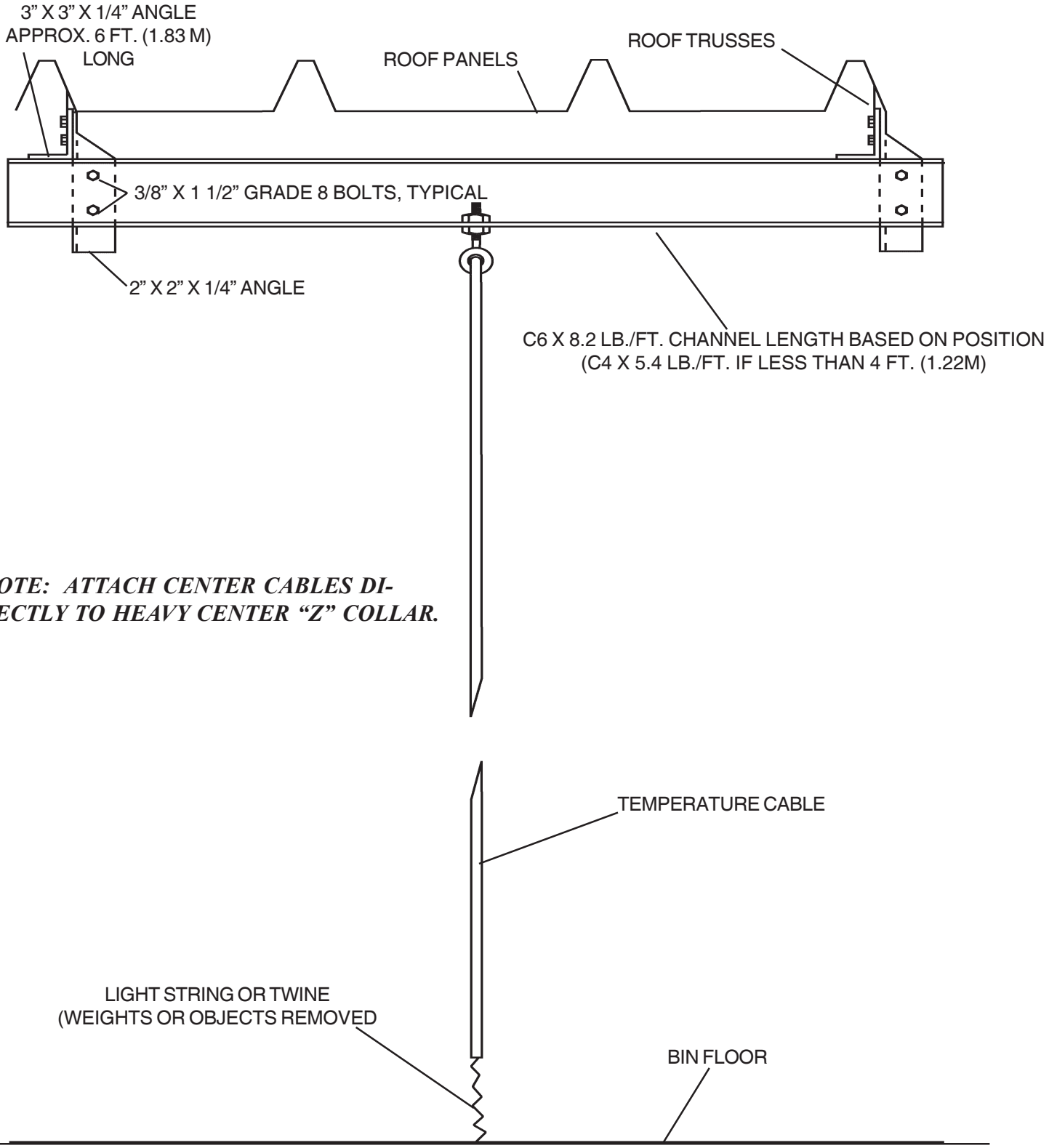
IMPORTANT

TEMPERATURE CABLES MUST BE HUNG FROM SUPPORT STRUCTURE. DO NOT ATTACH CABLES DIRECTLY TO Z-PURLINS OR ROOF REINF CHANNELS

Field Fabricated Temperature Cable Support Attachment

30 Degree Commercial Roof and 48 ft. Farm Roof

(39 ft. (11.89 m), (42 ft. (12.80 m), 45 ft. (13.72 m), 48 ft. (14.63 m), 54 ft. (16.46 m), & 60 ft. (18.29 m) Diameter Bins)



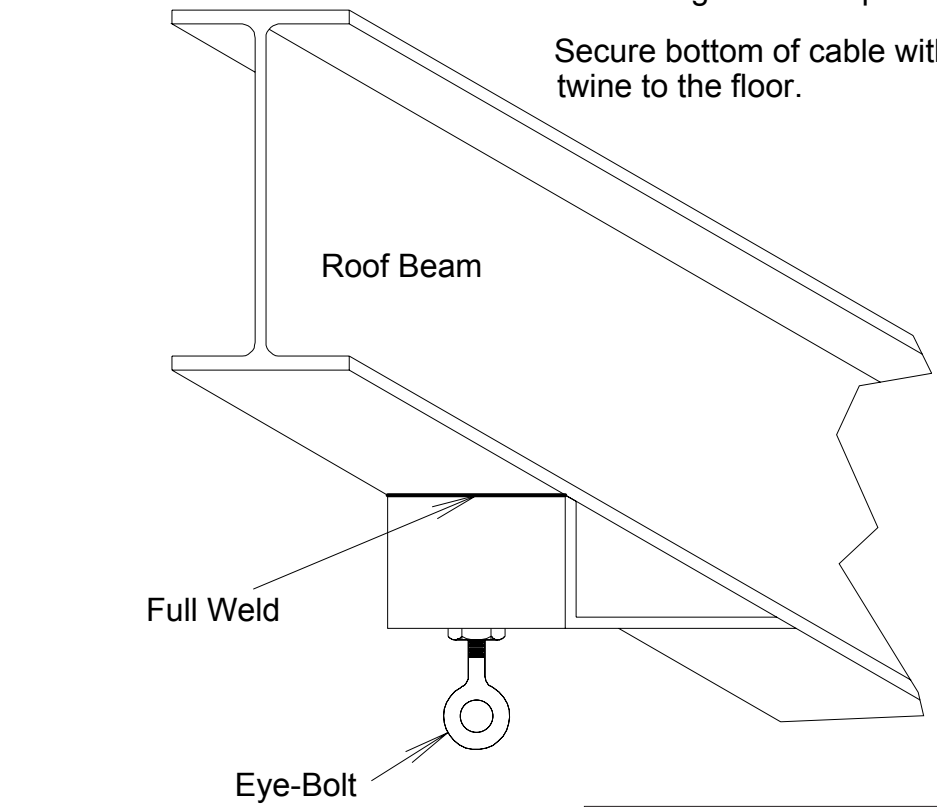
NOTE: ATTACH CENTER CABLES DIRECTLY TO HEAVY CENTER "Z" COLLAR.

Field Fabricated Temperature Cable Support Recommendations For Cables Above The "Z" Collar

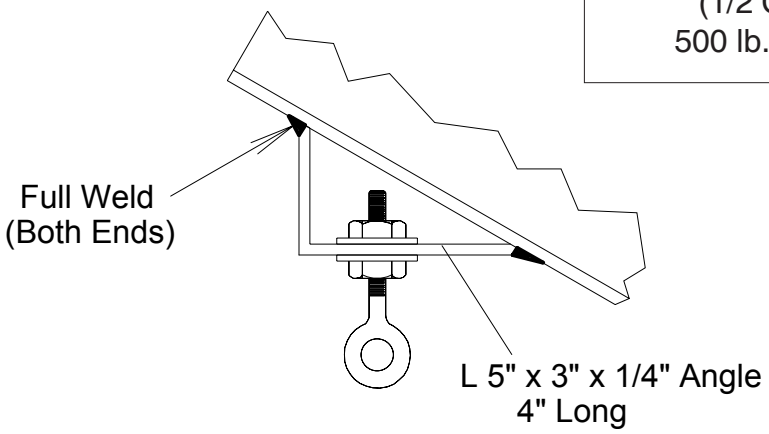
72 ft. (21.95 m) - 105 ft. (32.00 m) Roofs

IMPORTANT:

Do not attach weights to Temperature Cable.

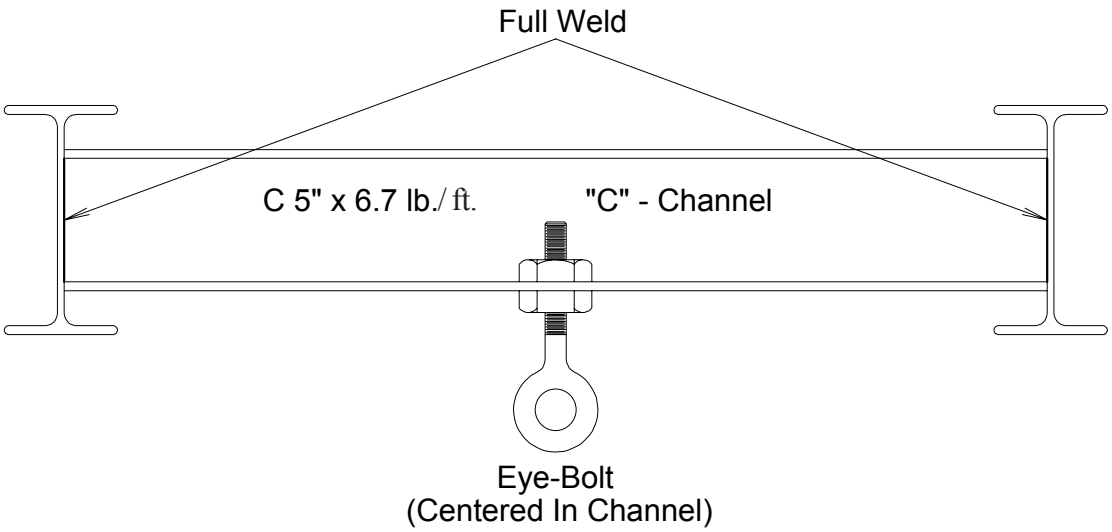


DO NOT ATTACH OR SUPPORT MORE THAN 1 TEMPERATURE CABLE PER ROOF BEAM.
(1 CABLE ABOVE "Z" - COLLAR
1,000 lb. LOAD ASSUMED PER BEAM)
(1/2 CABLE BELOW "Z" - COLLAR
500 lb. LOAD ASSUMED PER BEAM)



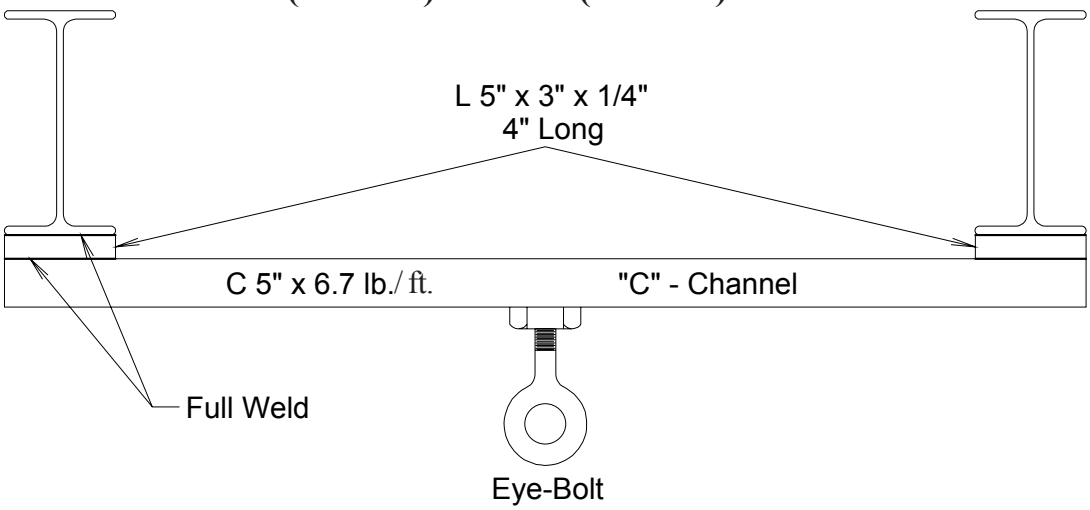
Field Fabricated Temperature Cable Support Recommendations For Cables Below The "Z" Collar

72 ft. (21.95 m) - 105 ft. (32.00m) Roofs



Field Fabricated Temperature Cable SupportRecommendations For Cables Below The "Z" Collar In An "X" - Braced Bay

72 ft. (21.95 m) - 105 ft. (32.00 m) Roofs



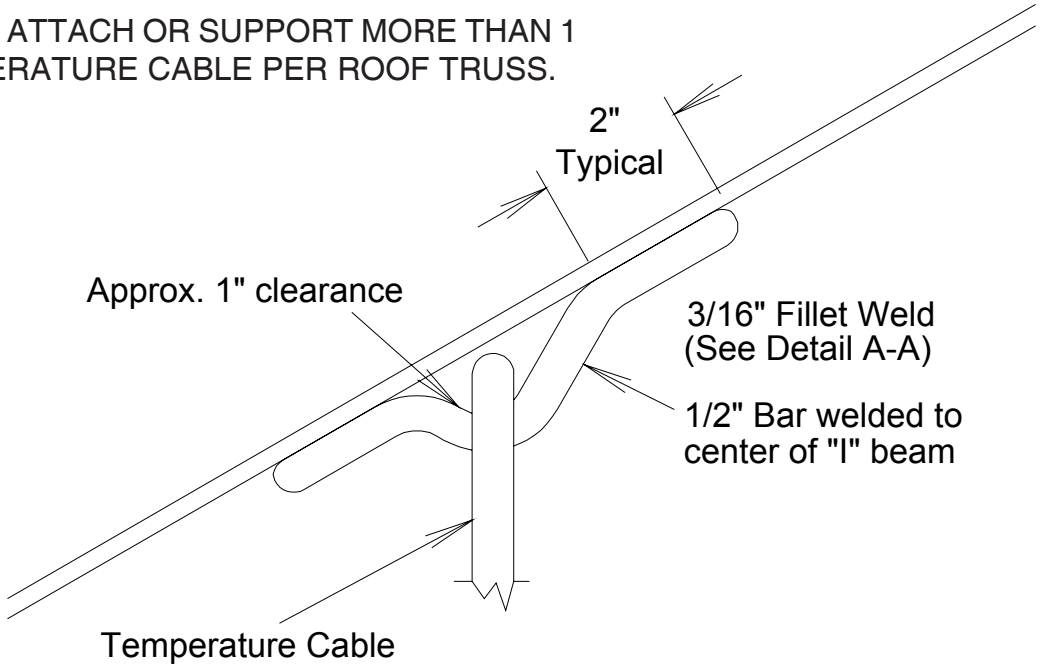
IMPORTANT: Do not attach or support more than one Temperature Cable per roof beam
(1 cable above "Z" - collar 1,000 lb. load assumed per beam)
(1/2 cable below "Z" - collar 500 lb. load assumed per beam)

IMPORTANT: Do not attach weights to Temperature Cable. Secure bottom of cable with a light twine to floor

Field Fabricated Temperature Cable Support Recommendations For Cables Above The "Z" Collar
Alternate Method
72 ft. (21.95 m) - 105 ft. (32.00 m) Roofs

IMPORTANT:

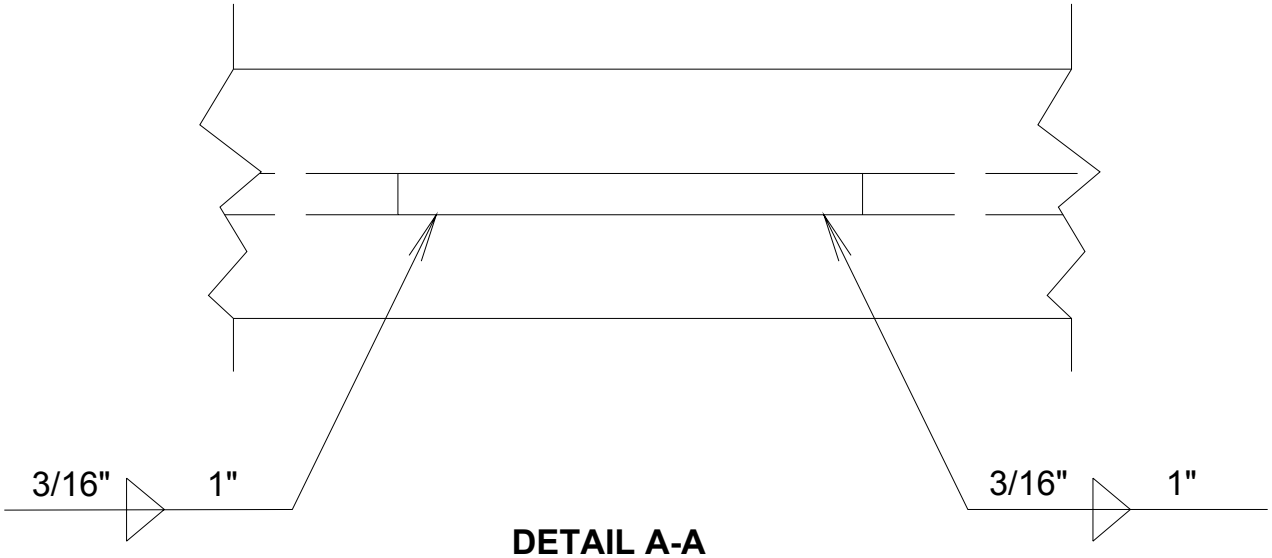
DO NOT ATTACH OR SUPPORT MORE THAN 1 TEMPERATURE CABLE PER ROOF TRUSS.



IMPORTANT:

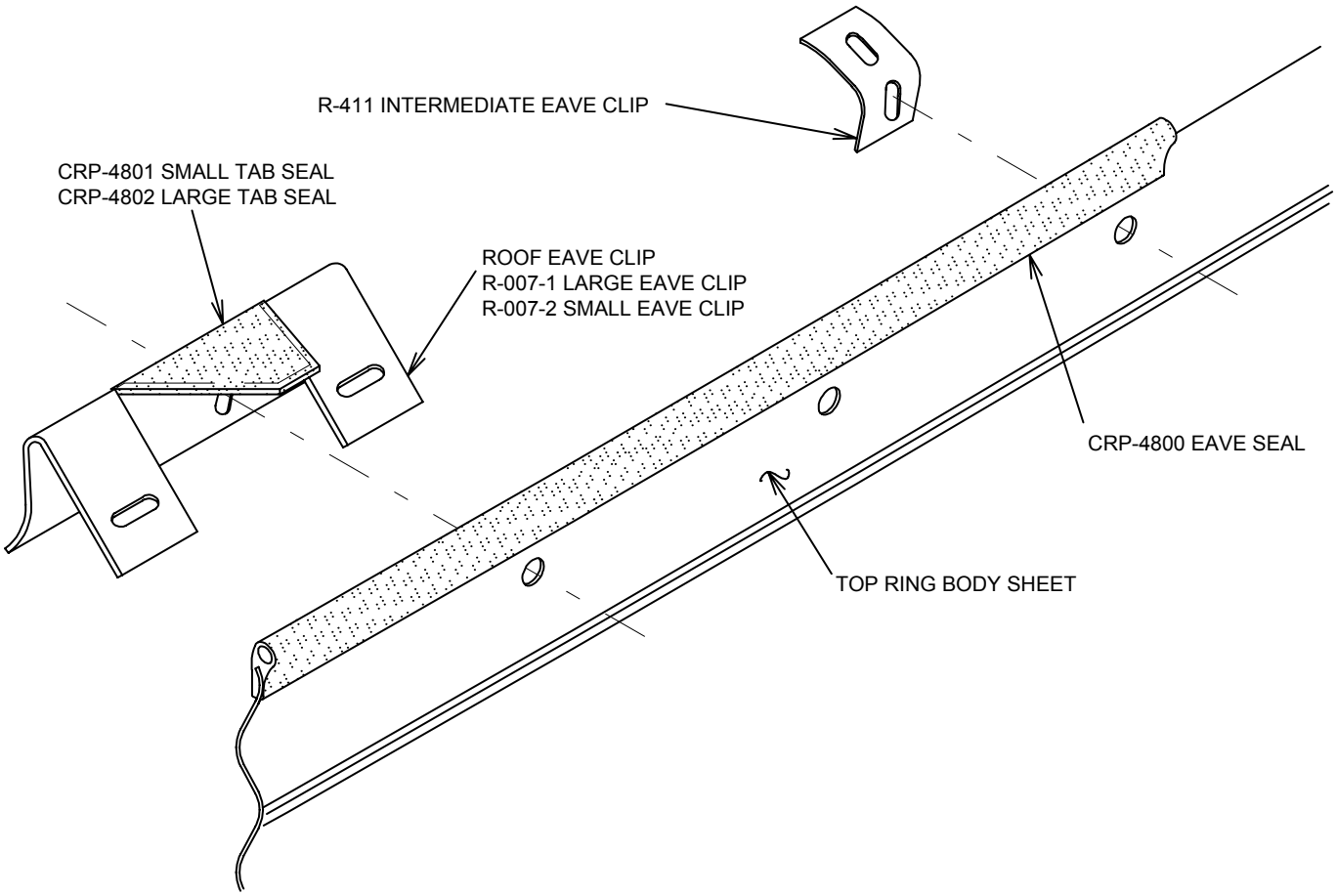
Do not attach weights to Temperature Cable.

Secure bottom of cable with a light twine to floor.



DETAIL A-A

Optional Grain Bin Eave Seal Installation



Before placing the eave clips on sidewall install eave seal around top edge of the first ring of sidewall.

Take a piece of the tab seal foam block and peel off paper back and place on eave clip as shown. One per eave clip. When properly placed on eave clip and roof sheet installed, it should give weather tight seal around roof rib. Be sure and use proper size of foam block.

30-Degree Roof Panel Information

PART NO.	ROOF SIZE AND NUMBER OF ROOF RIB HOLES	RIB LENGTH	NUMBER OF PANELS
CRP-4625	12 FT. (3.66 M) - 30 DEGREES 4 HOLES	71.3/8"	12
CRP-4626	15 FT. (4.57 M) - 30 DEGREES 5 HOLES	91.7/8"	15
CRP-4627	18 FT. (5.49 M) - 30 DEGREES 6 HOLES	112.3/8"	18
CRP-4628	21 FT. (6.40 M) - 30 DEGREES 7 HOLES	132.7/8"	21
CRP-4629	24 FT. (7.32 M) - 30 DEGREES 8 HOLES	153.1/2"	24
CRP-5320	27 FT. (8.23 M) - 30 DEGREES 10 HOLES	171.13/32"	27
CRP-5321	30 FT. (9.14 M) - 30 DEGREES 11 HOLES	189.7/16"	30
CRP-4662	33 FT. (10.06 M) - 30 DEGREES 10 HOLES	198.9/16"	33
CRP-4663	* 36 FT. (10.97 M) - 30 DEGREES 11 HOLES	219"	36
CRP-5811	39 FT. (11.89 M) - 30 DEGREES 12 HOLES	239.23/32"	39
CRP-4664	42 FT. (12.80 M) - 30 DEGREES 13 HOLES	260.3/8"	42
CRP-5014	45 FT. (13.72 M) - 30 DEGREES 13 HOLES	280"	45
CRP-4665	48 FT. (14.63 M) - 30 DEGREES 15 HOLES	301.11/16"	48
CRP-5210	54 FT. (16.46 M) - 30 DEGEES 16 HOLES	337.1/8"	54
CRP-4767	** 60 FT. (18.29 M) - 30 DEGREES 18 HOLES	377.5/16"	60
CRP-5052	72 FT. (21.95 M) - 30 DEGREES 12 HOLES - BOTTOM PANEL	250.5/16"	96
CRP-4813	75 FT. (22.86 M) - 30 DEGREES 13 HOLES - BOTTOM PANEL	272.3/16"	100
CRP-5004	78 FT. (23.86 M) - 30 DEGREES 14 HOLES - BOTTOM PANEL	292.7/8"	104
CRP-4815	90 FT. (27.43 M) - 30 DEGREES 18 HOLES - BOTTOM PANEL	375.11/16"	120
CRP-4893	105 FT. (32.00 M) - 30 DEGREES 15 HOLES - BOTTOM PANEL	314.15/16"	140

*RIB LENGTH AND NO. OF ROOF RIB HOLES ARE THE SAME FOR UPPER PANEL 72 FT. (21.95 M) THRU 90 FT. (27.43 M)
**RIB LENGTH AND NO. OF ROOF RIB HOLES ARE THE SAME FOR UPPER PANEL (105 FT. 32.00M)

NOTES

The GSI Group, Inc. Warranty

THE GSI GROUP, INC. (“GSI”) WARRANTS ALL PRODUCTS WHICH IT MANUFACTURES TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USAGE AND CONDITIONS FOR A PERIOD OF 12 MONTHS AFTER RETAIL SALE TO THE ORIGINAL END USER. THE PURCHASER’S SOLE REMEDY AND GSI’S ONLY OBLIGATION SHALL BE TO REPAIR OR REPLACE, AT GSI’S OPTION AND EXPENSE, PRODUCTS THAT, IN GSI’S SOLE JUDGMENT, CONTAIN A MATERIAL DEFECT DUE TO MATERIALS OR WORKMANSHIP. ALL DELIVERY AND SHIPMENT CHARGES TO AND FROM GSI’S FACTORY WILL BE PURCHASER’S RESPONSIBILITY. EXPENSES INCURRED BY OR ON BEHALF OF THE PURCHASER WITHOUT PRIOR WRITTEN AUTHORIZATION FROM AN AUTHORIZED EMPLOYEE OF GSI SHALL BE THE SOLE RESPONSIBILITY OF THE PURCHASER.

EXCEPT FOR THE LIMITED WARRANTY EXPRESSED ABOVE, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (ii) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR BENEFITS. PURCHASER’S SOLE AND EXCLUSIVE REMEDY IS AS SET FORTH IN THE LIMITED WARRANTY EXPRESSED ABOVE, WHICH SHALL NOT EXCEED THE AMOUNT PAID FOR THE PRODUCT PURCHASED. THIS WARRANTY IS NOT TRANSFERABLE AND APPLIES ONLY TO THE ORIGINAL PURCHASER. GSI SHALL HAVE NO OBLIGATION OR RESPONSIBILITY FOR ANY REPRESENTATIONS OR WARRANTIES MADE BY OR ON BEHALF OF ANY DEALER, AGENT OR DISTRIBUTOR OF GSI.

GSI ASSUMES NO RESPONSIBILITY FOR CLAIMS RESULTING FROM ERECTION DEFECTS OR UNAUTHORIZED MODIFICATIONS TO PRODUCTS WHICH IT MANUFACTURED. MODIFICATIONS TO PRODUCTS NOT SPECIFICALLY DELINEATED IN THE MANUAL ACCOMPANYING THE EQUIPMENT AT INITIAL SALE WILL NULLIFY THE PRODUCT WARRANTY THAT MIGHT HAVE BEEN OTHERWISE AVAILABLE.

THE FOREGOING WARRANTY SHALL NOT EXTEND TO PRODUCTS OR PARTS WHICH HAVE BEEN DAMAGED BY NEGLIGENT USE, MISUSE, ALTERATION OR ACCIDENT. THIS WARRANTY EXTENDS SOLELY TO ONLY PRODUCTS MANUFACTURED BY GSI. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. GSI RESERVES THE RIGHT TO MAKE DESIGN OR SPECIFICATION CHANGES AT ANY TIME.

PRIOR TO INSTALLATION, PURCHASER HAS THE RESPONSIBILITY TO COMPLY WITH ALL FEDERAL, STATE AND LOCAL CODES WHICH MAY APPLY TO THE LOCATION AND INSTALLATION OF PRODUCTS MANUFACTURED OR SOLD BY GSI.

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This Equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installation occurs.

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