GROWspan™
greenhouse structures

GrowSpan™ 32' Wide
Series 750 Greenhouse with Blackout System

Photo may show a building of a different length and width.

WARNING: Cancer and Reproductive Toxicity - P65Warnings.ca.gov

32' Wide Series 750 Blackout System

Revision date: 4.23.21

General Information

READ THIS DOCUMENT BEFORE YOU BEGIN

The procedures within this guide describe how to assemble the internal blackout system of the standard S750 greenhouse. ***Before you begin***, read and understand the documentation sent with your building. If you have any questions during the assembly, contact Customer Service at 1-800-245-9881 for assistance.

Technical diagrams include information specific to your building. Refer to the technical diagrams when instructed to do so to prevent mistakes and improper assembly.

ATTENTION: Individuals with limited construction experience should enlist the services of a qualified contractor familiar with local and regional building codes and the construction of similar greenhouse structures. Regardless of who completes the construction, ***some procedures must be completed before others***.

SAFETY PRECAUTIONS

- Wear eye and head protection.
- Wear gloves when handling metal components and cables.
- Use a portable GFCI (Ground Fault Circuit Interrupter) when working with electric power tools and cords.
- Use lifts and other power tools suitable to accomplish the procedures outlined in this document and in the detailed final drawings.
- Safety harnesses are required for all workers in elevated positions.

SAFETY AND ASSEMBLY NOTICE

THE ASSEMBLY OF THIS BLACKOUT SYSTEM MUST CONFORM TO ALL AUTHORITIES HAVING JURISDICTION IN THE REGION WHERE THE INSTALLATION WILL OCCUR. THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR FAILURE TO COMPLY WITH ESTABLISHED BUILDING CODES AND RESTRICTIONS BY A CONTRACTOR SUPPLIED BY THE CUSTOMER. IN THOSE AREAS WHERE SUCH AUTHORITIES DO NOT EXIST, THE ASSEMBLY MUST CONFORM TO THE REQUIREMENTS IDENTIFIED IN THIS DOCUMENT AND THE APPROVED BUILDING DRAWINGS.

ADDITIONALLY, THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR ANY DAMAGE OR INJURY DIRECTLY OR INDIRECTLY RESULTING FROM THE INSTALLATION OF THE BLACKOUT SYSTEM REGARDLESS OF THE EXISTENCE OF CODES AND RESTRICTIONS AND WHETHER THESE WERE FOLLOWED OR IGNORED.

SPECIAL ASSEMBLY NOTE: BEFORE YOU BEGIN

MANY OF THE PROCEDURES DESCRIBED BELOW AND WITHIN THIS GUIDE CAN OCCUR SIMULTANEOUSLY. SOME, HOWEVER, MUST BE COMPLETED BEFORE MOVING ON TO THE NEXT PROCEDURE.

TO BETTER UNDERSTAND THE ENTIRE ASSEMBLY PROCESS AND TO PREVENT DAMAGE OR POSSIBLE INJURY, READ THROUGH THIS ENTIRE GUIDE ***BEFORE*** YOU BEGIN.

PRE-ASSEMBLY PROCEDURE FOR THE BLACKOUT SYSTEM

The following general steps will help plan the installation of the blackout system:

1. Verify that all parts are included in the shipment. Notify Customer Service for questions or concerns.
2. Read these instructions, the final drawings, and all additional documentation included with the shipment ***before*** you begin.
3. Gather the tools, bracing, lifts, ladders, and required personnel. See sample tool and equipment list.
4. Read the warranty information and complete the documentation as instructed.

ASSEMBLY NOTE: Install Tek screws using a clutched drill driver running approximately 750 RPM while applying approximately 50 lbs of force. **DO NOT USE AN IMPACT DRIVER!**

Shipping Color Codes and Additional Systems

SHIPPING COLOR CODES

Parts for a specific building component or system can be found in these color-coded packages or shipping containers:

- **GREEN:** Main greenhouse including roof film, end wall framing and cladding, and double door.
- **GREY:** Interior Blackout System including the knee wall for each side.
- **BLUE:** Hardware to attach customer-supplied wood baseboard, or components for the steel base tube (included).
- **PURPLE:** HAF and main exhaust fans.
- **YELLOW:** Evaporative Cooling System.
- **BLACK:** Evaporative Cooling System frame.
- **RED:** Gable wall hinged vent.

SYSTEMS AND ACCESSORIES

Review all technical drawings related to each accessory or system (if present) *before and during* assembly. Some details will show locations of smaller parts that must be installed at a specific time. Read the following and proceed as needed to complete the construction.

BLACKOUT SYSTEM — INCLUDED (ALL MODELS — GREY)

Consult the instructions for the blackout system before you begin. For easier installation of some blackout system components, install these before pulling the main cover film.

EXHAUST FANS — INCLUDED WITH LE & SE MODELS (PURPLE)

Review the instructions included with these items to install. The rough openings should be present in the end walls if earlier suggestions were followed. In some instances, the purchase of additional framing may be necessary to complete the installation of some components.

EVAPORATIVE COOLING SYSTEM — LE & SE MODELS ONLY (YELLOW)

For this greenhouse, install the evaporative cooling systems in the end wall opposite the exhaust fans. This system requires a water source and works in conjunction with the wall vent. Review the instructions for the end wall vent and evaporative cooling system to install these components in the end wall opposite the end wall with the door and exhaust fans.

END WALL VENT — INCLUDED WITH LE & SE MODELS (RED)

As noted, the end wall vent is opposite the exhaust fans and on the same wall as the evaporative cooling system. Consult the main building drawing and vent installation guide to assemble and install the vent.

ATTENTION: It is best to review all instructions sent with accessories *before* any construction begins. Doing so helps prevent the need to disassemble or modify frame components.

CIRCULATION FANS — INCLUDED WITH LE & SE MODELS (PURPLE)

Circulation fans attach to the blackout system support rafters inside the greenhouse using the supplied QH1330 brackets, 2" x 2" square tubing, and 5/16" locknuts and bolts. Depending on personal preferences, additional customer-supplied materials may be required to mount the fans in the desired positions. Consult the documents included with the fan for additional installation details.

ATTENTION: ALL ELECTRICAL AND GAS SUPPLY CONNECTIONS TO BE COMPLETED BY A PROFESSIONAL, LICENSED AND QUALIFIED CONTRACTOR ACCORDING TO LOCAL AND REGIONAL BUILDING CODES AS THESE APPLY.

Required Tools & Equipment

REQUIRED TOOLS

The following list identifies the basic equipment and some main tools needed to assemble the blackout system. *The size of the required personnel lifts may vary. Additional hand tools and supports may be needed depending on the structure size, location, and existing restrictions and codes.*

- Tape measure or measuring device.
- Clutched cordless drill driver & drill bit set; drill bit size varies with connections.
- Corded and cordless impact wrenches for bolt connections and anchor bolts.
- Impact socket set that includes 15/16" for the 5/8" anchor bolts.
- Wrench set — up to 1” (covers most cases).
- Utility knife and blades to cut blackout material.
- Hammers, pry bars, & alignment bars for bolt installation.
- Generator or power source & extension cords.
- Cordless reciprocating saw (Sawzall®) & metal blades.
- Hand files (round and flat) to remove metal burrs from metal after cutting.
- Hammer drill (for anchor bolt installation). May not apply to all applications.
- Levels and plumb bob, or similar tool to square and level related frame members.
- Miscellaneous clamps, ratchets, and straps.
- Safety equipment to protect head, eyes, hands and feet. Safety straps and harness for working in lifts.

EQUIPMENT

- Aerial Lifts: Reach determined by height of foundation (if applicable) plus peak height of building. Add about 5’ extra.
- Ladders, work platforms, and other machinery for lifting designed to work safely at building height.

CUSTOMER-SUPPLIED PARTS AND MATERIALS

- Silicone sealant: Some sealant is included. Additional may be needed depending on application.
- Epoxy to secure anchor bolts to concrete (depends on local building codes).
- Materials to seal end wall and sidewall areas at ground level.
- Materials to supply power to electrical exhaust fans, evaporative cooling system water pump, and blackout system drive motor.
- Miscellaneous items for custom components and installation of those items.
- Straps and ratchets or similar items to square and plumb columns, rafters, and mid trusses during frame installation.
- Baseboard Lumber **(L & LE Models only)**: 2" x 8" x 144" boards (minimum).
- Controller for greenhouse and blackout systems. *Contact your sales representative for additional details.*

BASIC ASSEMBLY STEPS — BLACKOUT SYSTEM

The steps that follow describe the typical sequence to ensure proper blackout system assembly. When present, local restrictions and building codes may require additional steps. Failure to follow these steps or adhere to recognized codes and standards or both may result in an improperly assembled building system and *will void the warranty and all protection the building owner is entitled to*. These are the basic assembly steps:

1. Layout base plate positions for the blackout system end support rafters.
2. Mark anchor bolt locations and install anchor bolts.
3. Install blackout system as described in this document.
4. Test the blackout system.
5. Read the care and maintenance information near the end of this guide.

PARTS IDENTIFICATION

The following graphics will help identify smaller parts used to construct greenhouse.
Additional parts are identified in the technical drawings for the building.

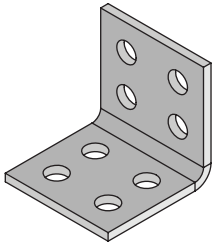
FA4482B
Tek Screw

QH1070
Pipe Strap

102198A
Poly Spring Wire

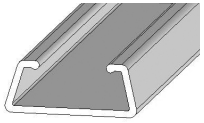
AR1530
Pull-Cable

116946 / 116947 / 116948
Light Deprivation Garages



111818
Channel Bracket

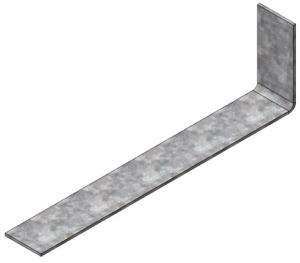
116987
Channel Corner Bracket



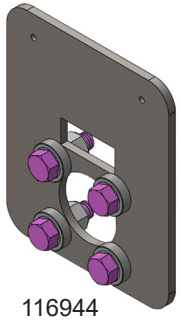
102197Z144
Spring Channel

116940
Pull-Cable Drum

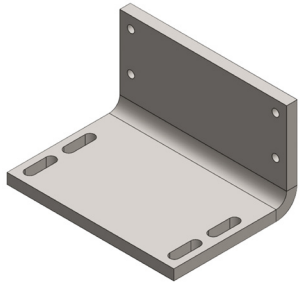
117061 & 117062
Brush Seal



116988
Channel Base Bracket



116944
Bearing Plate



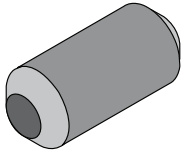
116362
Motor Bracket

AS1002
Pull-Cable Clamp

1.315" / 1.90"
Round Pipe

115198
Black-Out Tape

DE4011
Sealant



117058
Shear Pin

109904D
Adaptor

116018
Motor

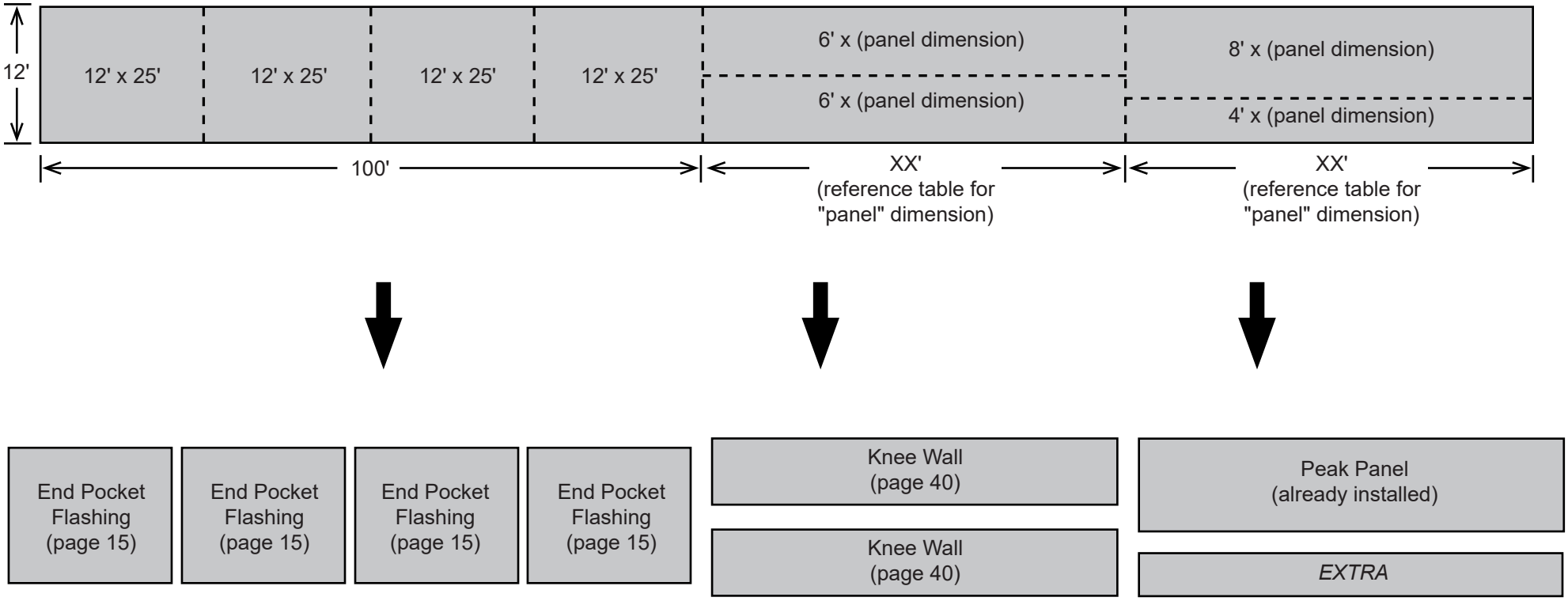
Blackout Material Cut Sheet

BLACKOUT CUT SHEET

Purchased blackout system comes with one roll of 116998 blackout material, which will be cut as needed to provide material sections for the peak, end flashing, and light deprivation kneewall. Shown to the right is a table providing specific cut dimensions based on purchased greenhouse length. Below are sample cut sheets illustrating panel cuts and material allocation. Cross reference this page as needed to verify the different panel dimensions for different applications.

ATTENTION: A section of this material is to be cut and installed during the greenhouse framing installation, prior to blackout installation. See "peak panel" in diagram below.

GREENHOUSE LENGH	"PANEL" DIMENSION
48'	50'
72'	74'
96'	98'
120'	122'



Diagrams not to scale. Panel layout is for illustration and instructional purposes only.

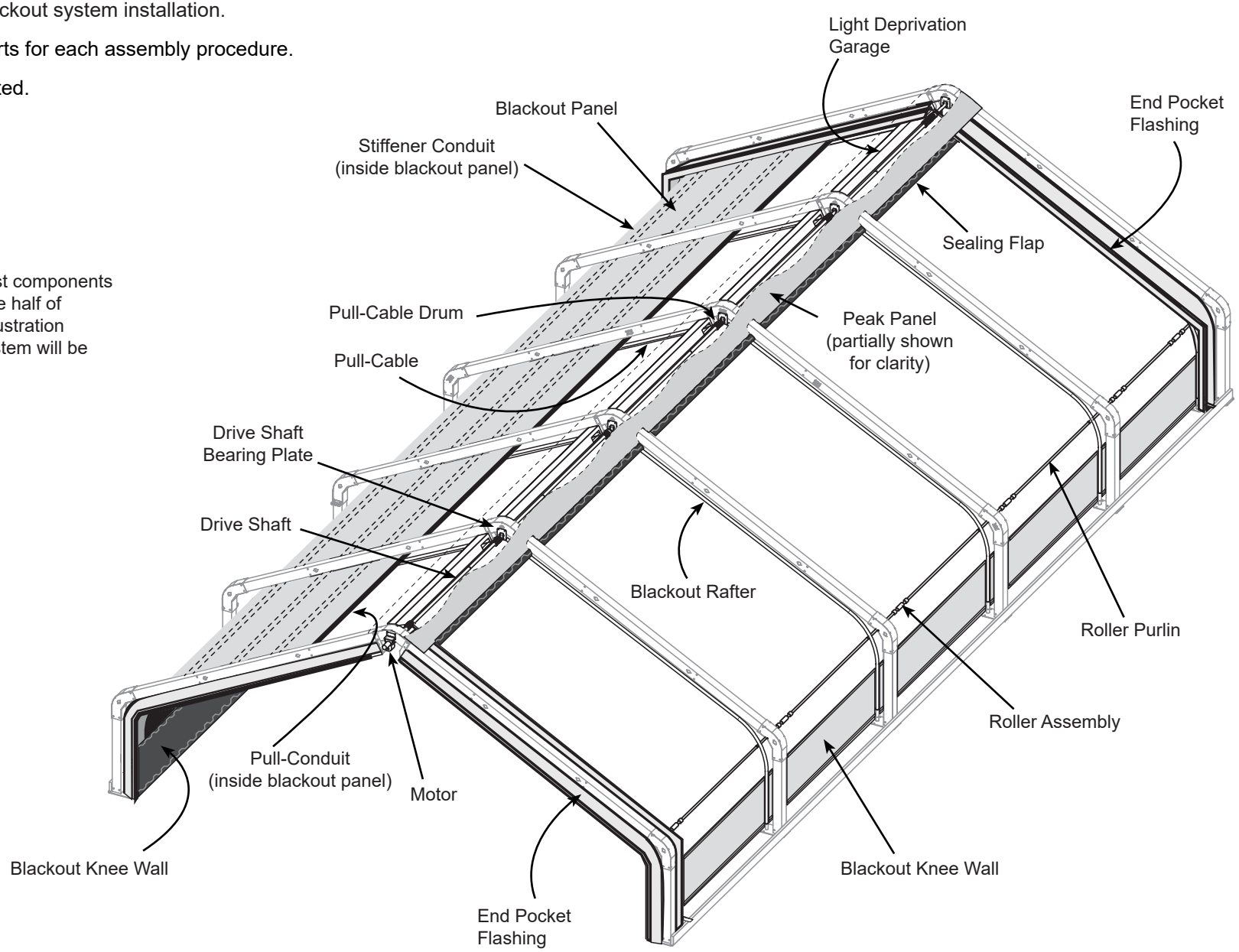
Blackout System Overview

OVERVIEW

This section describes blackout system assembly. See illustration below to identify main parts.

1. Prepare site for blackout system installation.
2. Locate required parts for each assembly procedure.
3. Proceed as instructed.

ATTENTION: Most components only shown on one half of greenhouse for illustration purposes. Full system will be symmetrical.



Drawing may show a model of a different length. Refer to Quick Start section located near the back of this guide for on-center measurements.

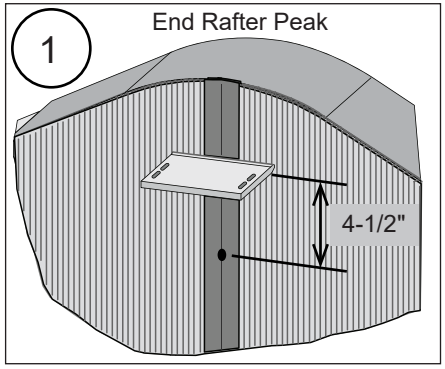
1 INSTALL MOTOR

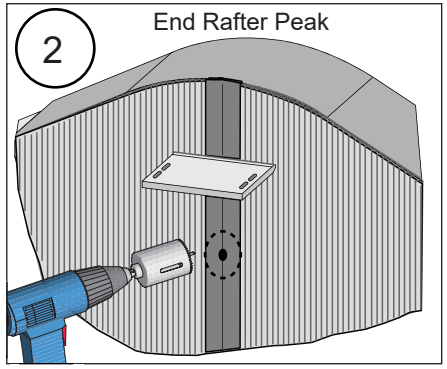
IMPORTANT: *Lifts/ladders and assistants are required.*

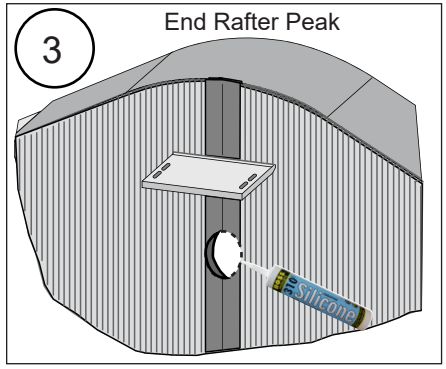
1. At the front end of the greenhouse, measure and mark a spot 4-1/2" down from the bottom/center of the 116362 motor bracket that is protruding from the gable wall polycarbonate glazing.

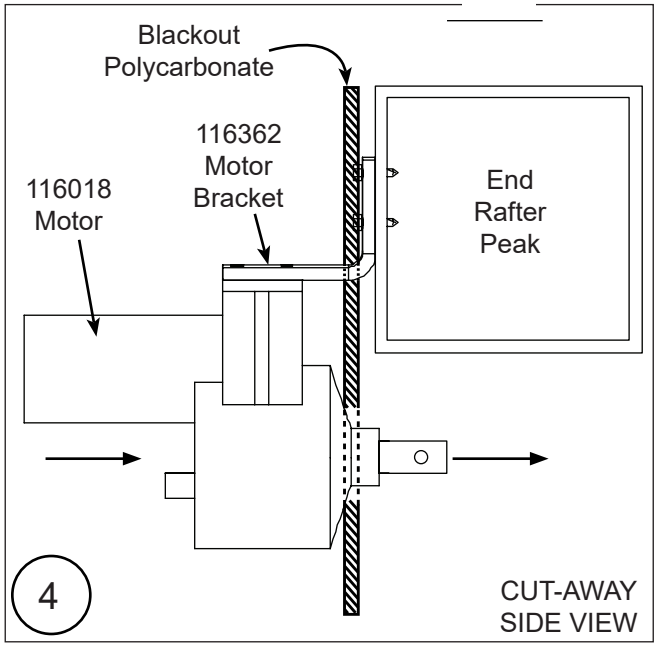
   NOTE: If desired, verify measured spot by hoisting and aligning the 116018 motor with the motor bracket to ensure the motor drive shaft will go through the polycarbonate in that spot when installed.

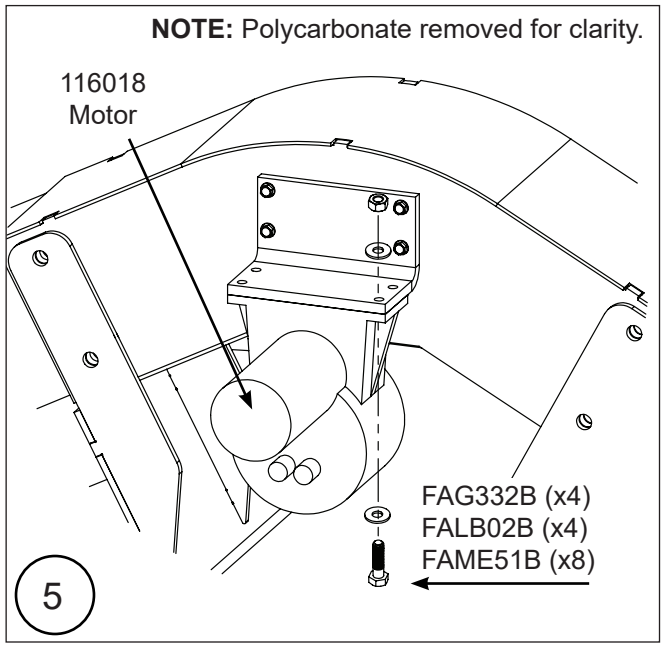
2. Using a 2" hole saw, drill a 2" hole through the polycarbonate and h-channel with the measured mark as the center.
3. Generously line the outer perimeter and inside walls of the 2" drilled hole with DE4011 sealant.
4. Carefully set the 116018 motor in place. Verify that motor sits tight against the polycarbonate and bolt holes in the motor and motor bracket are properly aligned. Slotted bracket holes allow for adjustment.
5. Attach motor to the bracket using FAG332B bolts, FAME51B washers, and FALB02B nuts.
6. If necessary, use more DE4011 sealant around the drilled hole on the inside of the greenhouse for light deprivation purposes.
7. Continue by installing the bearing plates.









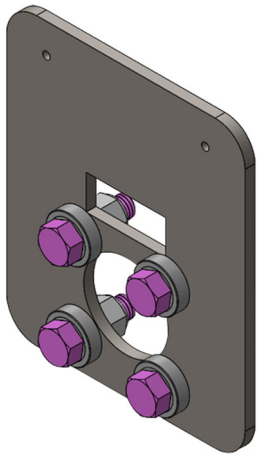


1

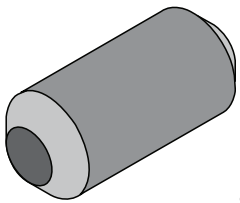
INSTALL BEARING PLATES AND SHEAR PIN

1. At each 6"x6" peak rafter assembly joint, except for the end one at which the motor is located, align the attachment holes of the 116944 bearing plates with the pre-drilled holes and attach using FA4482B Tek screws.
2. Insert the 117058 shear pin into the pre-drill hole in the motor drive shaft extension protruding into the greenhouse.

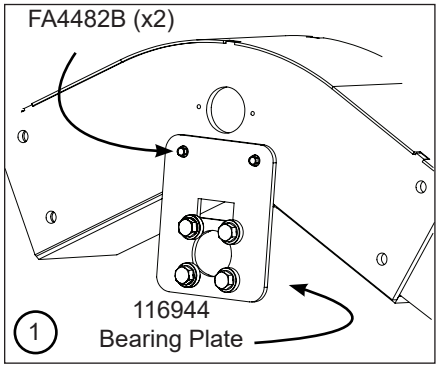
   ATTENTION: Shear pin will not sit in the hole by itself. If necessary, temporarily hold in place until the drive shaft adaptor can be installed.
3. Continue by installing the drive shaft assembly.

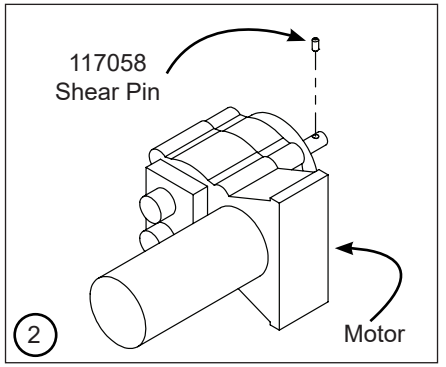


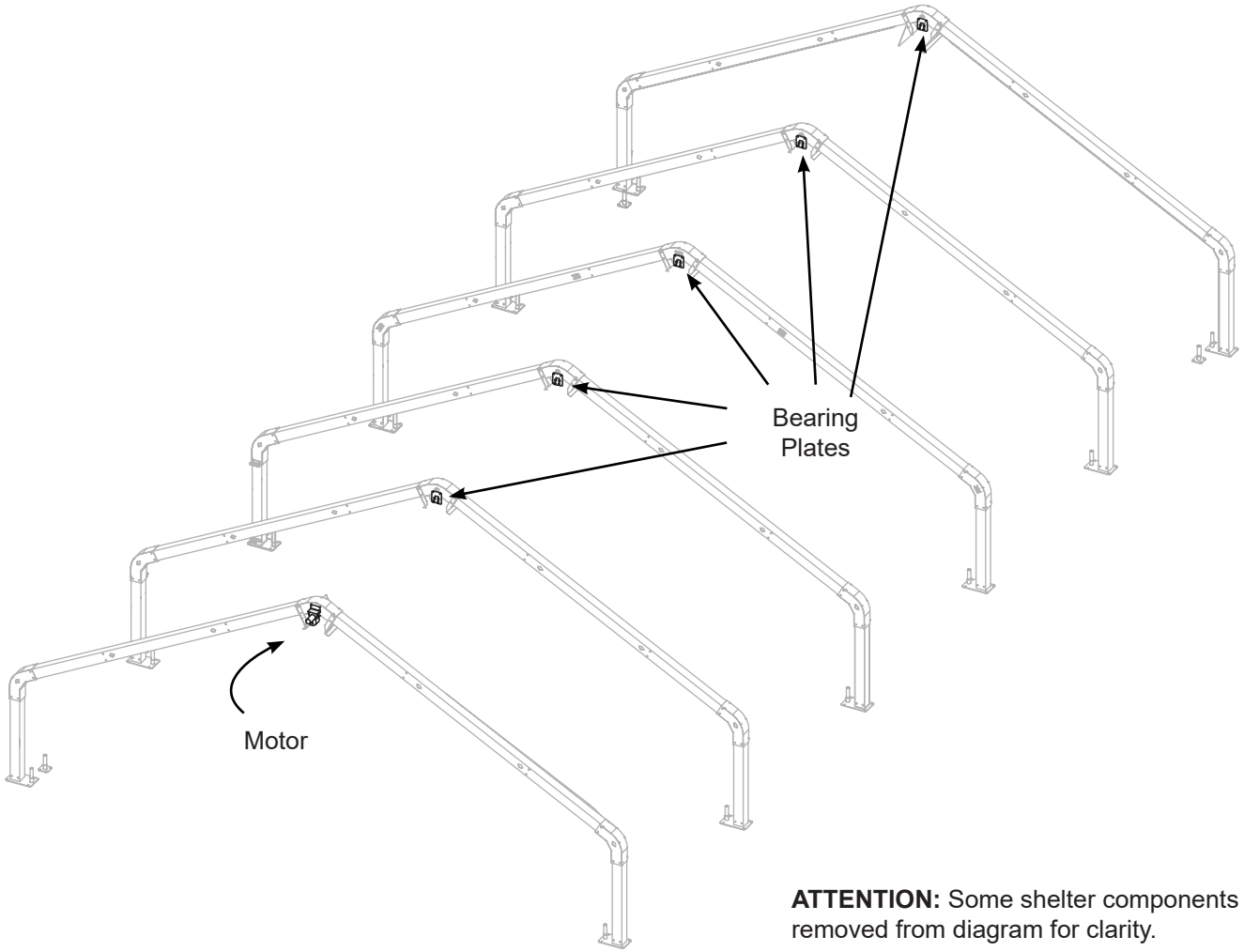
116944
Bearing Plate



117058
Shear Pin







ATTENTION: Some shelter components removed from diagram for clarity.

1 ASSEMBLE DRIVESHAFT

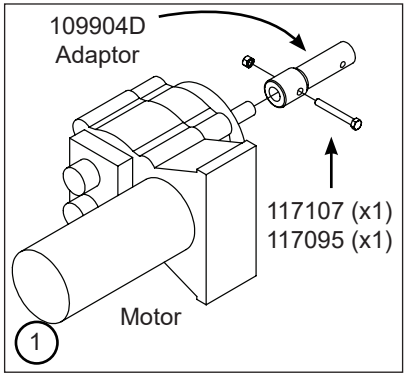
Driveshaft runs along the peak, extending from the motor, through all bearing plates.

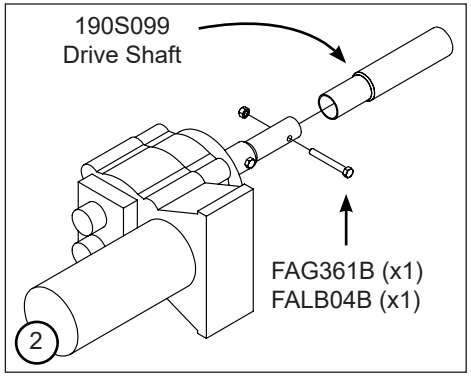
HELPFUL HINT: For ease of installation, assemble the driveshaft on the ground to pre-drill splice holes, and mark alignment lines on the splices. If assembling this way, follow steps 2, 4, and 5 on the ground, then disassemble and redo steps 1 through 5 in the air.

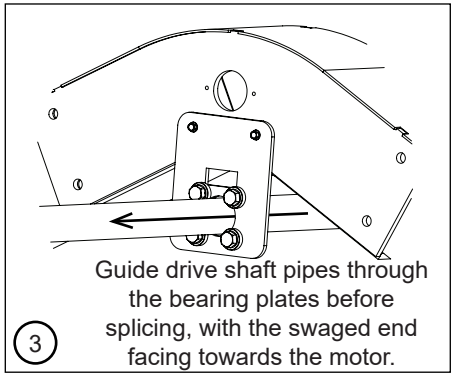
1. Using one 3/16"x2-1/2" bolt (117107) and one 3/16" nylon lock-nut (117095), attach the wider end of the 109904D adaptor to the motor shaft as shown. Verify shear pin is installed and did not fall out.
2. Slide the swaged end of a 190S099 pipe over the open end of the 109904D adaptor. Splice using one FAG361B bolt and one FALB04B nut.

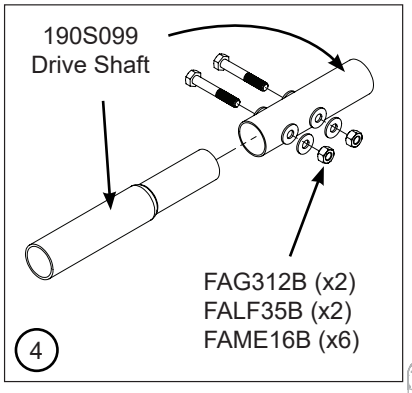
   NOTE: Drill a 5/16" splice hole through the swaged end of the 1.90" driveshaft pipe.
3. Guide the next 190S099 pipe through the 116944 bearing plate attached to the first interior rafter.
4. Slide the swaged end of the 190S099 pipe into the plain end of the first 190S099. Splice using two (2) FAG312B bolts, two (2) FALF35B lock-nuts, and six (6) FAME16B washers.

   NOTE: Drill 5/16" splice holes through the 1.90" driveshaft pipe.
5. Repeat steps as needed until driveshaft is fully installed end-to-end. Verify that the driveshaft extends approximately 2" past the bearing plate on the end rafter. Cut pipe to fit, if necessary.









ATTENTION: Some shelter components removed from diagram for clarity.

Main Panel Spring Channel

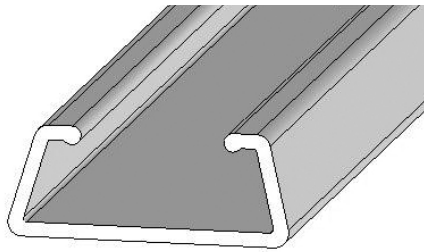
2 INSTALL MAIN PANEL SPRING CHANNEL

Install spring channel along the inside of the base tube to affix the main blackout panels.

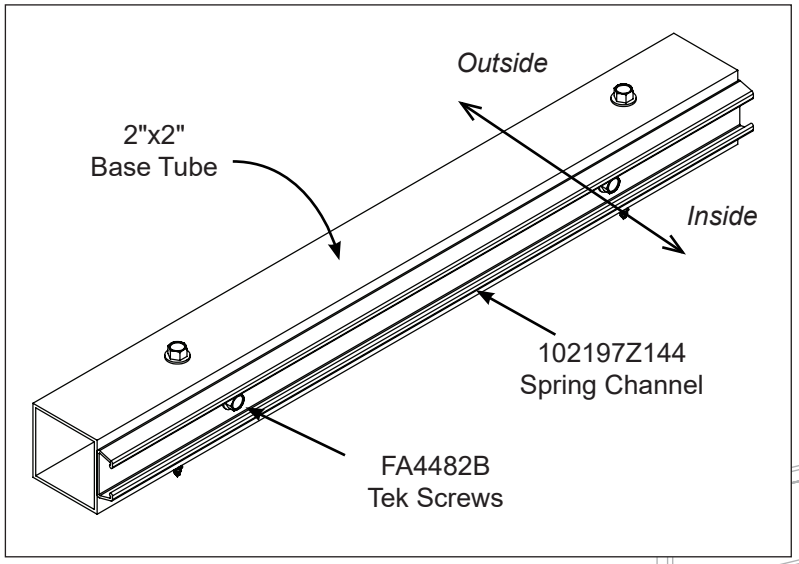
1. Locate 102197Z144 spring channel and attach to the INSIDE face of the 2"x2" metal base tube using FA4482B Tek screws or the baseboard with FA4650 wood screws. Space approximately every 12".

   Cut spring channel as needed to fit between the rafter legs.

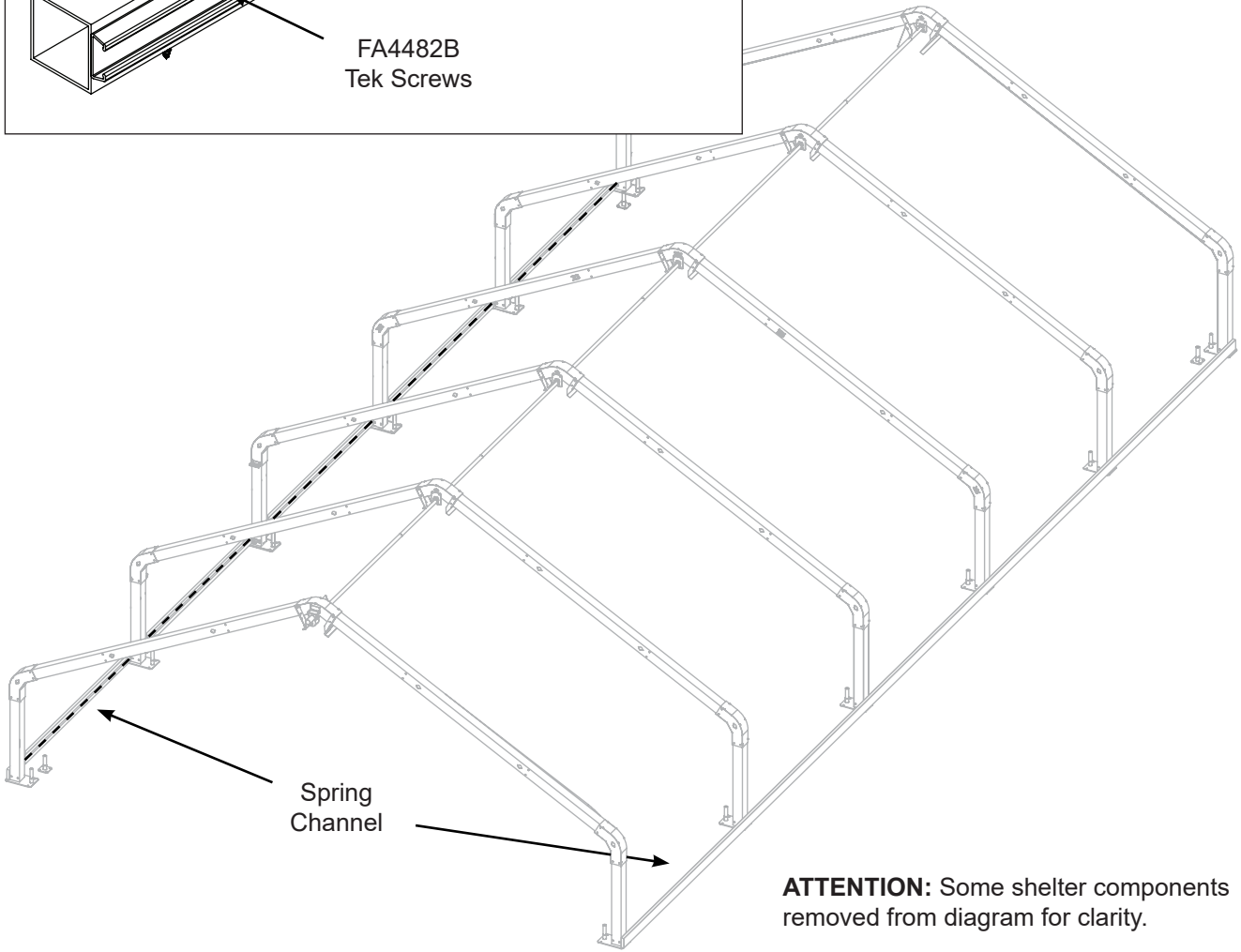
2. Continue with the installation of the end pocket flashing on the next page.



102197Z144
Aluminum
Spring Channel



NOTE: Diagram shows 2"x2" metal base tube. If wooden baseboard is installed, use wood screws to attach.



ATTENTION: Some shelter components removed from diagram for clarity.

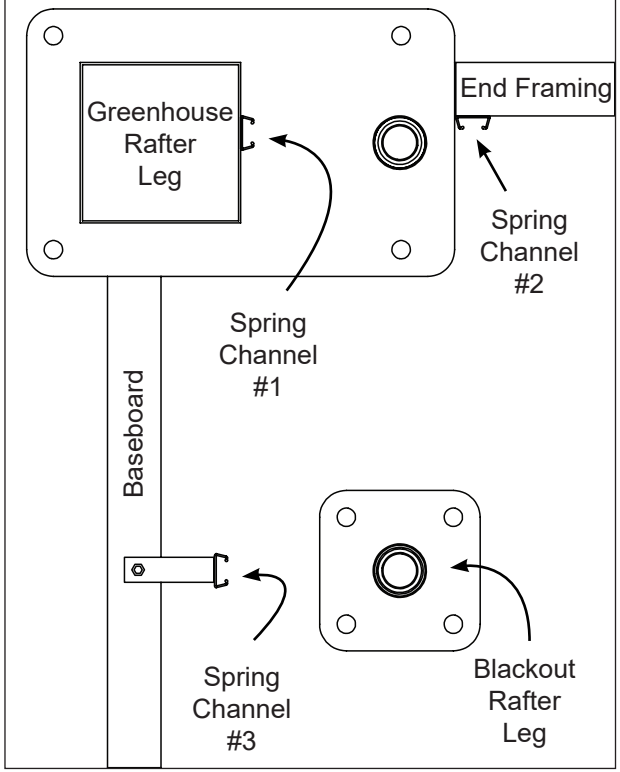
End Pocket Flashing Channel

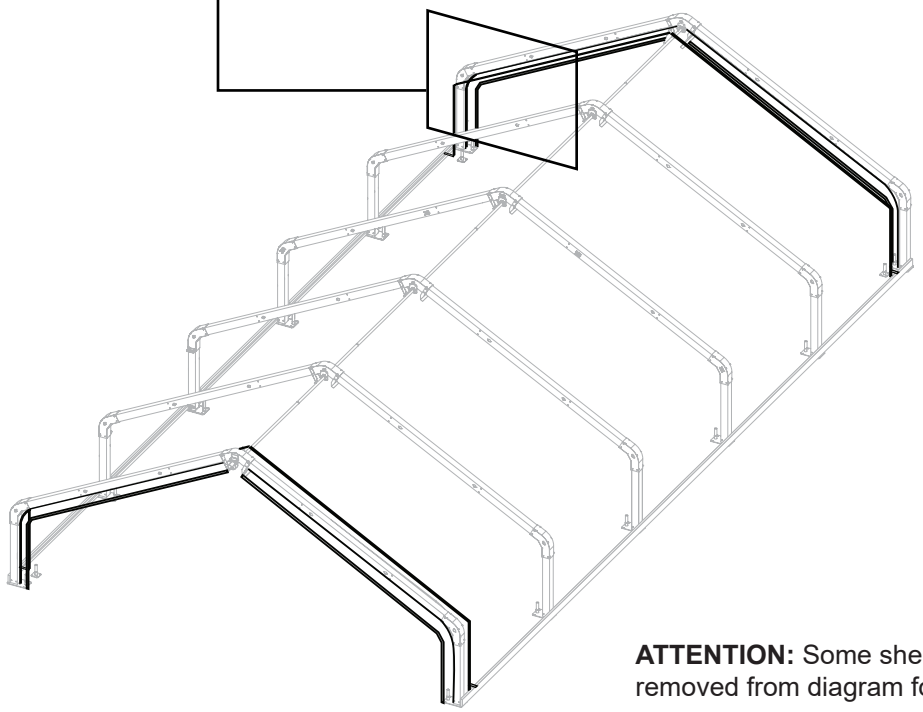
3 INSTALL END POCKET FLASHING SPRING CHANNEL

End pocket flashing acts as the light deprivation along the over-the-top rafter profile at the ends of the greenhouse. Pocket flashing panel is secured into five (5) runs of spring channel. Photos and diagrams on this page show an overview of the locations of the first three (3) spring channel runs. The remaining two (2) are installed later.

Further installation details and photos on the following pages. Familiarize with and consult this overview page as needed.

CUT-AWAY TOP VIEW





ATTENTION: Some shelter components removed from diagram for clarity.

3 INSTALL END POCKET FLASHING SPRING CHANNEL (continued)

Spring Channel #1

1. Locate 102197Z144 spring channel and attach to the inside face of the 6"x6" end rafter legs as shown in photo 1 using FA4482B Tek screws. Space approximately every 24".

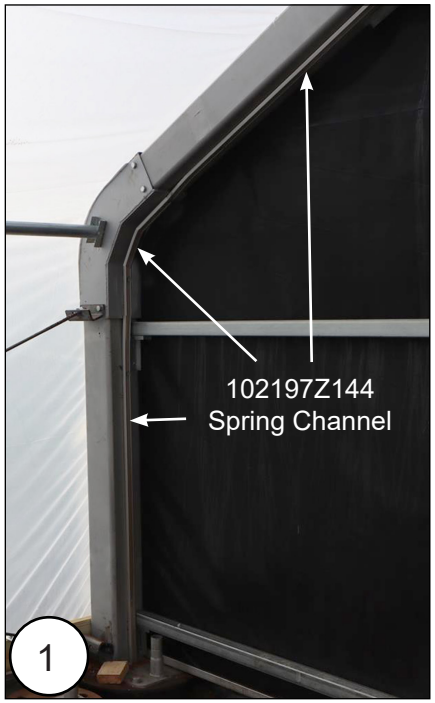
   Verify that spring-channel is centered under the rafter leg and follows the contours of the rafter profile from base to the rafter peak assembly. Cut spring channel to fit as needed.

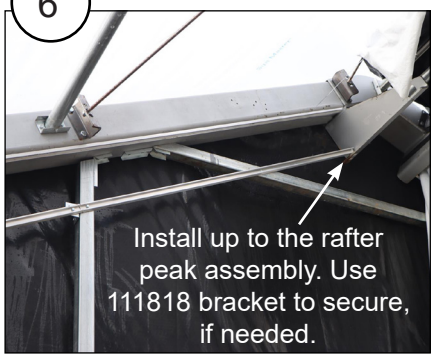
Spring Channel #2

2. Measure from ground level to the center of gable wall framing as shown in photo 2.
3. Cut a section of 102197Z144 to that measurement and attach to the inside face of the gable wall framing using FA4482B Tek screws as shown in photo 3.

   NOTE: Align spring channel flush with the inside edge of the end rafter base plate. Dimension is approximately 8" from the inside edge of the end rafter.
4. Notch the next section of spring channel as shown in photo 4 and bend at an angle to match the contours of the rafter profile and maintain the 8" spacing.
5. Attach bent section of spring channel to end framing using FA4482B Tek screws as shown in photo 5.
6. Continue installing spring channel up to the rafter peak assembly. Cut to fit as needed.

   ATTENTION: Use 111818 attachment brackets as shown in photo 6 as required.



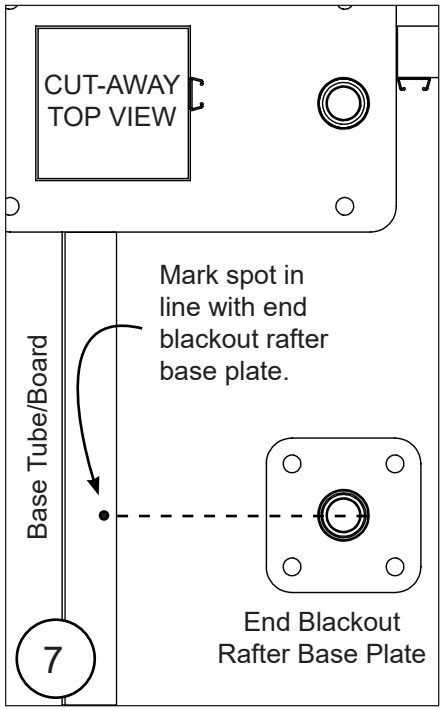


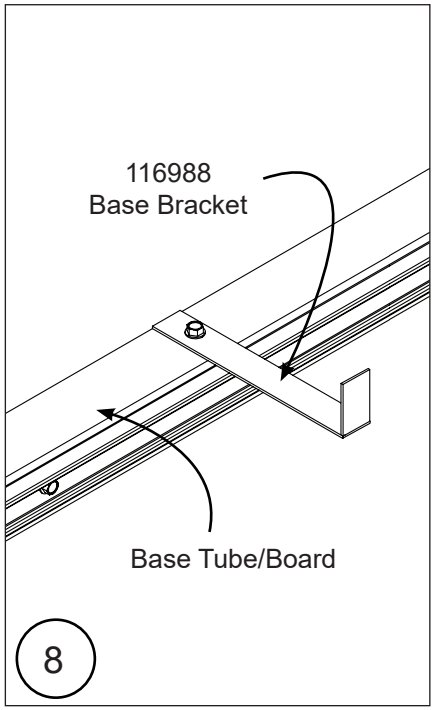
3 INSTALL END POCKET FLASHING SPRING CHANNEL (continued)

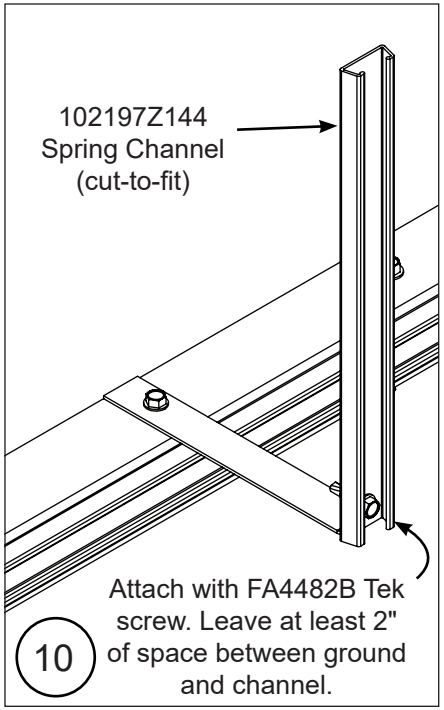
Spring Channel #3

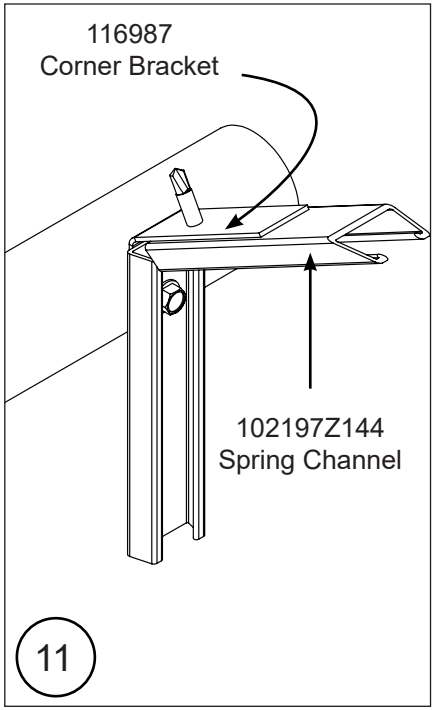
7. Mark a spot on the base tube (or baseboard) that is in line with the end blackout rafter base plate as shown in diagram 7.
8. Locate a 116988 base bracket. Attach to the base tube/board in the spot marked in the previous step using an FA4482 Tek screw (base tube) or FA4650 wood screw (baseboard), as shown in diagram 8.
9. Measure from ground level to the center of corner purlin as shown in photo 9.
10. Cut a section of 102197Z144 to that measurement and attach to the 116988 bracket and the corner purlin using FA4482B Tek screws as shown in diagram 10. Leave at least 2" of space between ground level and the 102197Z144 channel.

    ATTENTION: Verify that the 116987 corner bracket is installed *behind* the 102197Z144 channel as shown in diagram 11.
11. Locate a section of 102197Z144 and attach to the 116987 bracket using an FA4482B Tek screw as shown in diagram 11.
12. Verify the distance between spring channel #3 and the 6"x6" rafter is the same along the entire profile, and continue to attach 102197Z144 to the underside of the lengthwise purlins using FA4482B Tek screws. Cut sections to fit as needed and install to the peak purlin.
13. Repeat steps 1-12 at each greenhouse corner as necessary.
14. Continue with the end pocket flashing panel installation.









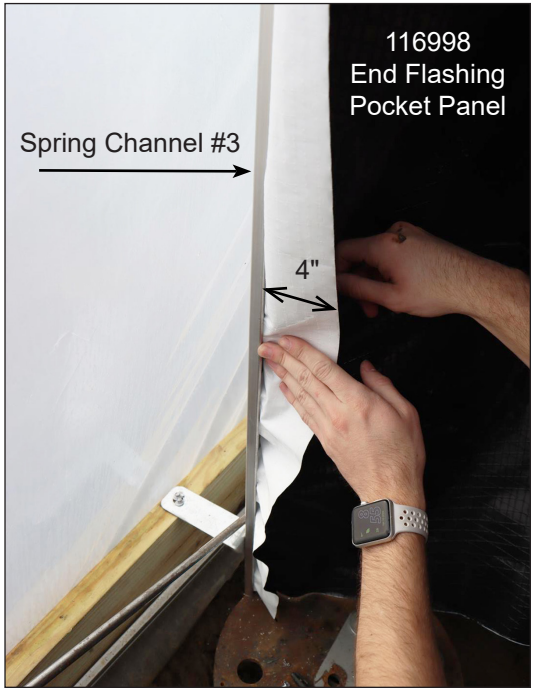
End Pocket Flashing Panels

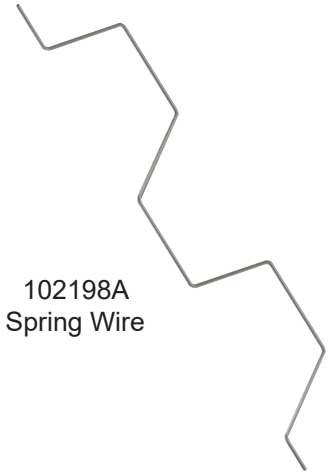
4 INSTALL END POCKET FLASHING PANELS

Consult *Blackout Material Cut Sheet* (page 6) for panel material reference.

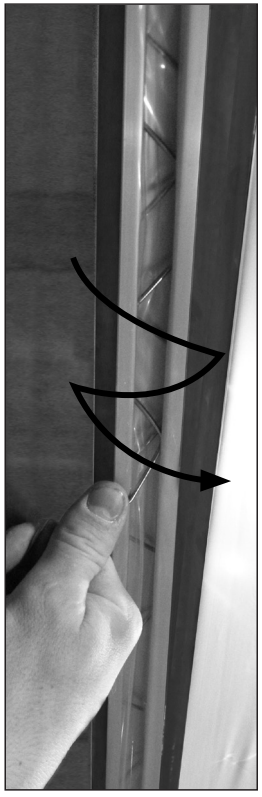
1. Locate the 12' roll of 116998 black/white flashing material. Unroll and cut a 25' length
2. Starting at the bottom corner, with the BLACK side facing the INSIDE of the greenhouse, secure the 12'x25' section of 116998 material into spring channel #3 using 102198A spring wire.

   IMPORTANT: Verify that there is 4" of excess hanging into the greenhouse.
3. Continue securing material into spring channel #3 from base to peak, maintaining the 4" of excess material.

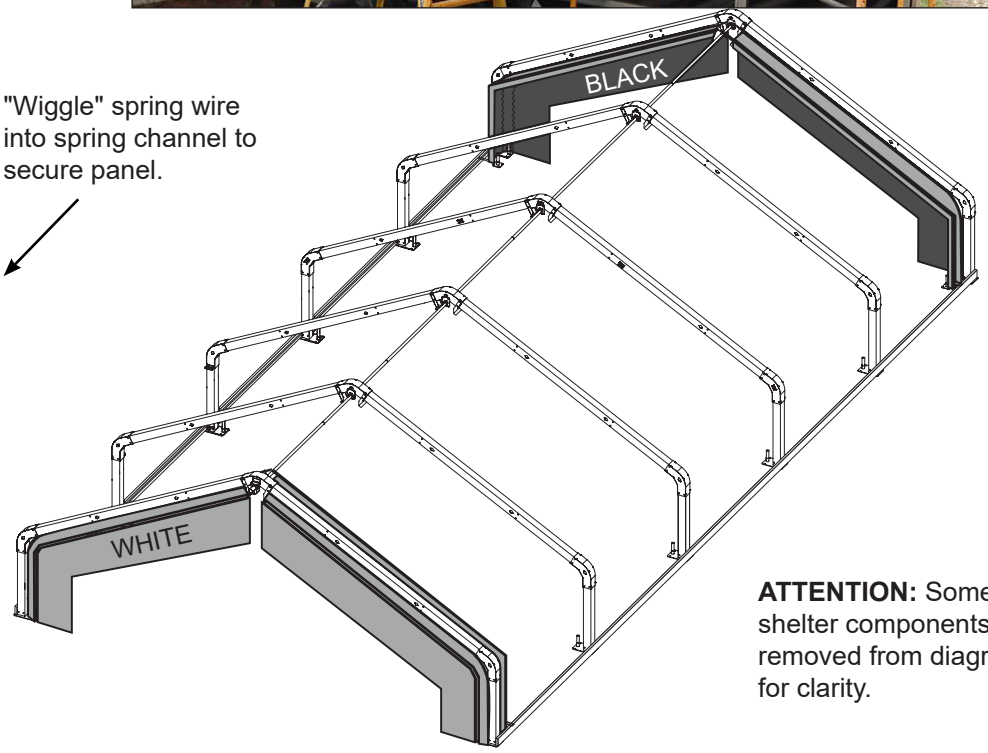




WEAR EYE PROTECTION WHEN INSTALLING SPRING WIRE!



"Wiggle" spring wire into spring channel to secure panel.



ATTENTION: Some shelter components removed from diagram for clarity.

4 INSTALL END POCKET FLASHING PANELS (continued)

4. Push panel back up into spring channel #1 and secure material using 102198A spring wire.

   IMPORTANT: Do not allow slack in the panel between spring channel #1 and spring channel #3, but do not install overly taut.

5. Continue using 102198A spring wire to secure material into spring channel #1 from base to peak rafter assembly.

6. Move to spring channel #2, and use 102198A spring wire to secure flashing panel from base to peak rafter assembly. Do not allow slack between spring channels #1 and #2.

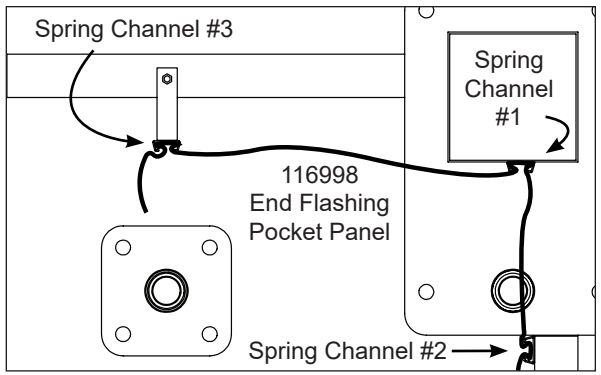
7. Measure and mark a spot on the panel 48" in from the corner as shown.

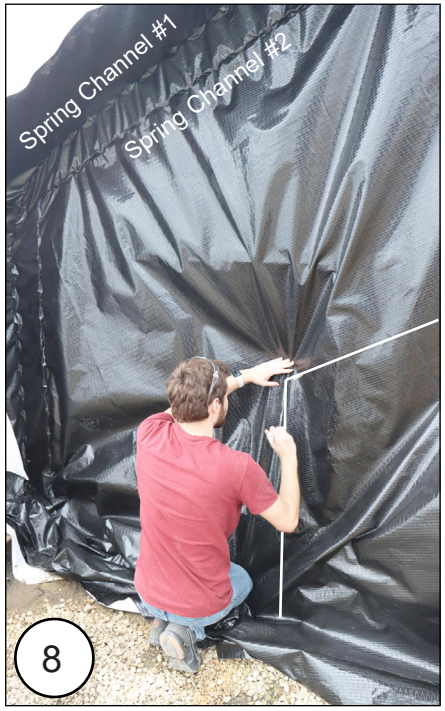
8. From the corner mark, mark lines parallel with the side wall and the roof profile.

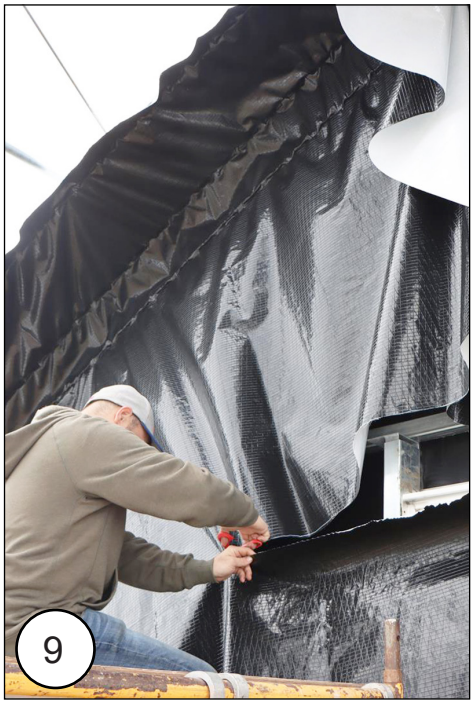
9. Trim panel along marked lines as shown.

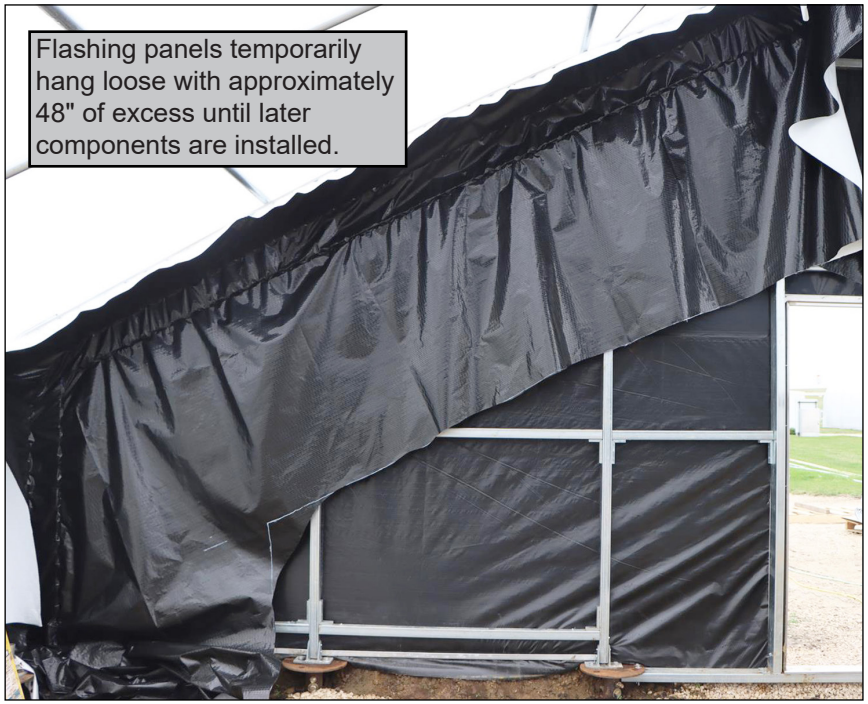
10. Repeat steps 1 through 9 for the remaing three corners of the greenhouse.

11. Continue with the preparation of the blackout panel on the following page.









5

PREPARE BLACKOUT PANELS

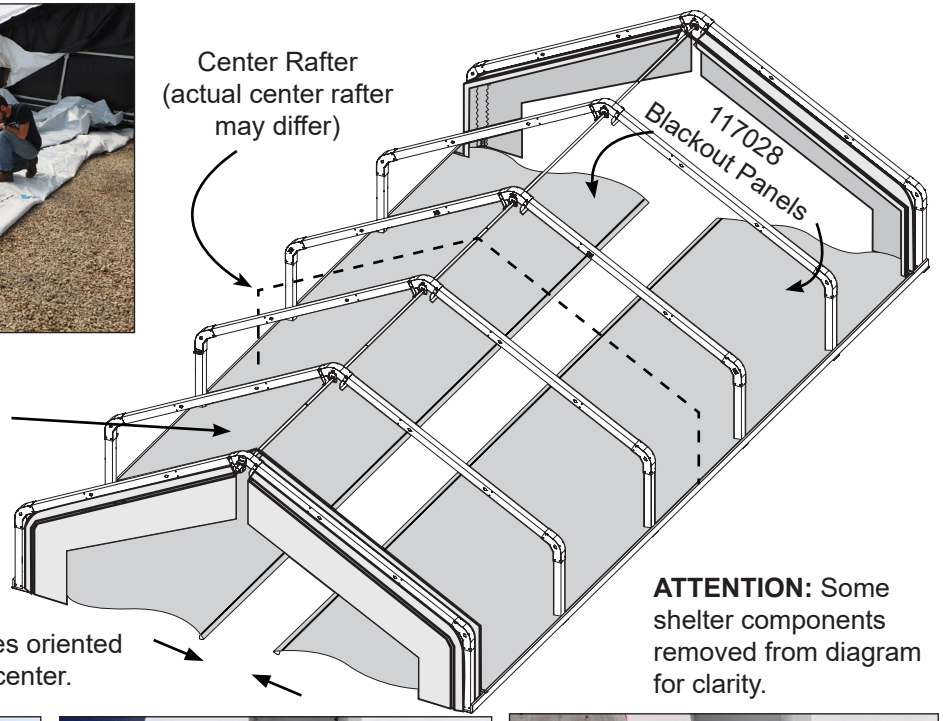
1. Locate a 117028 blackout panel. Unroll and position along the base board/tube as shown.

   IMPORTANT: Verify that panel is positioned so that the WHITE side is facing UP and that the conduit pocket is oriented towards the middle of the greenhouse.

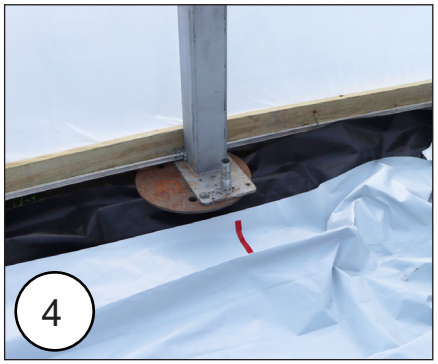
2. Unfold and spread panel out, aligning the raw material edge (non-conduit pocket) with the baseboard/tube.
3. Measure and mark the center of the blackout panel.
4. Align the center mark with the center rafter of the greenhouse.

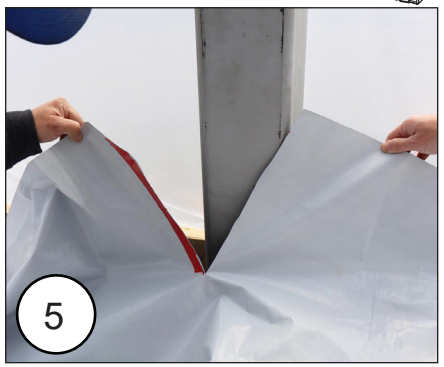
   ATTENTION: Depending on greenhouse length, the center rafter may be a 6"x6" square rafter leg, or a round mid rafter. Photos show 6"x6" only. Adjust accordingly, if needed.

5. Slit the blackout panel at the center line as shown.
6. Wrap panel around 6"x6" rafter as shown.
7. Continue by securing blackout panel to the baseboard/tube.



ATTENTION: Some shelter components removed from diagram for clarity.





5

ATTACH BLACKOUT PANELS

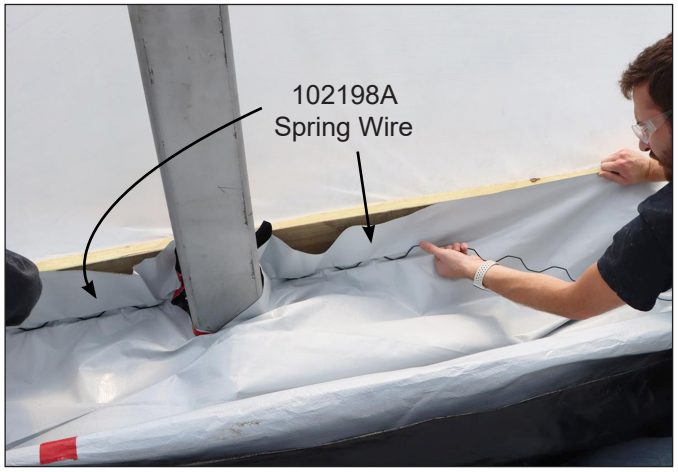
1. Starting at the center rafter, secure the edge of the blackout panel to the spring channel on the baseboard/tube using 102198A spring wire.

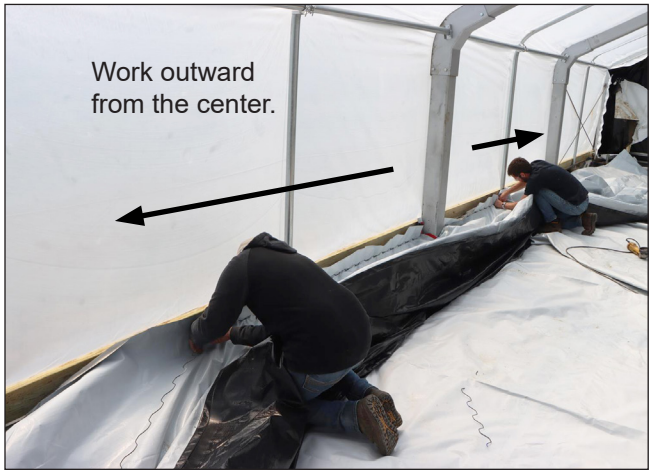
   NOTE: Secure with approximately 4" of excess *above* the spring channel as shown.

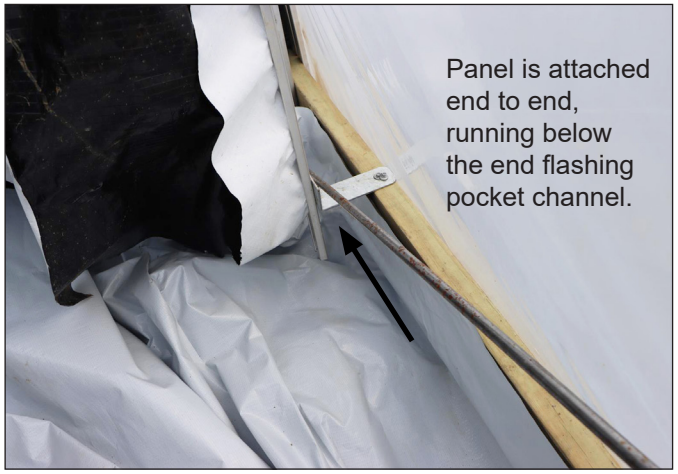
2. Moving outward, continue installing spring wire to secure panel. Cut panel as needed to wrap around rafter legs and cut spring wire to fit between them.

3. Secure panel to baseboard/tube all the way to the gable wall. Panel runs under spring channel #3 of the end flashing pocket as shown.

4. Once panel is installed end-to-end, return to each rafter leg. For light sealing purposes, tape the openings using provided 115198 blackout tape.







5

INSTALL PULL CONDUIT

Assemble two blackout panel pull conduits. Start each conduit assembly with the plain end of a swaged pipe and add swaged pipes to arrive at the length of the frame. The conduits are used to pull the blackout panel up over the blackout rafters for light deprivation.

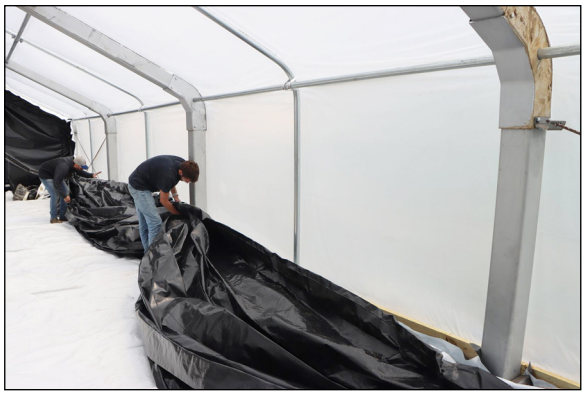
1. Locate all sections of 131S147 pipe needed to assemble the pull conduits.
2. Use 115198 blackout tape or provided duct tape to tape the swaged end of one 131S147 pipe for cover protection.
3. Insert the taped swaged end into the conduit pocket of the blackout panel, and push into the pocket until only a few inches of the plain end is sticking out.

   HELPFUL HINT: Use the front door opening to allow for easy access when sliding conduit pipes into the conduit pocket.
4. Insert the swaged end of the next 131S147 pipe into the plain end of the first pipe.
5. Secure pipe splice with three (3) Tek screws.
6. Use duct tape to tape over each Tek screwed splice.
7. Repeat as needed until conduit run is fully assembled.
8. Cut conduit pipe to fit as needed. Conduit should be 10" shorter than the greenhouse length.
9. Repeat for the panel on the other half.
10. Continue by preparing attached panel for blackout rafter assembly on the following page.

5

PREPARE BLACKOUT PANELS FOR BLACKOUT RAFTER INSTALLATION

In order to install the blackout rafters, the installed blackout panels will need to be folded and bunched behind the blackout rafter base tubes. With assistance, carefully fold and bunch the panel as shown. Ensure that the pull conduit is resting on TOP of the bunched panel for easier access later. Continue with the installation of the Blackout Rafters on the following page.

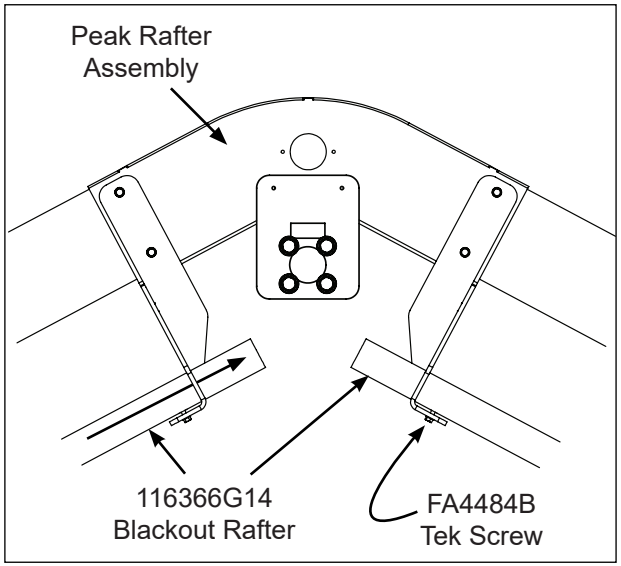


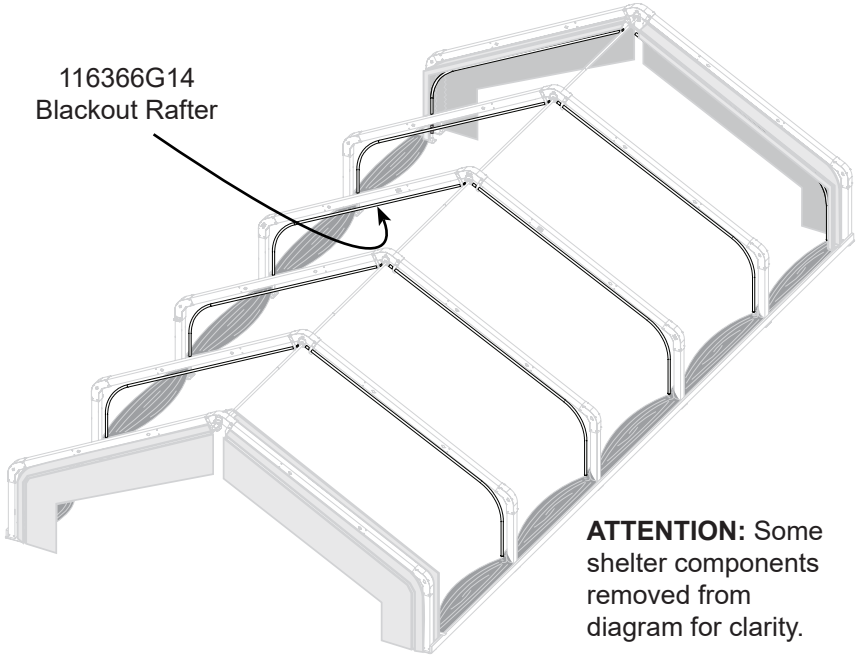
ATTENTION: Some shelter components removed from diagram for clarity.

6

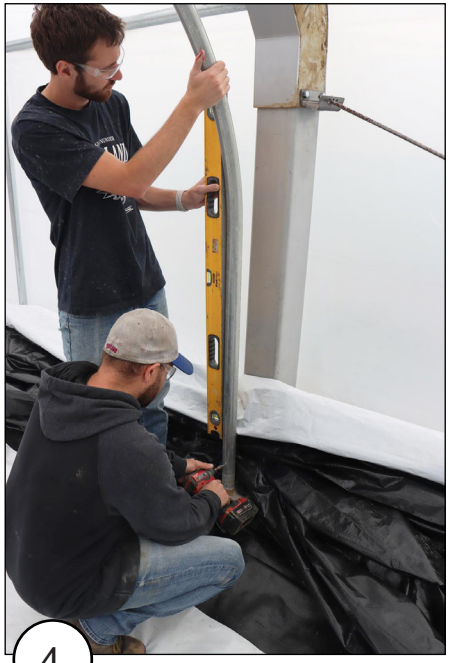
INSTALL BLACKOUT RAFTERS

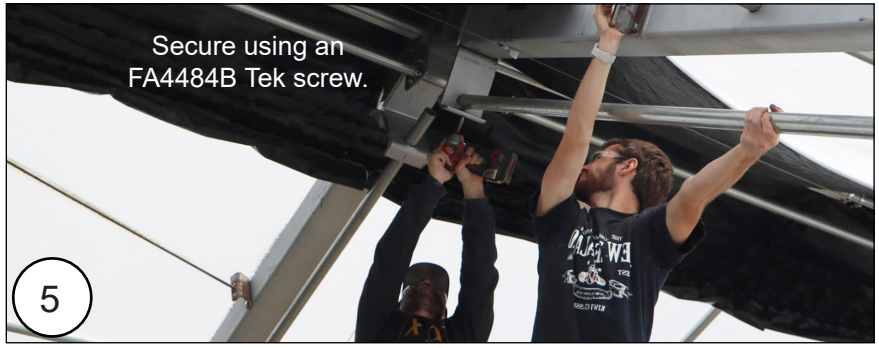
1. Locate a 116366G14 blackout rafter and start at one end of the greenhouse.
2. With proper lifts and assistance, guide the long plain end of the rafter pipe up through the rafter hole in the peak rafter assembly as shown.
3. Temporarily hold in place at the peak as the bottom end of the rafter pipe is guided onto the corresponding rafter base plate.
4. Verify blackout rafter is plumb & properly aligned and attach at the base plate using two FA4482B Tek screws.
5. Move to the peak rafter assembly and secure the blackout rafter using an FA4484B Tek screw installed through the pre-drilled hole in the peak rafter assembly tab below the rafter.
6. Repeat for each blackout rafter and then continue with the installation of the Blackout Garages on the following page.

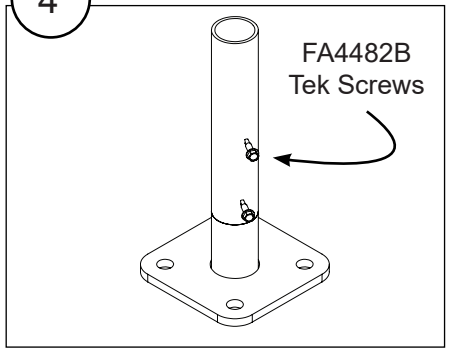




ATTENTION: Some shelter components removed from diagram for clarity.





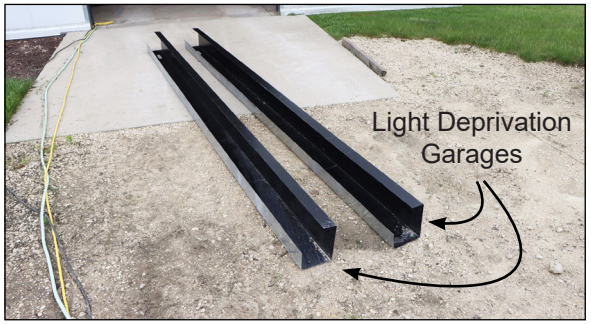


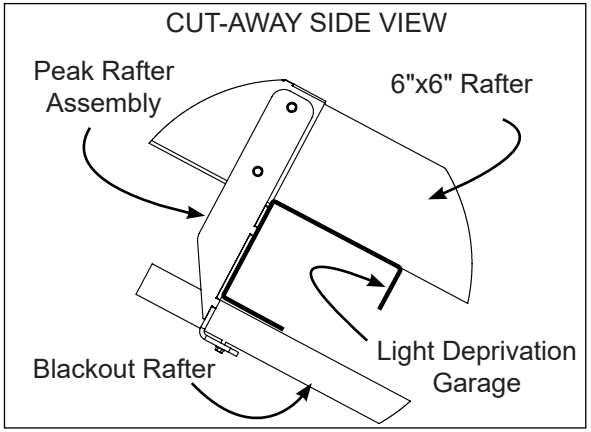
7

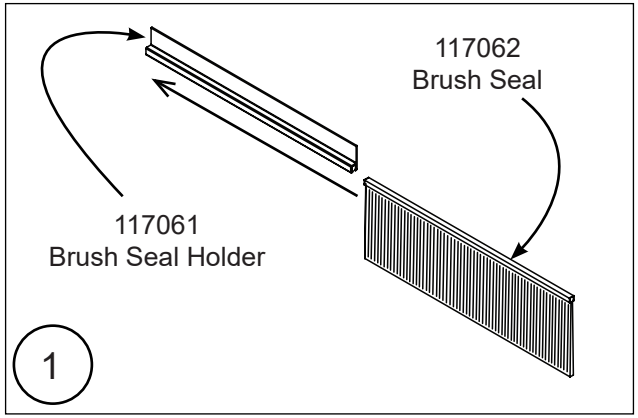
PREPARE GARAGES

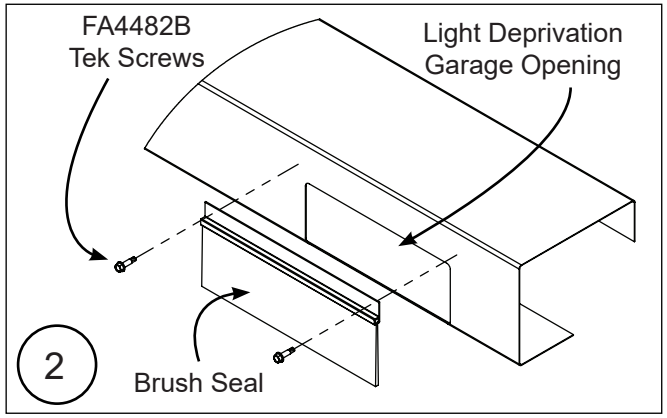
Light deprivation garages are installed along the peak of the greenhouse, one run on each side of the peak assembly. Garages act as a light deprivation pocket the pull-up conduits of the blackout panels will rest inside when closed.

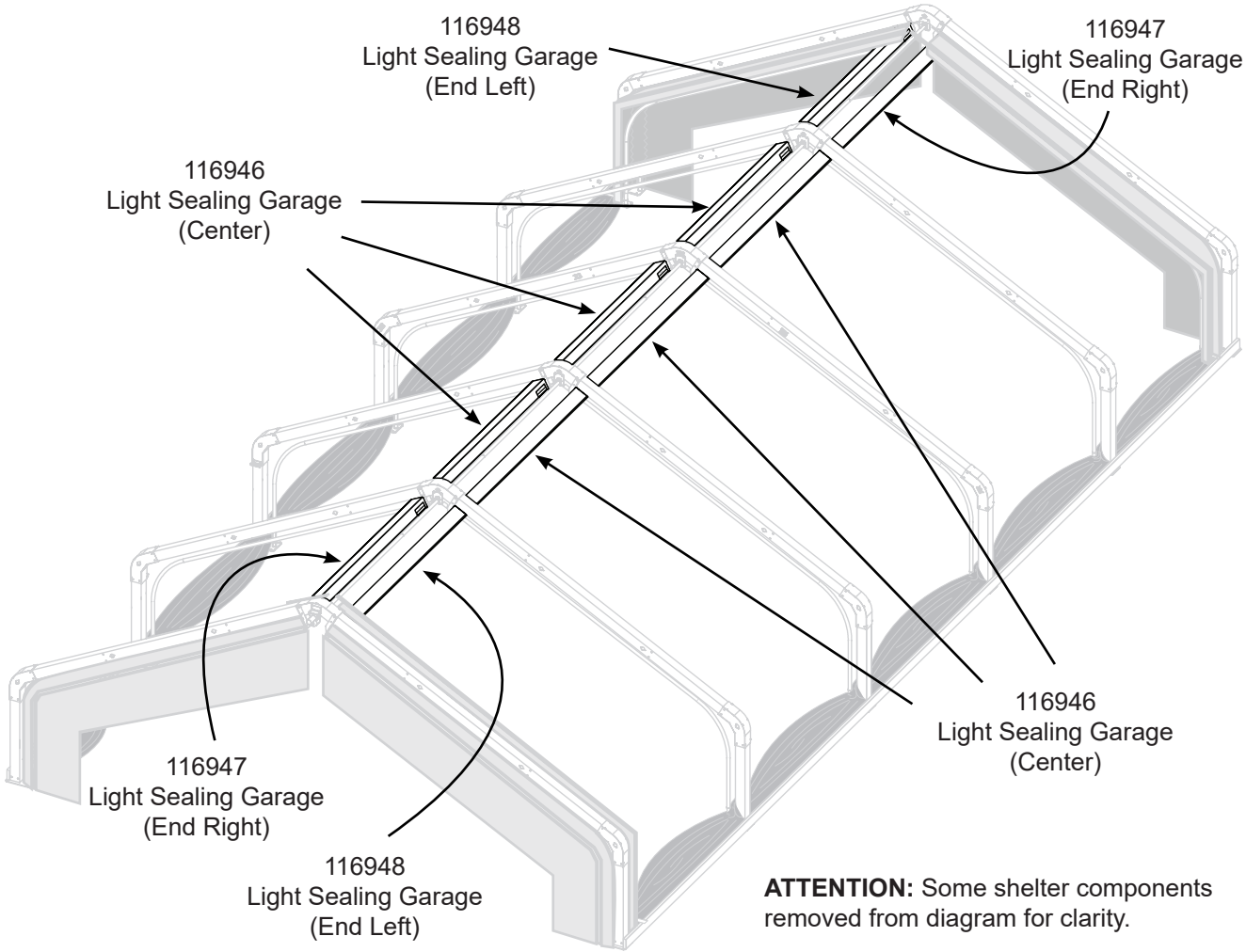
1. Locate the 12" sections of brush sealing (117061 & 117062). If components are not shipped assembled, slide the brush seals into the brush seal holders as shown.
2. Locate all sections of light deprivation garages (116946, 116947 & 116948). Attach brush seals as shown using FA4482B Tek screws to cover all openings in the light deprivation garages











ATTENTION: Some shelter components removed from diagram for clarity.

7

INSTALL GARAGES

3. Determine garage layout.

   IMPORTANT: 116947 and 116948 garages are installed in end bays only. Orientation is critical. When looking at an gable wall from the INSIDE of the greenhouse, the 116947 will be installed on the RIGHT side and the 116948 will be installed on the LEFT. See diagram on previous page and reference photos to the right.

4. Starting in an end bay, with proper lifts and assistance, hoist the proper light deprivation garage into place as shown. Garages fit snug against the peak rafter assembly, and wedge between the 6"x6" rafter and blackout rafter.

5. Align the end of the first light deprivation garage with the center of the 1st interior rafters.

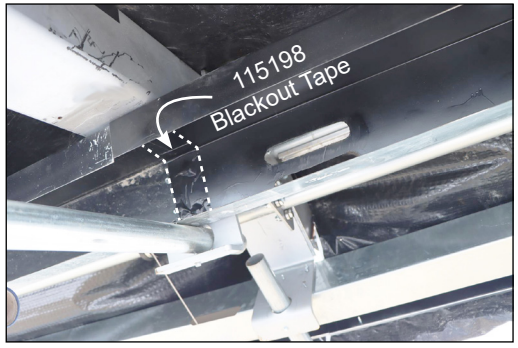
6. Clamp garage in place. Use a section of wood if necessary as shown in photo 6.

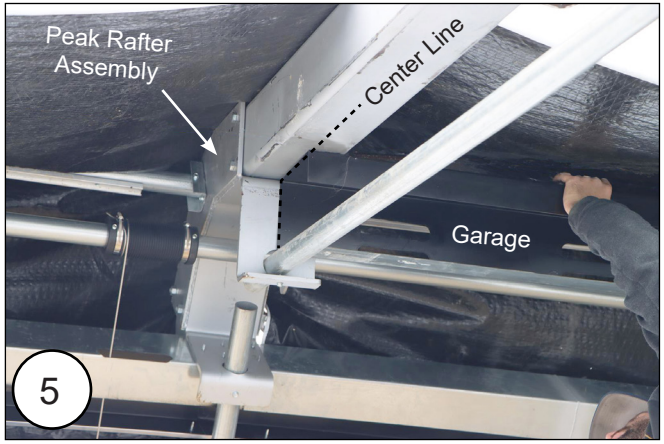
7. Pre-drill attachment pilot holes through the garage and the peak rafter assembly.

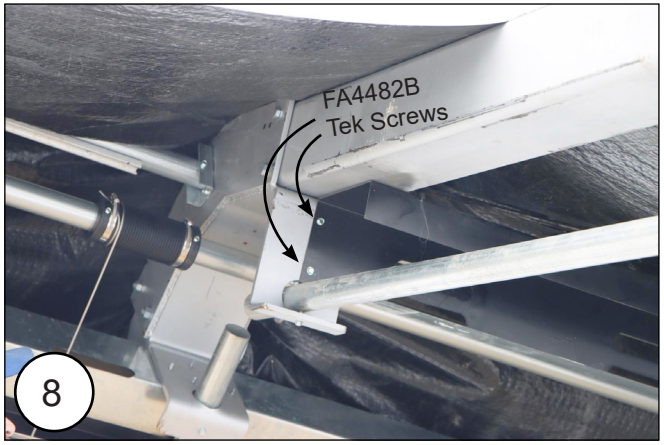
8. Secure garage using FA4482B Tek screws.

9. Repeat steps to install garages end-to-end on both sides, verifying correct garage layout.

10. Use 115198 blackout tape to cover garage splices at each peak rafter assembly as shown.







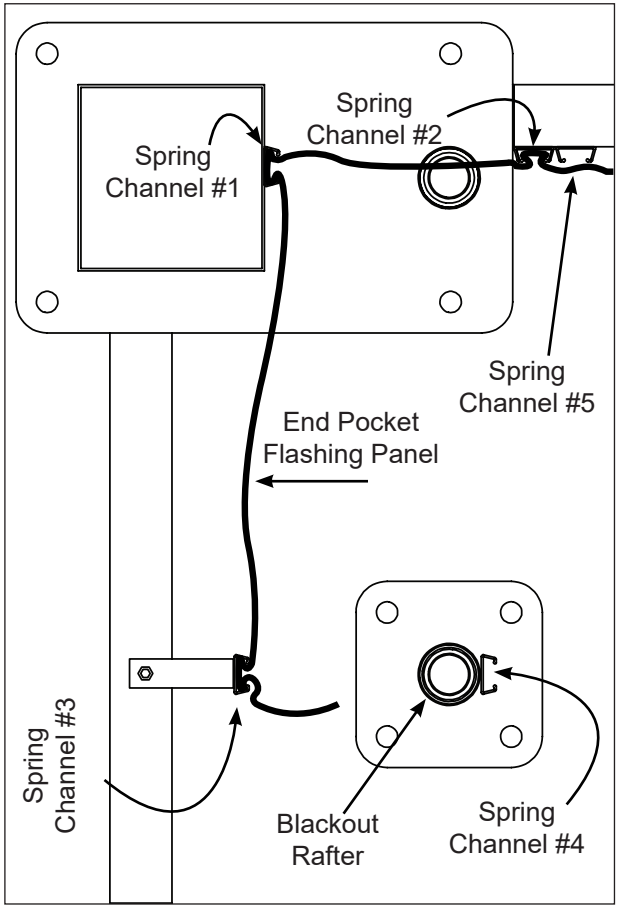
Finish End Pocket Flashing Channel

8 INSTALL END POCKET FLASHING SPRING CHANNEL

Spring Channel #4

1. Locate 102197Z144 spring channel and attach to the inside face of the end blackout rafters as shown using FA4482B Tek screws. Space approximately every 24".

   Verify that spring-channel is centered under the rafter leg and follows the contours of the rafter from base to the rafter peak assembly. Cut spring channel to fit as needed.



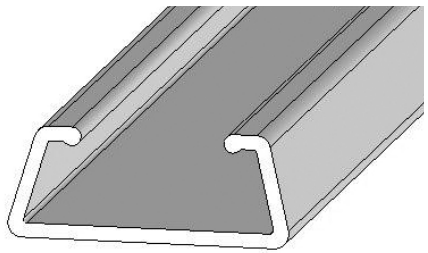
ATTENTION: Some shelter components removed from diagram for clarity.

8 INSTALL END POCKET FLASHING SPRING CHANNEL (continued)

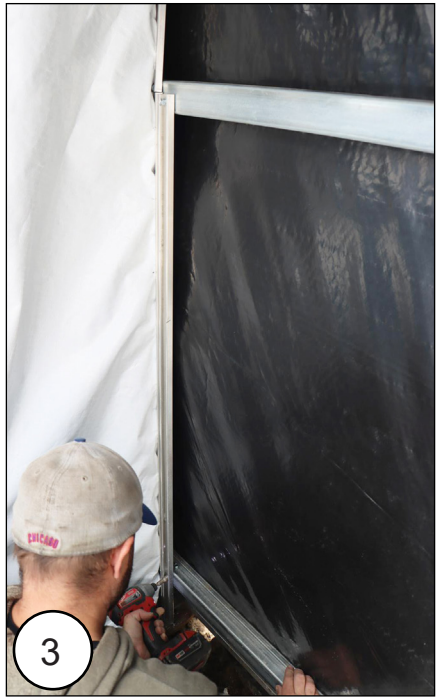
Spring Channel #5

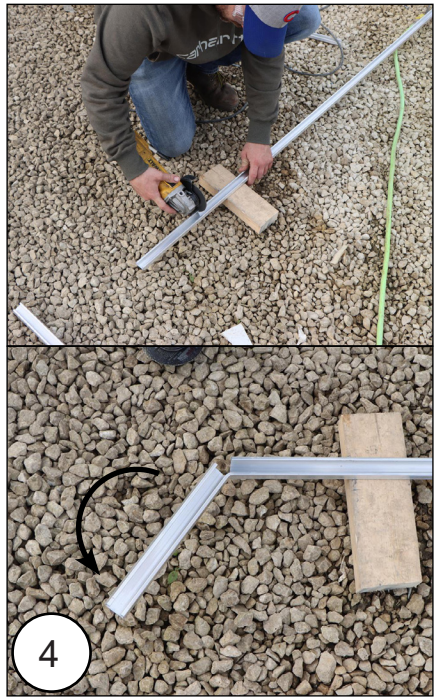
2. Measure from ground level to the center of gable wall framing as shown in photo 2.
3. Cut a section of 102197Z144 to that measurement and attach to the inside face of the gable wall framing using FA4482B Tek screws as shown in photo 3.
4. NOTCH the next section of spring channel as shown in photo 4 and bend at an angle to match the contours of the rafter profile.

   ATTENTION: Verify channel is installed directly parallel with Spring Channel 2
5. Attach bent section of spring channel to end framing using FA4482B Tek screws as shown in photo 5.
6. Continue installing spring channel up to the rafter peak assembly. Cut to fit as needed.
7. Repeat for remaining corners.
8. Continue by finishing the installation of the end flashing pocket panels.



102197Z144
Aluminum
Spring Channel



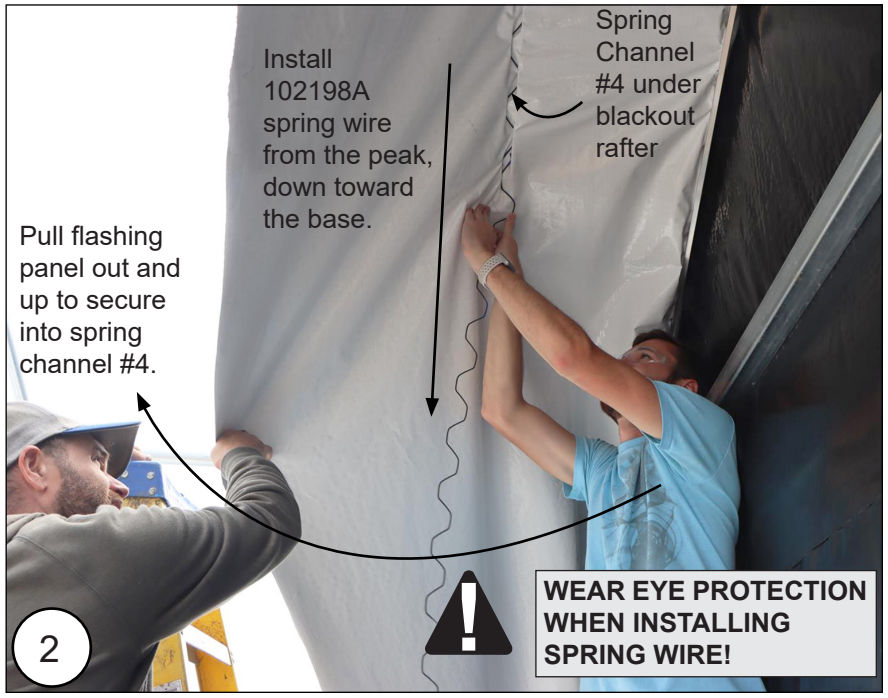


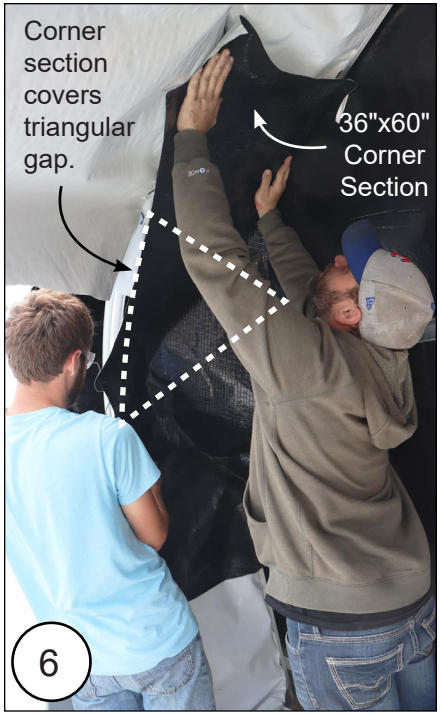
Finish End Pocket Flashing Panels

9 INSTALL END POCKET FLASHING PANELS

1. In order to eliminate excess slack and tension in the end flashing pocket at the rafter bend, cut the corner of the loosely hanging flashing panel at a 45° angle all the way up to spring channel #3, as shown in corresponding photo to the right.
2. Starting at the rafter peak assembly, pull the flashing panel up over spring channel #4 under the blackout rafter and secure material using 102198A spring wire. See corresponding photo to the right.

   IMPORTANT: Do not allow slack in the panel between spring channel #3 and spring channel #4, but do not install overly taut.
3. Continue using 102198A spring wire to secure material into spring channel #3 from the peak rafter assembly to the open edge of the cut fabric at the top of the corner rafter bend, as shown in corresponding photo to the right.
4. Starting at the base of the blackout rafter, pull the flashing panel over spring channel #4 and secure material using 102198A spring wire. Stop at the open edge of the cut fabric at the corner rafter bend, as shown in corresponding photo to the right.
5. Locate excess 116998 panel material and cut a 36"x60" section.
6. Uninstall spring wire near the open edges of the cut fabric and position the cut corner piece over the triangular gap with the BLACK side facing towards the INSIDE. See photo 6 to the right.
7. Reinstall spring wire accordingly in spring channel #4 to secure over top of the triangular flashing panel gap.





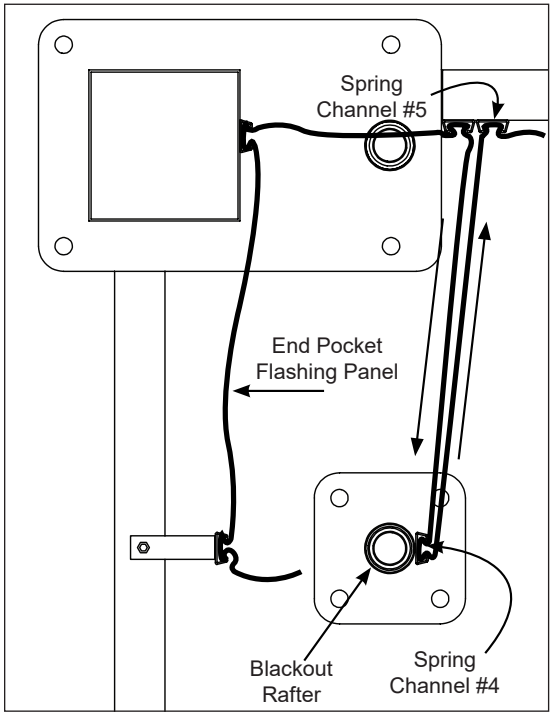
9 INSTALL END POCKET FLASHING PANELS (continued)

8. Starting at the peak, push panel back up into spring channel #5 and secure material using 102198A spring wire.

   IMPORTANT: Do not allow slack in the panel between spring channel #4 and spring channel #5, but do not install overly taut.

9. Continue using 102198A spring wire to secure material into spring channel #5 from the peak rafter assembly to the blackout rafter bend where the corner section is loosely installed.

10. Fold upper and lower flashing panel excess sections over top of the corner section of material, and secure to spring channel #5 as needed to to ensure a smooth corner look with only BLACK material showing on the inside.



9 INSTALL END POCKET FLASHING PANELS (continued)

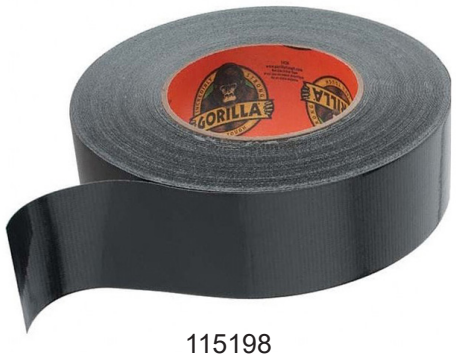
ATTENTION: Remaining steps require a degree of careful craftsmanship to light seal and to maintain an aesthetically pleasing finished look.

11. Once fully installed, trim all panel excess along spring channel #5, at the peak, and along the base.

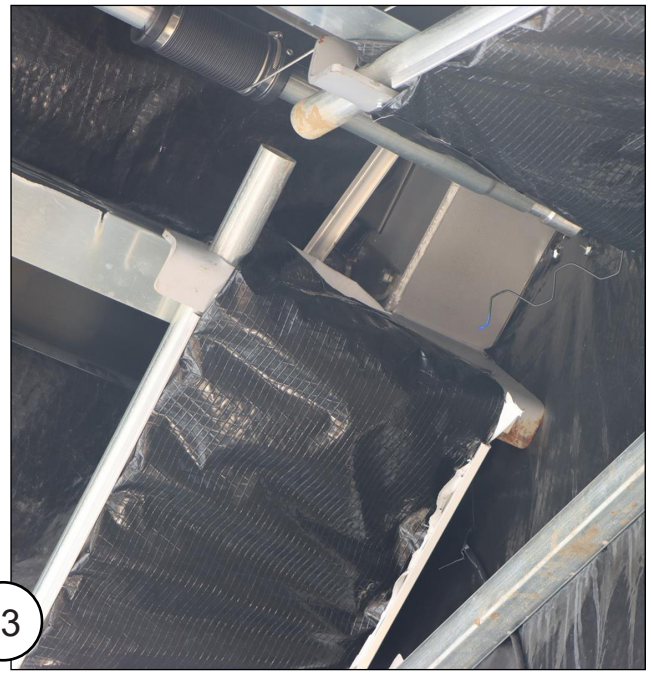
    IMPORTANT: At the peak and along the base, leave enough excess as needed to wrap and finish for light deprivation.

12. At the base, wrap and tape excess panel material as needed using 115198 blackout tape. See photos to the right.

13. Along the peak, wrap and tape excess panel material around the peak rafter assembly as needed using 115198 blackout tape. See photos to the right.

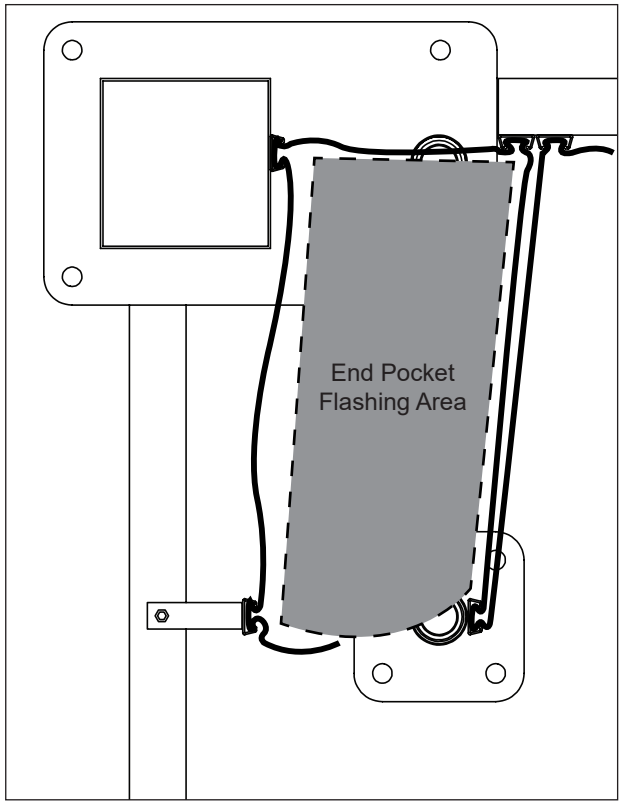


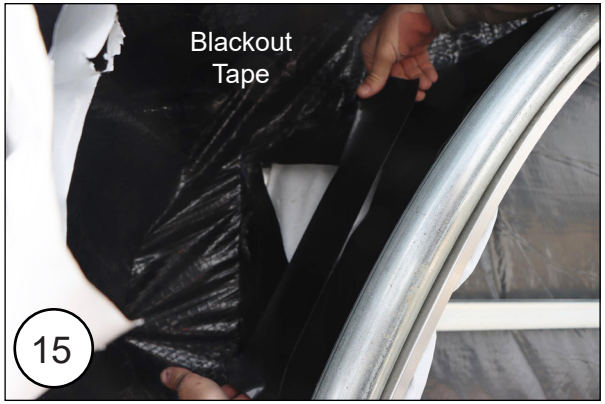
115198
Blackout Tape



9 INSTALL END POCKET FLASHING PANELS (continued)

14. At the blackout rafter bend, where the corner section was used to cover the white triangular gap in the flashing panel, tape the seams using 115198 blackout tape.
15. On the inside of the flashing pocket, at the blackout rafter bend, there will be another triangular gap of white material. Use 115198 blackout tape to cover this area.
16. Repeat all steps in this sectionfor each corner.
17. Continue by installing blackout roller purlins on the following page.



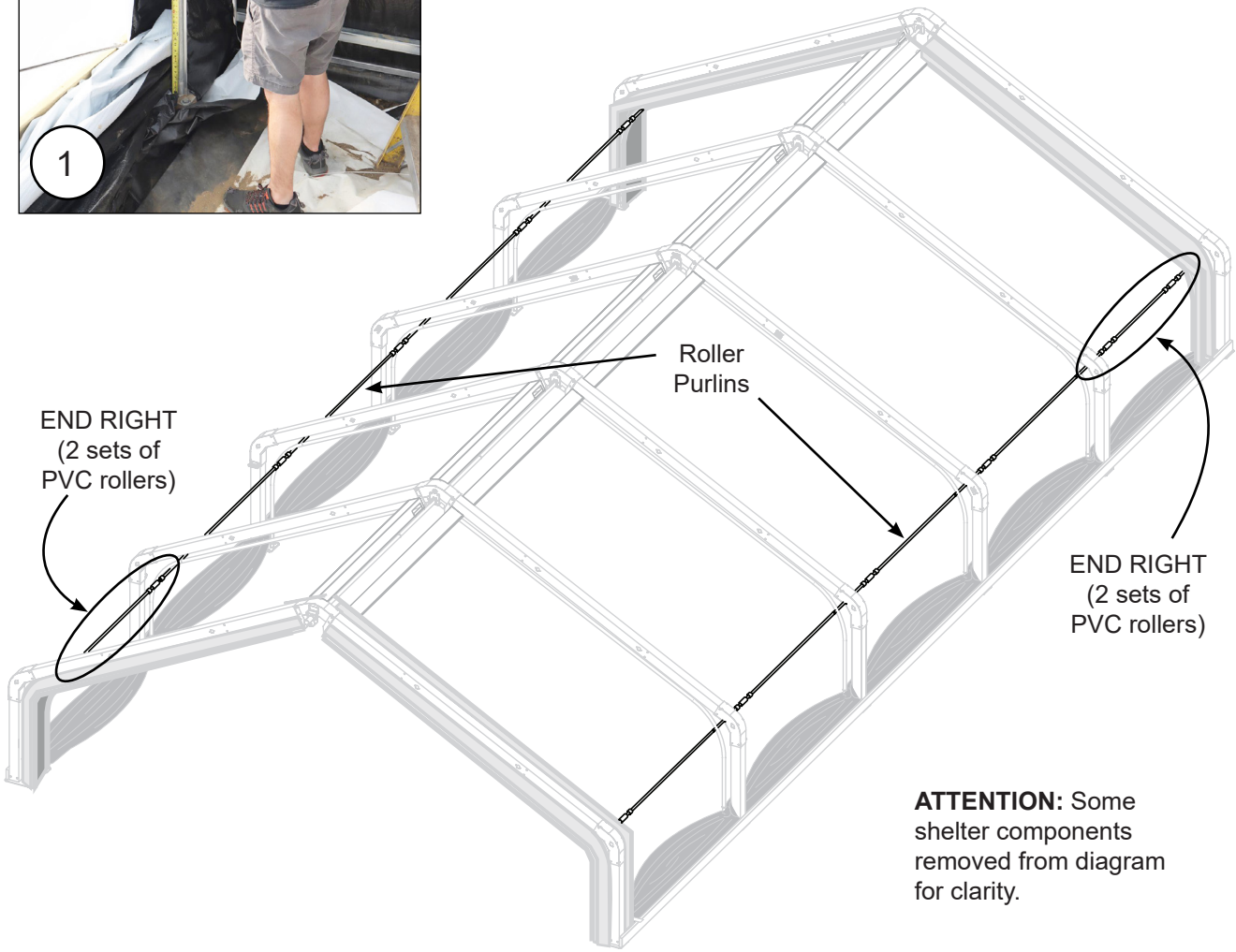


10 PREPARE ROLLER PURLINS

Roller purlins are installed end-to-end on the inside face of the blackout rafters. They are positioned in the corner bends to act as a directional guide for pull cables and pull-up conduits of the blackout panels. Purlins redirect pull-cables from obstructing potential grow area and minimize conduit friction along the side wall of the rafter profile during operation.

1. At one end blackout rafter, measure and mark a spot that is in the center of the bend radius of the rafter. Exact location is not critical, as long as it's close to center. See photo to the right.
2. Locate provided 10' section of 116332 PVC pipe, and cut roller sections:
   - For each END bay, cut three (3) sections at 6" and six (6) sections at 1".
   - For each MID bay, cut two (2) sections at 6" and four (4) sections at 1".
3. Locate and layout the 131S147 purlin tubing. Each bay will require two sections-one along each side.
4. Prepare each purlin by sliding on the cut sections of PVC (1",6",1"), as shown in photo 4.

   ATTENTION: Each END RIGHT bay purlin requires one extra set of PVC sections (1",6",1") to match the pull cable openings of the light deprivation garages.



ATTENTION: Some shelter components removed from diagram for clarity.

10 INSTALL ROLLER PURLINS

5. With assistance, hoist an end bay section of 131S147 pipe into place and align with the previously measured mark. Secure with a QH1070 pipe strap, using FA4482 Tek screws installed through the spring channel under the end blackout rafter. See photo 5.

   NOTE: Purlin pipe extends to the gable wall.

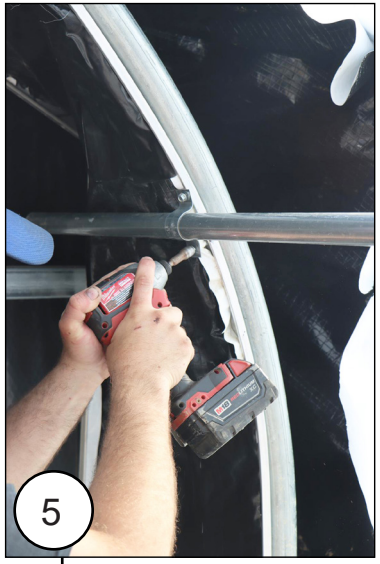
6. Verify roller purlin is level and secure to the next blackout rafter using a QH1070 pipe strap and FA4482B Tek screws. Do not fully tighten the top screw.

7. Slide the next roller purlin into place. Once spliced, fully tighten the loose Tek screw in the QH1070.

8. Secure purlin splice using one FA4482B Tek screw through the QH1070 pipe strap as shown in photo 8.

9. Repeat all steps to install the roller purlin runs end-to-end.

10. Continue by installing the pull-cable drums.

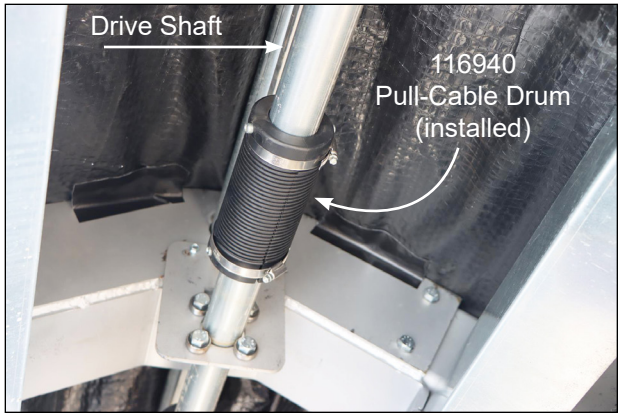


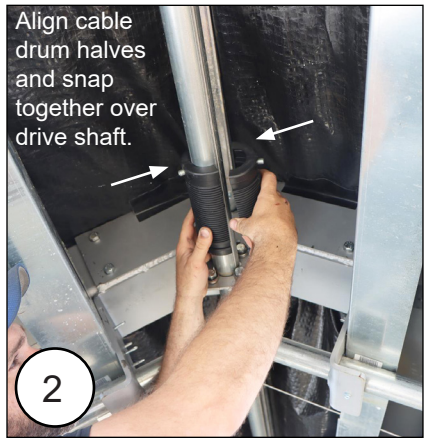
11 INSTALL PULL-CABLE DRUMS

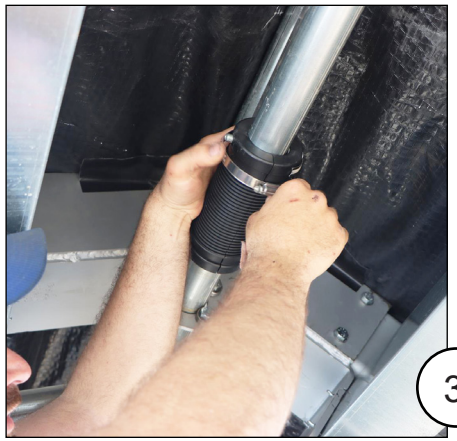
1. Locate the 116940 pull-cable drums. Disassemble as shown in photo below.
2. At every opening in the light deprivation garages (both sides), loosely install a cable drum by closing the halves together around the drive shaft.

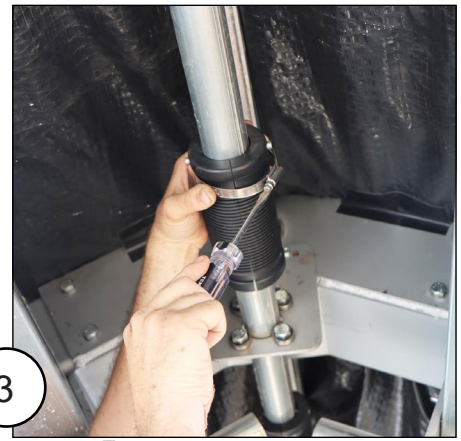
   IMPORTANT: Verify that the set nuts and set screws are installed properly in the cable drums before installing the band clamps.
3. Loop the band clamps around the drums in the designated grooves and slightly tighten using a flat-head screwdriver as shown.

   ATTENTION: Do not fully tighten. Drums are adjusted and tightened later.

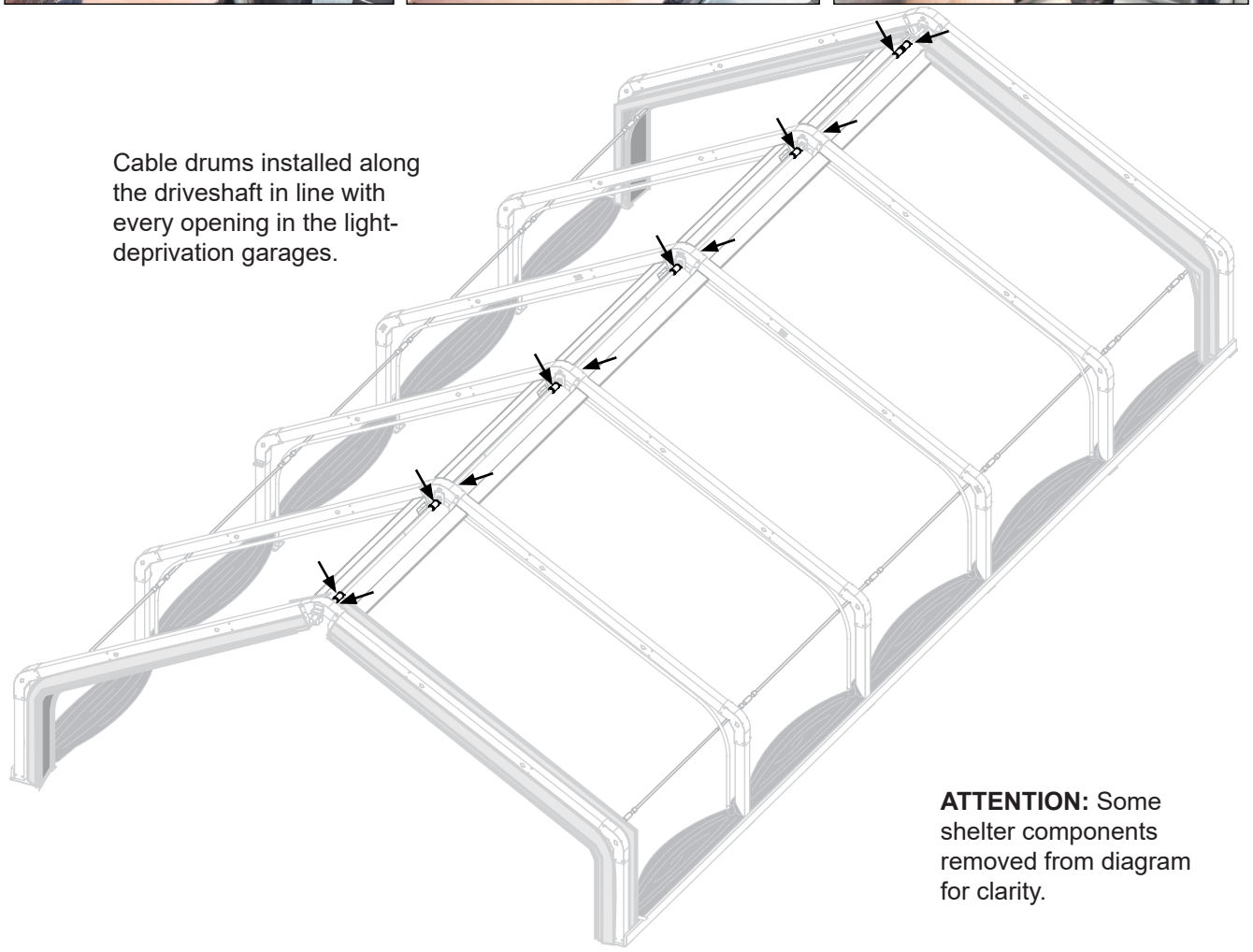








Cable drums installed along the driveshaft in line with every opening in the light-deprivation garages.

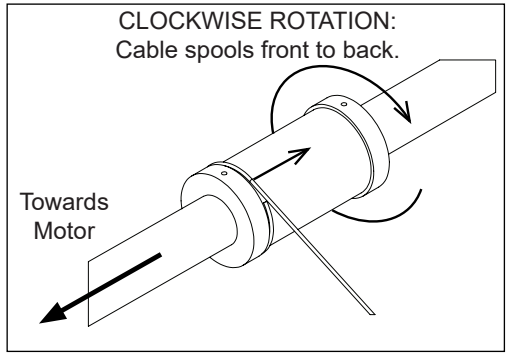


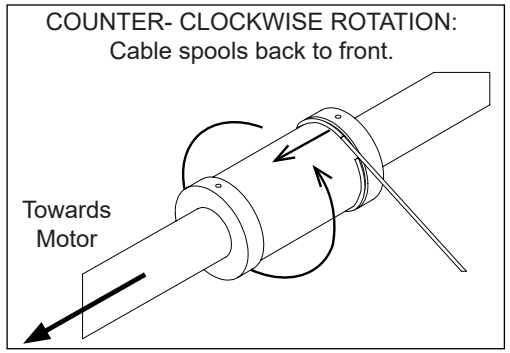
ATTENTION: Some shelter components removed from diagram for clarity.

12 INSTALL PULL-CABLES

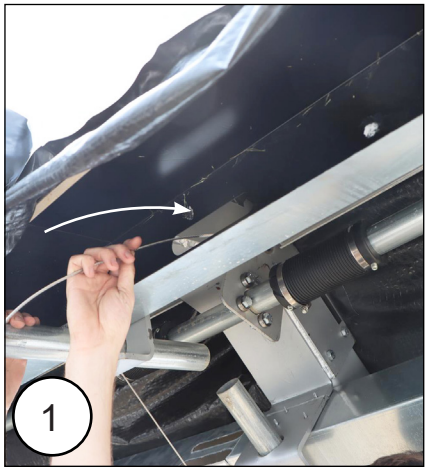
Pull-Cables are attached to the cable drums and pull-conduits of the blackout panels. When the driveshaft rotates, cables wrap around the drums to close the panels.

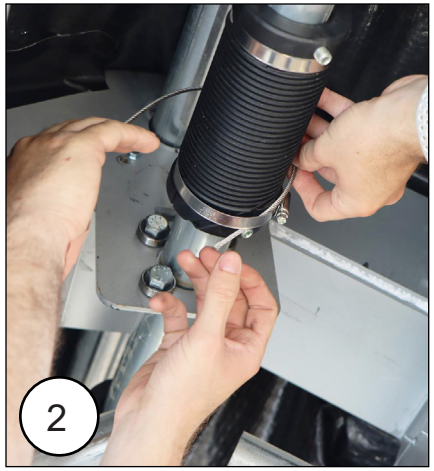
VERY IMPORTANT: Drive-shaft rotation is critical when determining where on the cable drums the pull-cables are to be attached. Verify which direction the driveshaft spins OR which direction is desired once the motor is wired. Consult the diagrams below and install accordingly. All cables will either spool front-to-back or back-to-front. DO NOT alternate or vary cable spooling.

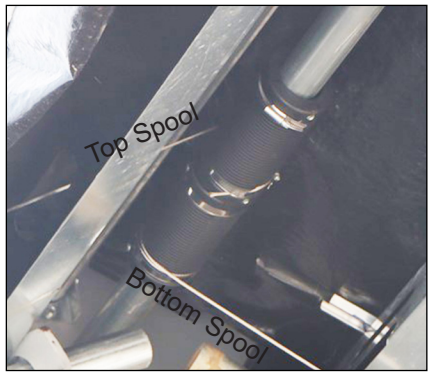




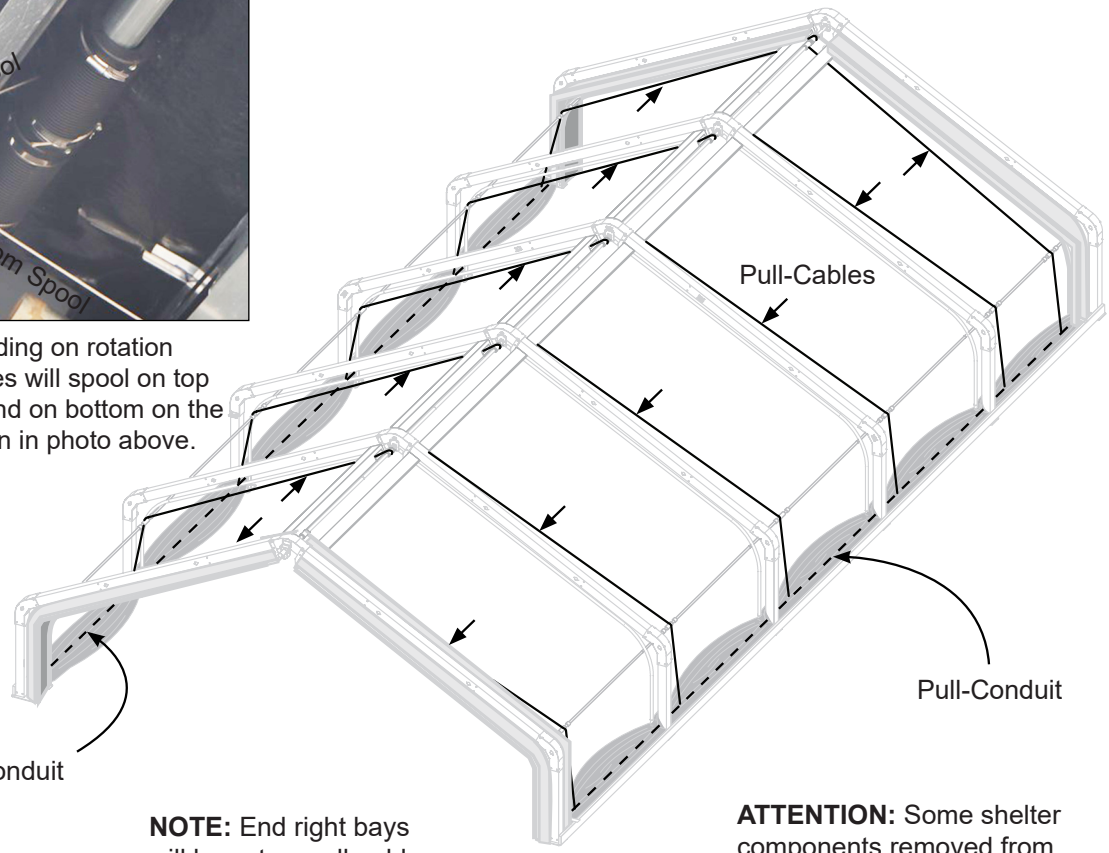
1. Without cutting to length from the spool, unroll and run AR1530 cable up through a garage opening.
2. Consult "very important" note and diagrams above to determine attachment location and wrap around the corresponding cable drum accordingly.
3. Set cable in the groove under the band clamp, then tighten using a flat-head screwdriver.







NOTE: Depending on rotation direction, cables will spool on top on one side, and on bottom on the other, as shown in photo above.



NOTE: End right bays will have two pull-cables.

ATTENTION: Some shelter components removed from diagram for clarity.

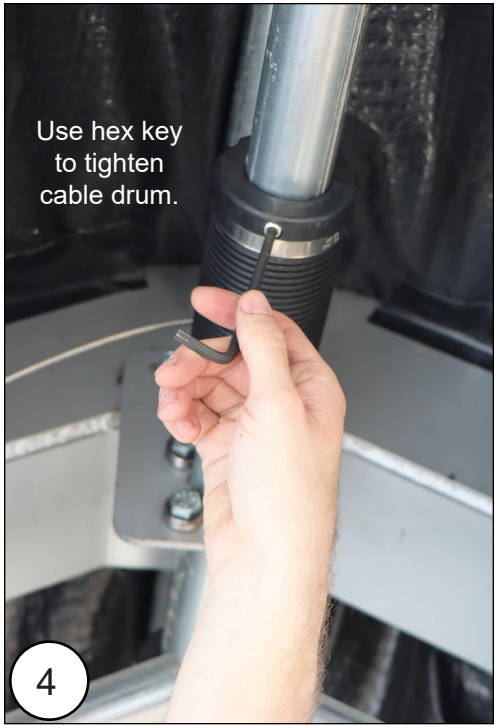
12 INSTALL PULL-CABLES (continued)

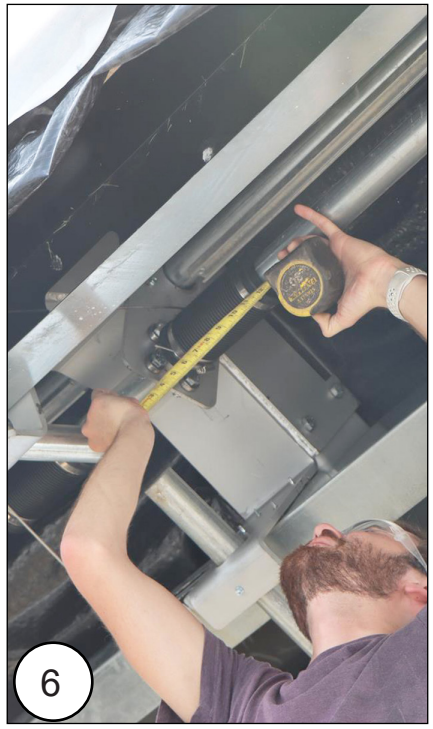
4. Verify cable drum is properly aligned in line with the garage opening. Adjust as needed. Using a flat head screwdriver and a hex key, tighten the band clamps and set screws to secure cable drum in place.
5. Run the attached pull-cable OVER the roller purlin and down to the ground. Temporarily secure cable in place and cut at ground level.

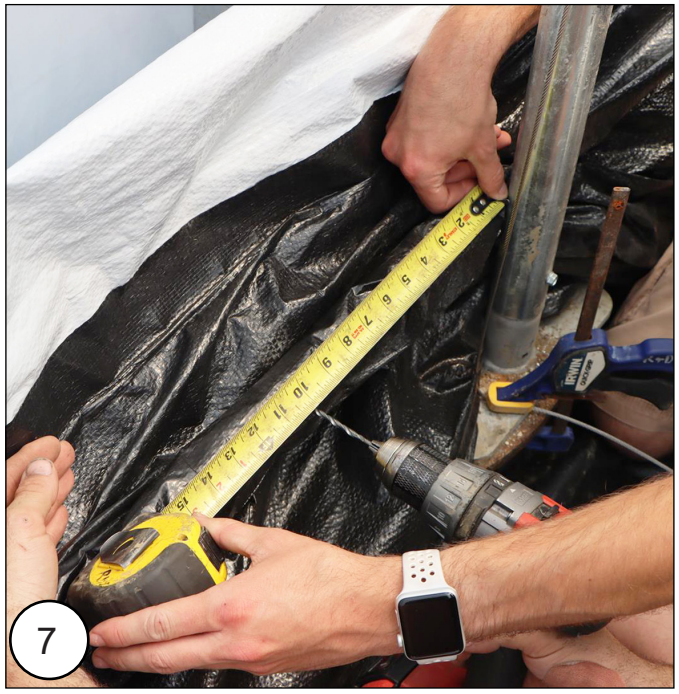
   IMPORTANT: Verify the cable is still running through the opening in the light deprivation garage.
6. Measure the distance from the peak rafter assembly to the OPPOSITE end of the cable drum on which the cable has been attached based on driveshaft rotation.

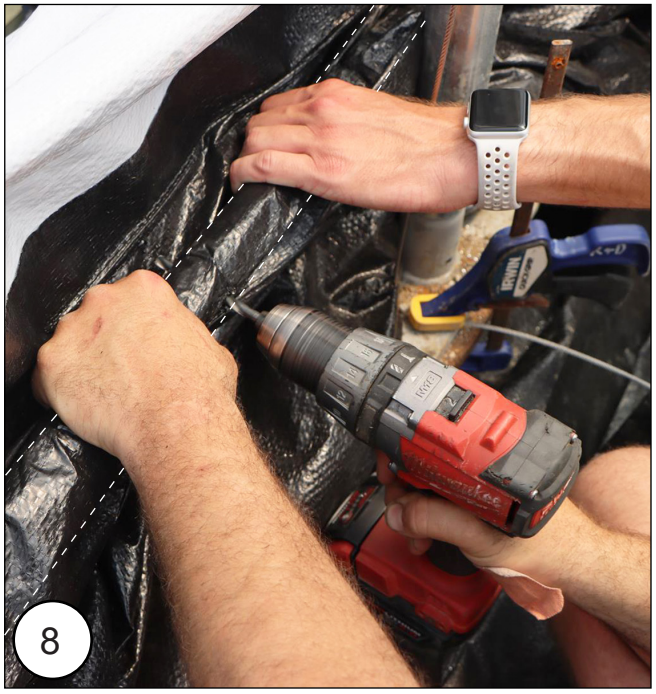
   EXAMPLE: If the cables are spooling from back-to-front, measure the distance from the rafter to the front of the cable drum, as shown in photo 6.
7. Measure that same distance from the blackout rafter to the pull conduit and mark the spot as shown in photo 7.

   ATTENTION: Verify that the pull-conduits in the blackout panels are CENTERED with the greenhouse.
8. At the measured mark, drill a 3/16" through-hole in the pull-conduit as shown.
9. Continue by attaching pull-cable to pull-conduit.





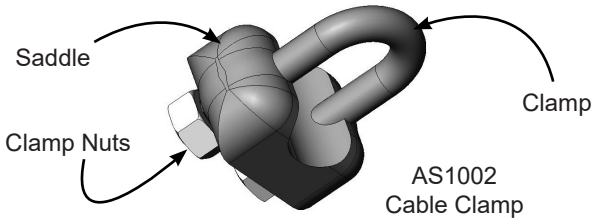


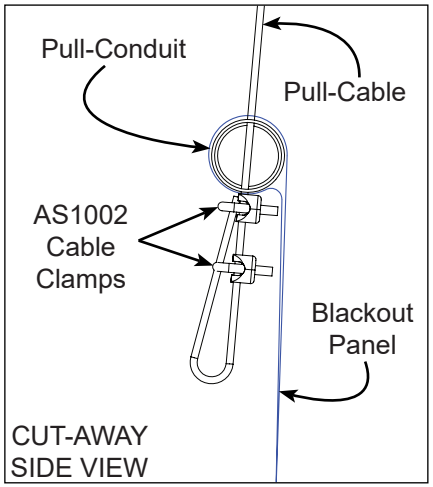


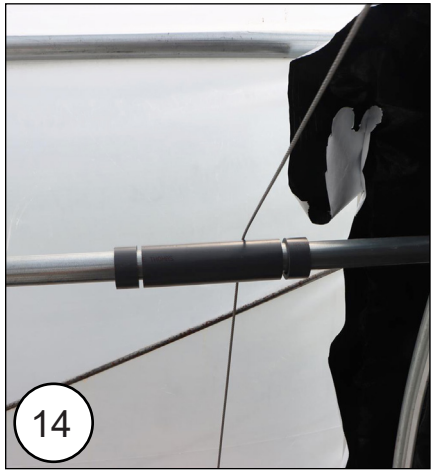
12 INSTALL PULL-CABLES (continued)

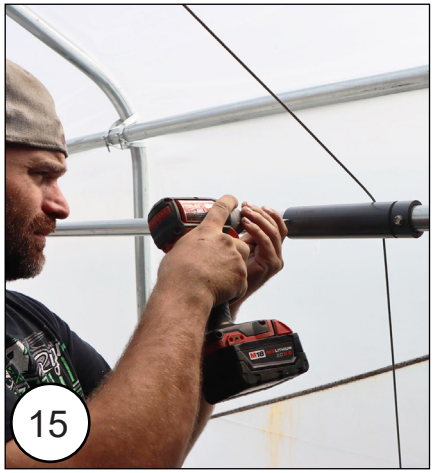
10. Run the pull-cable through the drilled hole in the pull-conduit as shown.
11. Pull the pull-cable through the pull-conduit to adjust the height of the pull-conduit up to 27" above ground level.
12. Loop the pull-cable through the AS1002 cable clamps as shown, and clamp onto the saddle with the "live end" positioned *away* from the saddle as shown in photos and diagrams.
13. Verify pull-conduit is level before installing and securing the next pull-cable.
14. With pull-cable clamps tightened, position the corresponding 6" PVC roller of the roller purlin so that is centered under the pull-cables.
15. Push the 1" PVC stoppers on either side of the 6" PVC rollers in and secure in place with FA4482B Tek screws oriented with the heads to the INSIDE of the greenhouse.

    ATTENTION: Do not install the 1" sections too tightly against the 6" roller. Space tight enough to prevent the cable from slipping in between, but allow for roller to spin freely.
16. Repeat all steps as needed to install all pull-cables for both panels and ensure the pull-conduits are suspended 27" above ground.
17. Continue by installing the blackout panel stiffener conduits.







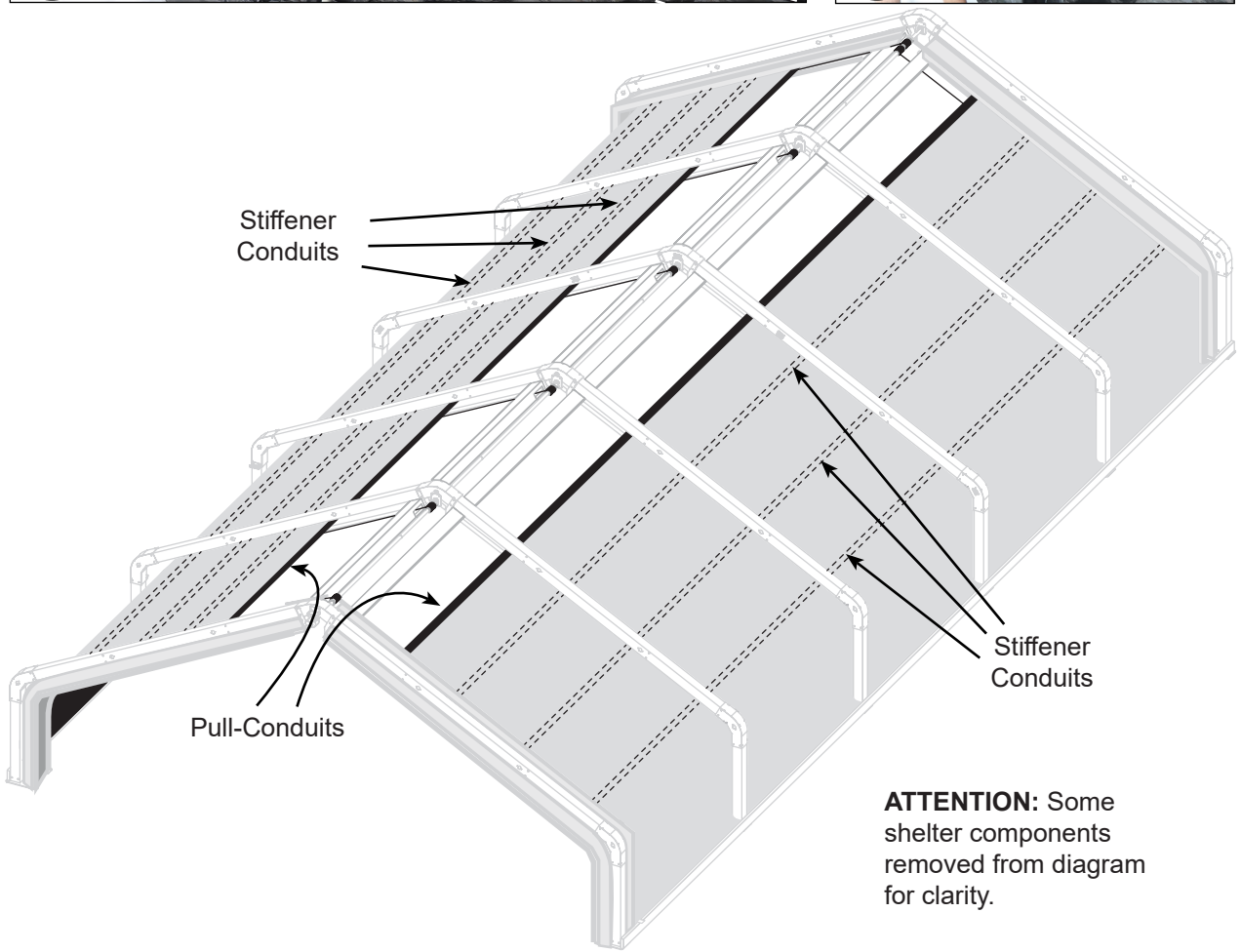


13 INSTALL STIFFENER CONDUITS

Going forward, either the motor will need to be wired for operation, or an alternative method for rotating the driveshaft will need to be implemented.

Consult a licensed electrician if needed for all motor wiring details.

1. Operate the motor to rotate the driveshaft and lift the blackout panels. Raise panels up to a point where the first conduit pocket is roughly 36" above ground level.
2. At the centerpoint of the pocket, slit the *pocket only* to insert the 131S147 stiffener conduits.



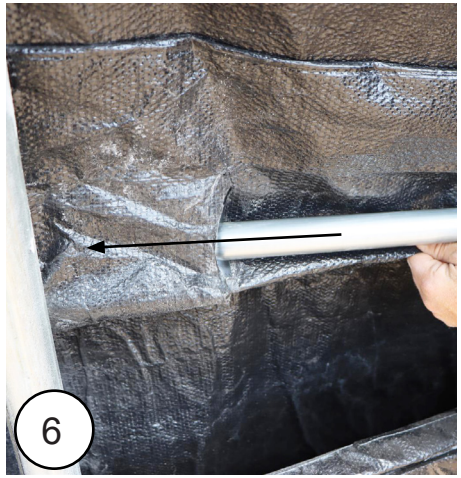
ATTENTION: Some shelter components removed from diagram for clarity.

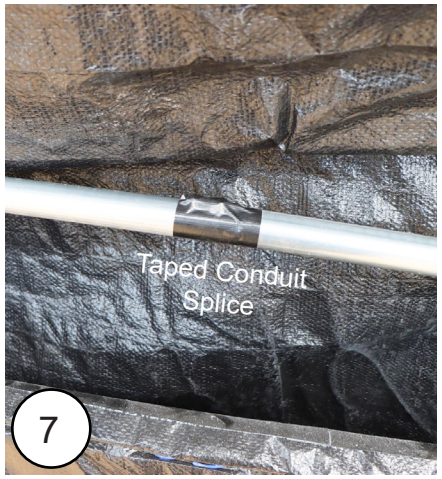
13 INSTALL STIFFENER CONDUITS (continued)

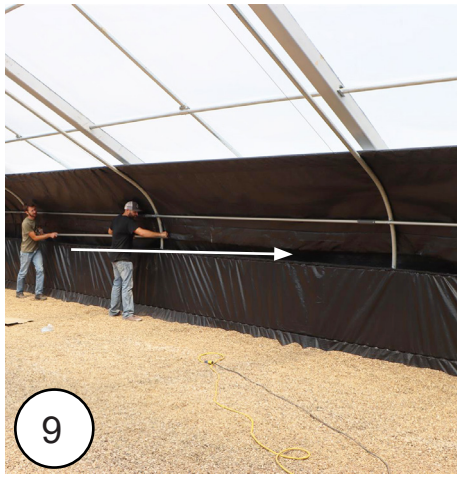
3. Locate the 131S147 stiffener conduit pipes. On the ground, assemble full conduit lengths, using FA4482B Tek screws to splice, as shown.

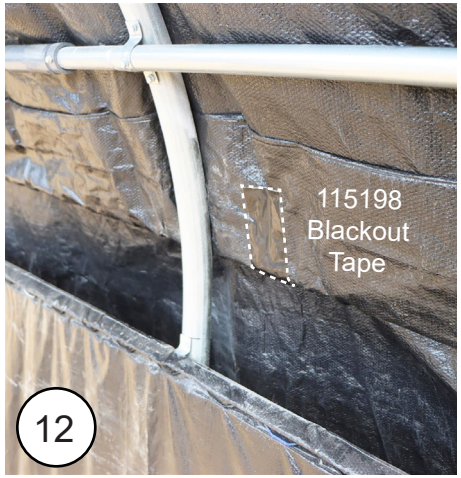
   IMPORTANT: Conduit should be 10" shorter than the greenhouse length.

4. Unsplice assembled conduit at the spot where the slit in the conduit pocket was made on the previous page.
5. Use 115198 blackout tape or provided duct tape to tape the ends of the two halves of the assembled conduit lengths that will be inserted into the center slit in the conduit pocket, as shown.
6. Starting in the center, insert the first half of the conduit length into the slit in the conduit pocket.
7. Slide assembled stiffener conduit into the pocket, verifying that all Tek-screwed conduit splices are taped to protect cover.
8. Guide conduit length fully into the pocket.
9. Repeat steps 6 through 8 for the second half of the conduit length, sliding into the conduit pocket in the opposite direction.
10. Splice conduit in the center slit using FA4482B Tek screws.
11. Tape conduit splice using 115198 blackout tape or duct tape.
12. Tape conduit pocket slit using 115198 blackout tape.
13. Repeat all steps for each conduit pocket in the blackout panels.
14. Continue by installing the Blackout Knee Walls.





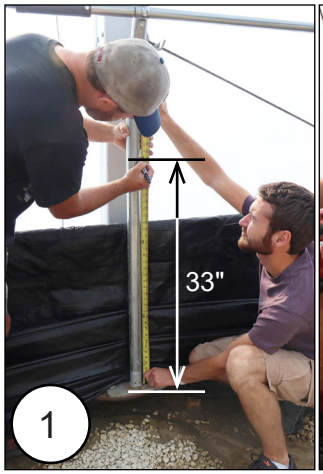


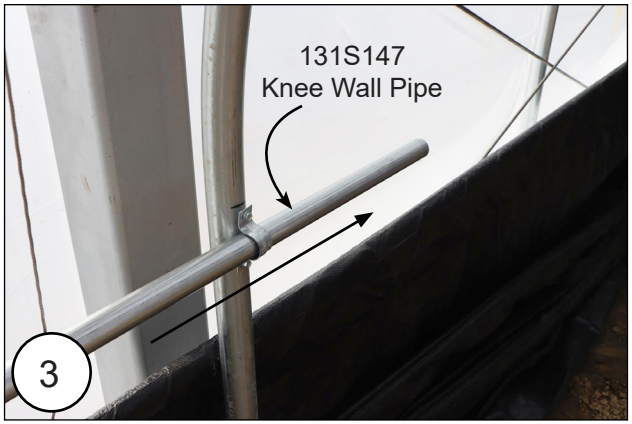


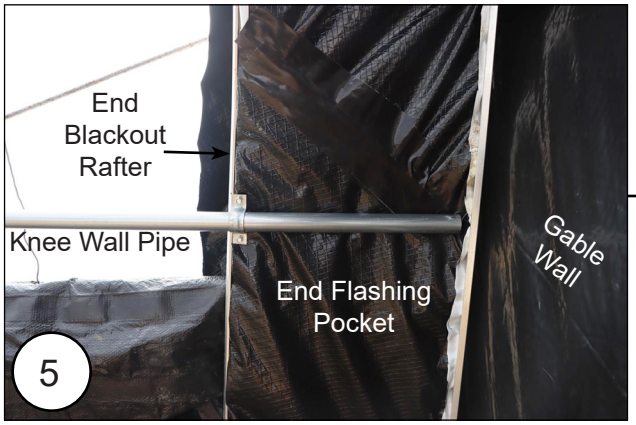
14 INSTALL KNEE WALLS

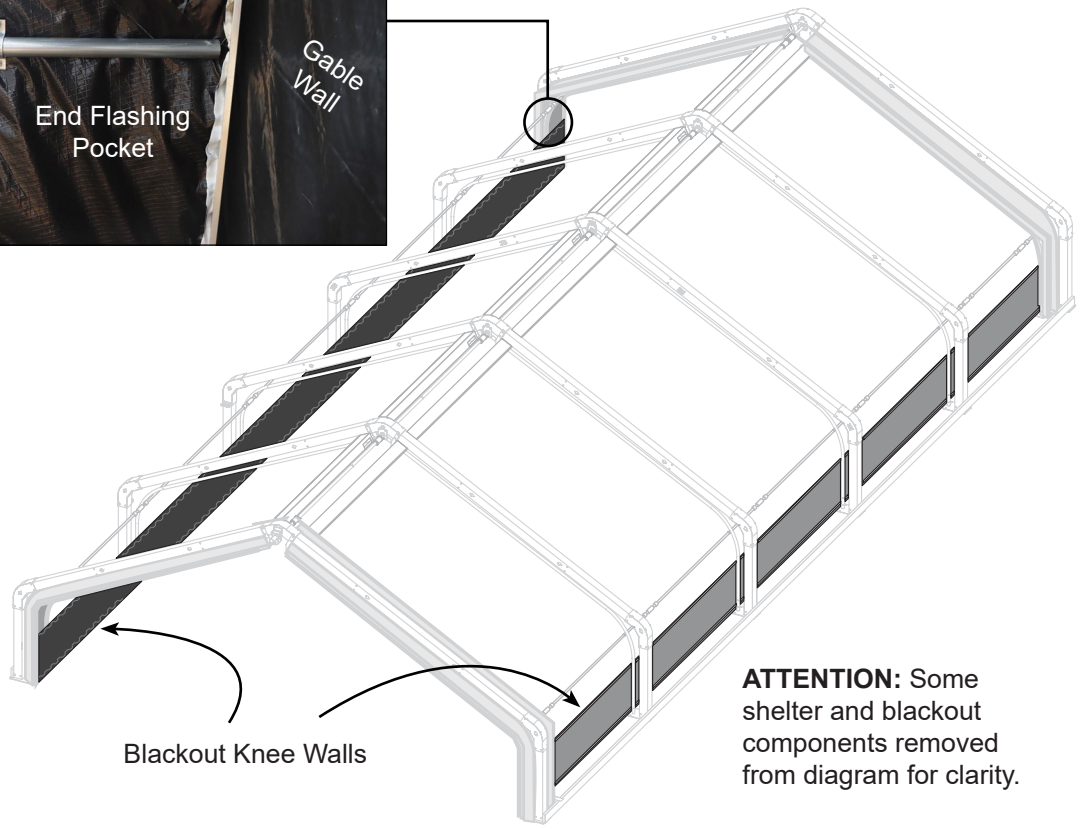
Blackout Knee Walls act as both a light deprivation agent and an aesthetic barrier to hide the blackout panel when open. Consult *Blackout Material Cut Sheet* (page 6) for panel material reference.

1. At one blackout rafter leg, measure and mark a spot that is 33" above ground level.
2. Using FA4482B Tek screws, loosely install a QH1070 pipe strap at the measured mark as shown. Do not fully tighten Tek screws.
3. Locate and insert 131S147 knee wall pipe through the QH1070 pipe strap.
4. Continue adding 131S147 pipes and QH1070 pipe straps as such until the knee wall pipe run is gable wall-to-gable wall. Use a level to keep pipe run uniform and at the same 33" height from end-to-end.
5. Verify that pipe runs extend to just before the gable walls. Cut to fit as needed. QH1070 pipe straps on the END blackout rafters will be installed over the spring channel attached to the underside, as shown.





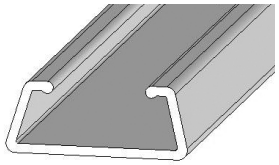




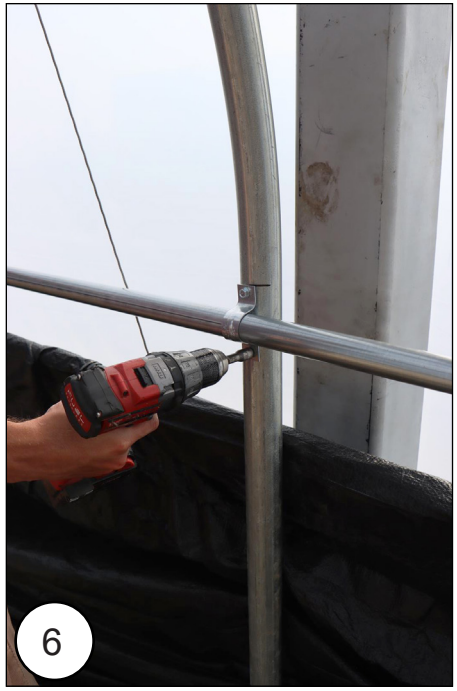
ATTENTION: Some shelter and blackout components removed from diagram for clarity.

14 INSTALL KNEE WALLS (continued)

6. Once the upper knee wall pipe is installed and level, return to all QH1070 pipe straps and tighten the attaching Tek screws.
7. Repeat all steps to install a bottom knee wall pipe run that is just above ground level.
8. At each gable wall corner, measure from ground level to the center of gable wall framing as shown in photo #8.
9. Cut a section of 102197Z144 to that measurement and attach to the inside face of the gable wall framing using FA4482B Tek screws as shown in photo #10.
10. Using FA4482B Tek screws, install sections of 102197Z144 to the inside face of the upper knee wall pipe runs from end-to-end, as shown. Cut to fit as needed.
11. Using FA4482B Tek screws, install sections of 102197Z144 to the inside face of the bottom knee wall pipe runs from end-to-end, as shown. Cut to fit as needed.



102197Z144
Aluminum
Spring Channel

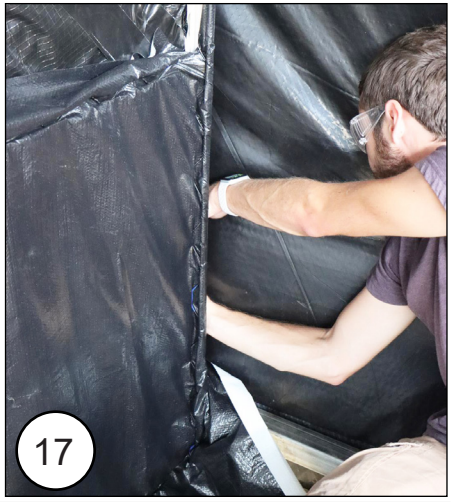


14 INSTALL KNEE WALLS (continued)

12. Consult the *Blackout Material Cut Sheet* (page 6) and measure and cut to length a section of 116998 blackout material equal to the "panel" dimension of the building.
13. Spread one panel out, aligning the material edge with the lower knee wall pipe on one side.
14. Hoist panel into place, with the BLACK side of the material facing the INSIDE of the greenhouse.
15. Starting in the center of the panel and moving outward toward the gable walls, secure the top edge of the blackout knee wall panel into the spring channel attached to the upper knee wall pipe using 102198A spring wire.

    ATTENTION: Verify that there is 3" of excess material above the spring channel on the upper knee wall pipe.
16. Repeat for the bottom knee wall pipe.

    IMPORTANT: Do not allow slack in the panel between upper and lower spring channels, but do not install overly taut.
17. Pull outside edges of the knee wall panel past the vertical spring channel on the ends, and secure into channel using 102198A spring wire.
18. Slit the 3" excess of the knee wall panel at each blackout rafter.
19. Wrap the 3" excess of the knee wall panel around the top of the upper knee wall pipe as shown and secure in place behind the pipe using provided 115198 blackout tape.

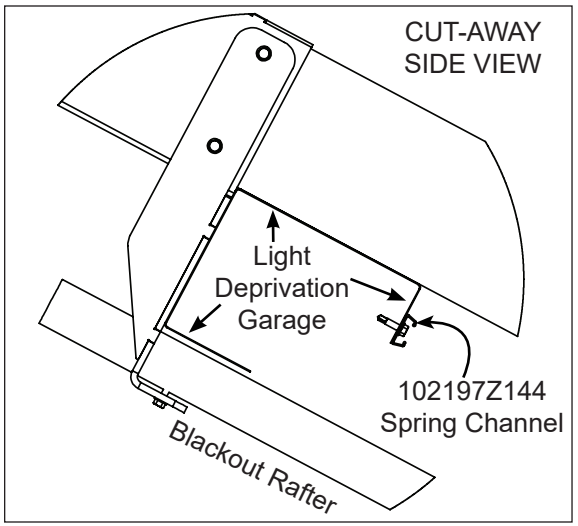


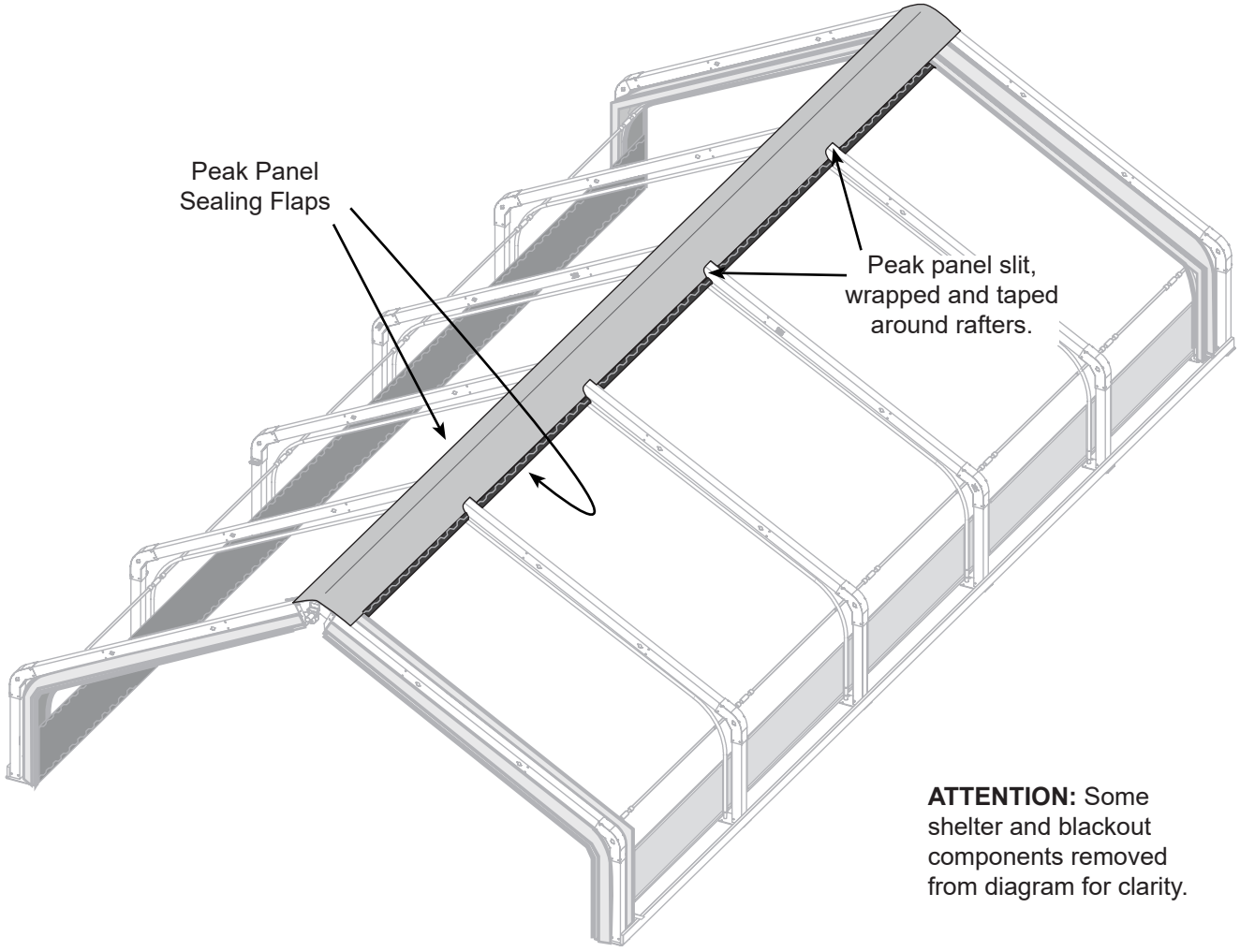
15 INSTALL GARAGE SPRING CHANNEL

Peak panel is to be slit and wrapped around both the 6"x6" rafters and the intermediate round pipe rafters. Once wrapped, the panels are to be folded to create a light sealing flap, and secured to a run of spring channel attached to the light deprivation garages.

IMPORTANT: Careful craftsmanship will be required for both light sealing and aesthetic purposes.

1. Starting at one end of the greenhouse, hoist a section of 102197Z144 spring channel into place and align flush with the lower edge of the lip extension of the light deprivation garage. See diagram below and photo to the right for location reference.
2. Using FA4482B Tek screws, attach the spring channel to the garages. Space approximately every 18".
3. Repeat as needed to install spring channel runs end-to-end for both sides.



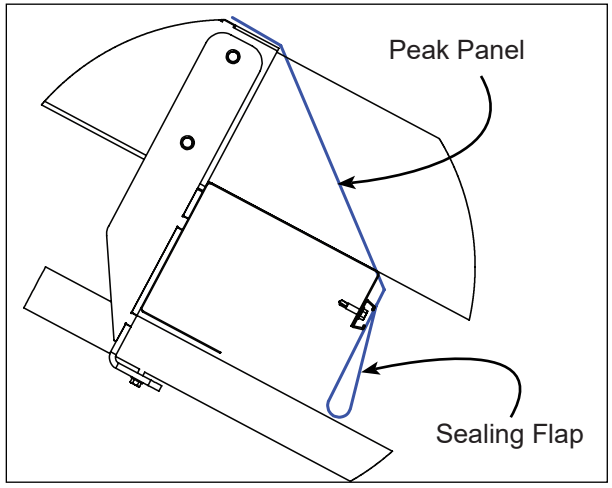


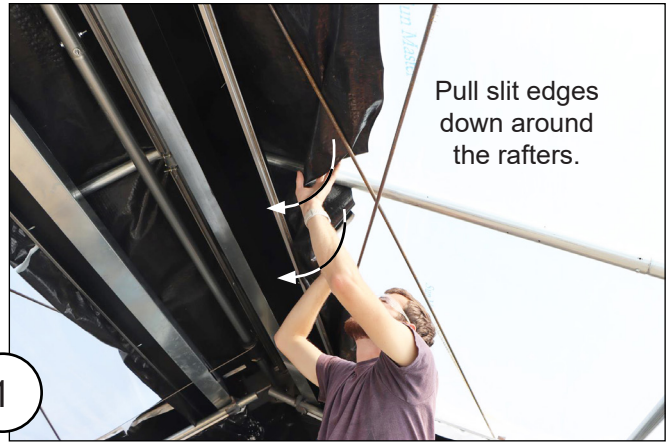
ATTENTION: Some shelter and blackout components removed from diagram for clarity.

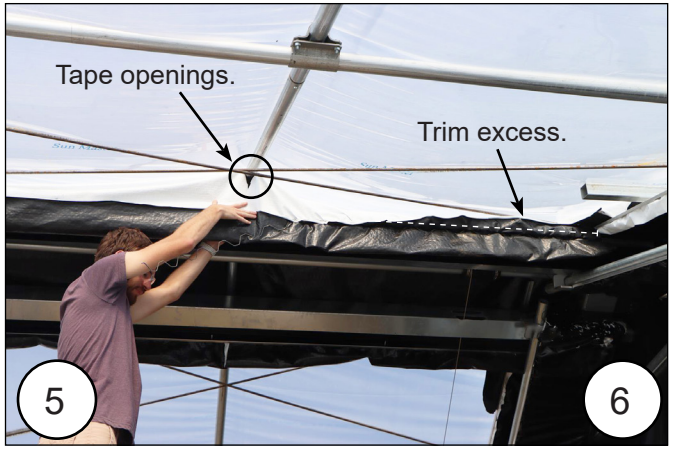
15 CREATE SEALING FLAP

1. At every 6"x6" rafter and intermediate round tube rafter, slit the peak panel to the light deprivation garage so that it can hang down past the rafter and over the previously installed spring channel.
2. Fold the bottom edge of the peak panel back up toward the greenhouse film.
3. Verify that the folded edge that hangs past the spring channel is 5" long and touches the blackout rafter.
4. Secure in place using 102198A spring wire, and ensure that the 5" flap dimension stays constant from end to end.

   NOTE: Carefully overlap the slit edges when folding and securing into the spring channel for light deprivation and aesthetic purposes.
5. With folded flap secured in place as desired, trim excess as needed.
6. Return to each rafter where the peak panel was slit & wrapped around and seal all openings using provided 115198 blackout tape.







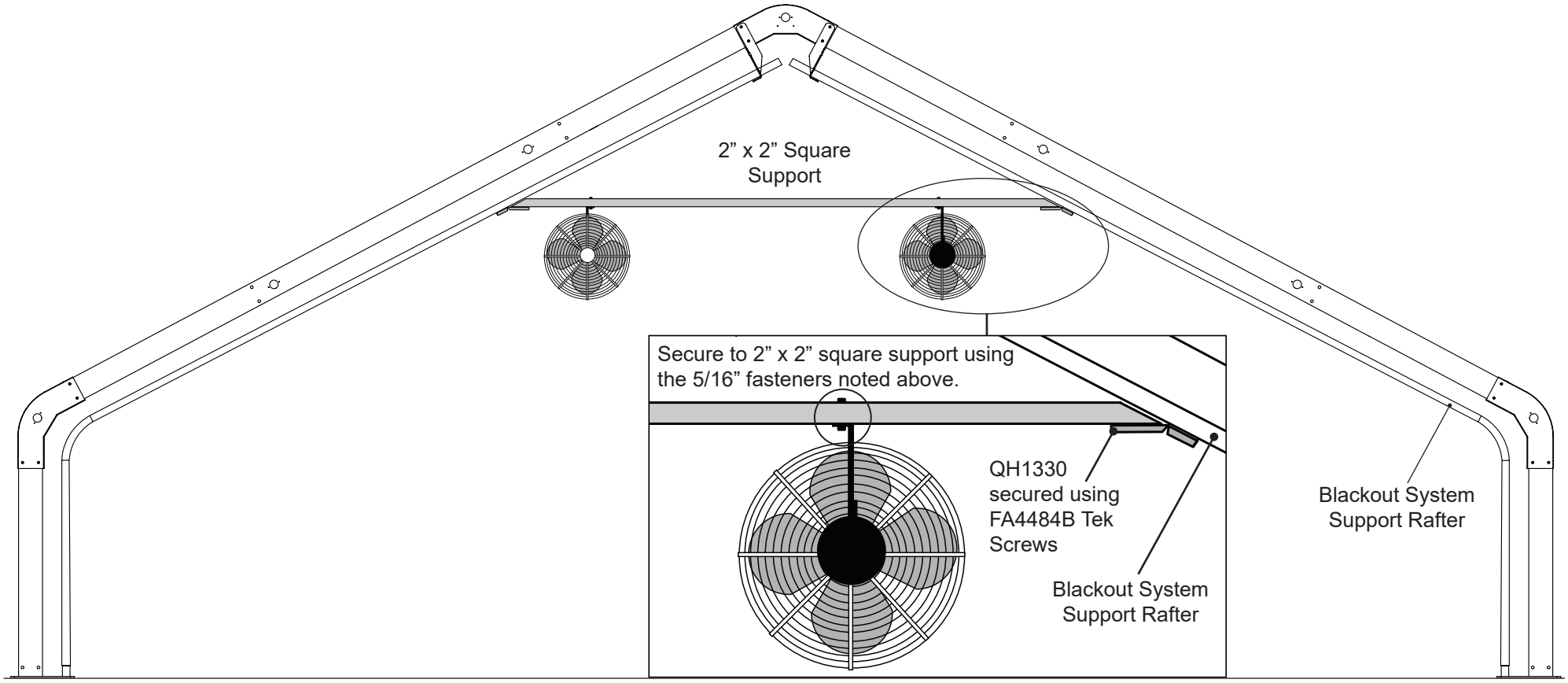
16 INSTALL CIRCULATION FANS

Review information and diagrams on this page to install the circulation fans.

PARTS:

- 111939 20” Horizontal Flow Fans
- S20P144 (2” x 2”) Square Tubes
- QH1330 Variable Angle Brackets
- FAG338B (5/16” x 3”) Hex Bolts
- FALF37B (5/16”) Locknuts
- FA4484B Tek Screws

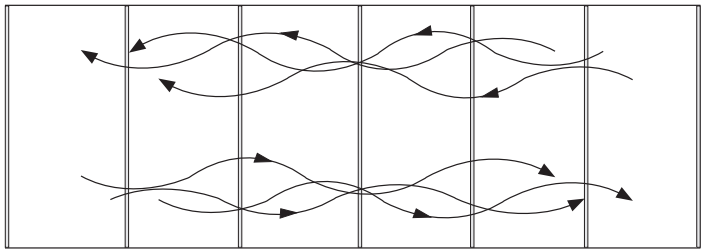
- Secure the 2” x 2” support tube(s) to the ***blackout system support rafters***.
- Measure the fan and fan bracket to help determine the height and position of the 2” x 2” support tube(s).
- After height is determined, cut the S20P144 square tube(s) to length.
- Bevel the ends of each 2” x 2” square tube for the best fit.
- Use a drill and 3/8” drill bit to drill the mounting holes in the 2” x 2” support tube(s).
- Fans mounted on the same support tube ciruculate air *in opposite directions*.
- Space support tubes 24’ apart for buildings with four (4) or more fans. See Side Profile diagrams on the next page.
- ***All electrical work to be completed by a professional and experienced electrical contractor familiar with regional codes and established regulations.***



16

INSTALL CIRCULATION FANS — SIDE PROFILES

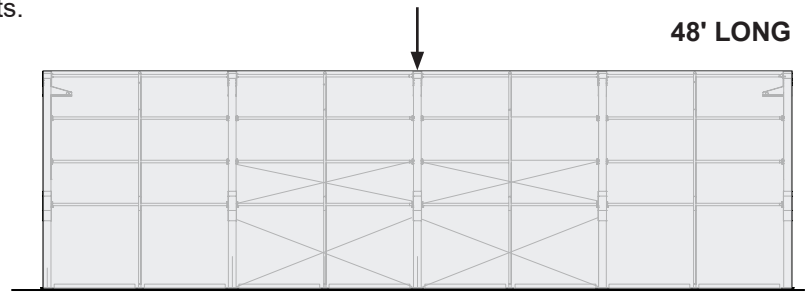
Arrows on side views show where to position each pair of circulation fans for best results.



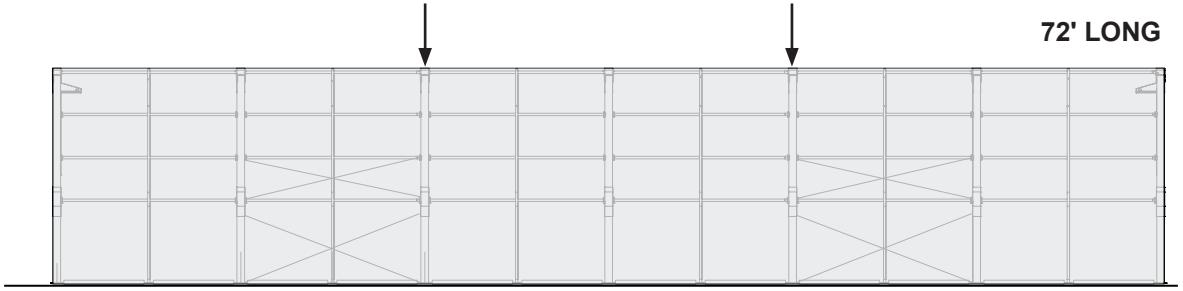
TOP VIEW SHOWING TYPICAL AIR FLOW DIRECTION

SIDE VIEWS SHOWN

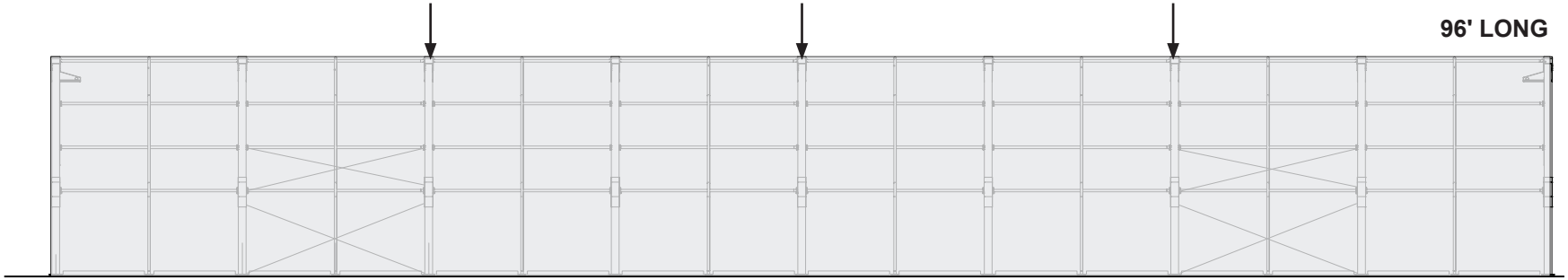
48' LONG



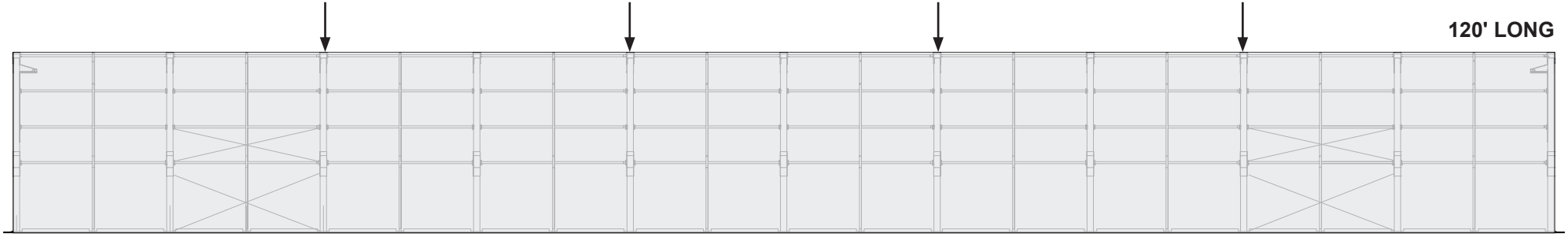
72' LONG



96' LONG



120' LONG



Frame Check and Light Deprivation

FRAME CHECK

Inspect the entire greenhouse frame for sharp edges or fasteners that could damage the cover during installation.

1. Verify that all frame and system members are properly secured and that all bolts and clamps are tight.
2. Recheck the frame assembly for sharp edges or clamps and bolts that may interfere with the operation of the blackout panels. File or tape sharp edges as needed.
3. Reposition clamps and bolts as needed and tape all rafter pipe joints with duct tape to protect the panel material.
4. Verify that the blackout rafters are properly and adequately anchored.

LIGHT DEPRIVATION

When greenhouse and blackout system are installed completely, and the blackout system is in the "closed position", there is potential for light leakage based on frameworkblackout material installation. Inspect the entire greenhouse for potential gaps where external light could leak into the greenhouse. Many minor details and touch-ups will need to be taken care of at the customer's discretion. A great deal of carefulness, craftsmanship, and throroughness is required, and proper installation will eliminate most potential issues. 115198 black tape & DE4011 black-out sealing caulk is included to seal gaps accordingly. Other customer-supplied light sealing agents can also be used such as opaque foam, non-clear caulking, regular duct tape etc.

1. Open the supplied DE4011 opaque sealant and apply a thin bead along the bottoms of gable wall and knee wall termination, where needed.
2. Return to any holes or gaps where light might leak into and repair these using the sealant.

   ATTENTION: Once entire blackout system has been installed, and is in the CLOSED position, repeat this step where light is visibly leaking through, if applicable.
3. After all operation details have been tested, verify all areas are sealed tight and that light does not leak into system. The following components have been added that may remedy trouble areas like corners, and along sealing edges:

   -115298 blackout tape
   -DE4011 blackout sealing caulk (aluminum color)

   ATTENTION: Many minor details and touch-ups are taken care of at the customer's discretion. A great deal of carefulness, craftsmanship, and throroughness is required, and proper installation will eliminate potential issues.
4. One major potential area for light leakage is where the pull conduits seal inside the light deprivation garages. It is important that when in the CLOSED position the pull-conduits are nestled deep enough into the light deprivation garages that light cannot penetrate into the greenhouse. To ensure optimal light deprivation, operate the system to fully close the blackout panels. Loosen the cable clamps on the pull-cables to adjust as needed to keep the pull-conduits tightly "parked" in the garages, and then retighten. It may be necessary to repeat this process from time to time after extended use.

115198
Black-Out Tape

DE4011
sealant

Quick Guide to Care and Maintenance

1. Complete and return all warranty documentation.
2. Perform all initial and periodic inspections as described in this 3-page care and maintenance guide.
3. Follow the instructions under the Blackout System Care heading.
4. Contact your sales representative for answers to your blackout system questions.
5. Direct all warranty and warranty-related questions to our greenhouse customer service department at 1.800.245.9881.

BLACKOUT SYSTEM CARE AND MAINTENANCE

Inspecting your blackout system after construction and throughout the year is essential. Periodic inspections help maintain the structural integrity of the system and can identify conditions and components that require attention. Read the following information and complete the inspections as presented to properly care for and maintain your blackout system.

ATTENTION: FAILING TO COMPLETE THESE INSPECTIONS IN A TIMELY MANNER AND AS INSTRUCTED MAY RESULT IN INJURY AND DAMAGE AND WILL INVALIDATE THE WARRANTY.

Initial Inspection

Immediately after construction, check these items:

- Inspect frame components to verify all connections are tight and to ensure all bolts and nuts are installed and tight. If fasteners are missing, install recommended fasteners and tighten. Document any damaged frame components and contact your sales representative for solutions.
- Verify all rafters, purlins and bracing are installed and tight. Inspect points where rafters, purlins and bracing are attached to main frame to ensure all mounting mounting hardware is installed correctly and tight. Check to ensure nothing contacts roof, side, gable wall film (or polycarbonate panels), blackout material, or the operational pathways of the blackout panels.
- Inspect drive shaft and bearing plate connections and ensure these are tight. Inspect all fasteners to ensure these are installed and tight.
- Verify motor mount and cable drums are installed and tight. Motor should be fastened tightly to motor bracket.
- Inspect pull-cables and roller assemblies to verify they move freely and do not rub against the walls of the light deprivation garage openings.
- Verify pull-conduits are straight, spliced tightly together, and nestle deep enough into the light deprivation garages to adequately light seal when in the closed position. Ensure all pull-cable clamps are installed and tight. If clamps are missing or loose, install new clamps. Contact a sales representative for additional clips.
- Examine blackout material for holes or light leaks. Document any damaged material and contact your sales representative for solutions.
- Open and close system to check motor operation. Inspect material when closed to ensure proper seal.

Post-Installation Inspection

Perform the following inspection 2-4 weeks after completing the installation of the blackout system:

- Inspect material for punctures or damage. Also, ensure contents of greenhouse are not touching or rubbing on the material. Repair all material damage as instructed by your sales representative.
- Recheck motor and pull-conduits to verify these are operating and sealing properly when closed.

Semi-Annual Inspections

Beginning after installation, and throughout the life of the blackout system, regional conditions (geologic, meteorologic, etc.) and overall use can affect components. In addition to items in previous inspections, check these items at least two (2) times throughout the year. (Allow a few months to pass between each inspection unless weather conditions, weather-related events, or regional influences warrant more frequent inspections.) Complete the following:

- Inspect all material for worn or damaged areas. Repair as needed and as instructed by your sales representative.
- Check all fastener hardware to ensure these are tight and intact.
- Verify that building contents are not touching or rubbing against material.
- Inspect components for damage resulting from use or environmental conditions. Repair or replace damaged components as instructed by your sales representative.
- Consult the maintenance and care information included with the blackout system, including all motors and other components. Service these items as instructed in the documentation included with the blackout system. Contact Engineering Services and Products Company for replacement parts and additional servicing information.
- Inspect cables to ensure these are tight and intact. Replace worn, broken, or missing cable immediately.

Blackout System Care

Proper care of your blackout system is important and helps prolong the life of the components. Attend to the following items in order to properly care for blackout system:

- Perform all inspections as previously instructed.
- Remove debris and objects that may accumulate on blackout material using appropriate tools that will not damage blackout material when removing debris.
- Never hang anything from any component of blackout system.
- If needed, contact your sales representative for replacement parts or for answers to your blackout system care and maintenance questions.
- Service all components of the blackout system in accordance with the documentation included with those items.
- Read, understand, and follow information presented on the next page.
- Record all inspections in a log book for reference and warranty inquiries.

Additional Care and Maintenance Instructions for Harsh or Humid Environments

In addition to previous inspections and care requirements, the following recommendations can further protect the blackout system and its components.

- Do not store corrosive materials inside the greenhouse.
- Do not allow greenhouse contents to contact metal frame parts, cover panels, end panels, or blackout system components.
- Remove any liquid or solids that spill, splash, or contact greenhouse components.
- Lubricate all fasteners, hinges, and threaded connections with a light film lubricate to protect parts from moisture, corrosion, and other effects resulting from a harsh or humid environment.
- Remove environmental residue from frame, frame components, cover, end panel, and blackout material.
- Use of water to remove some contaminates may be dangerous. Consult a qualified professional when in doubt and to safely remove materials that react violently with water. Do not store materials that react violently with water or other chemicals or substances inside the greenhouse.
- If manufacturing occurs in or around greenhouse, verify that fumes, residue, and airborne pollutants resulting from that manufacturing are properly managed in an environmentally-sound manner. To ensure structural integrity, protect greenhouse components from manufacturing by-products that cause corrosion, or that could weaken or deteriorate material.
- To prevent damage, injury, or both, replace deteriorated, damaged, or inoperable parts immediately. Contact your sales representative for all replacement parts.

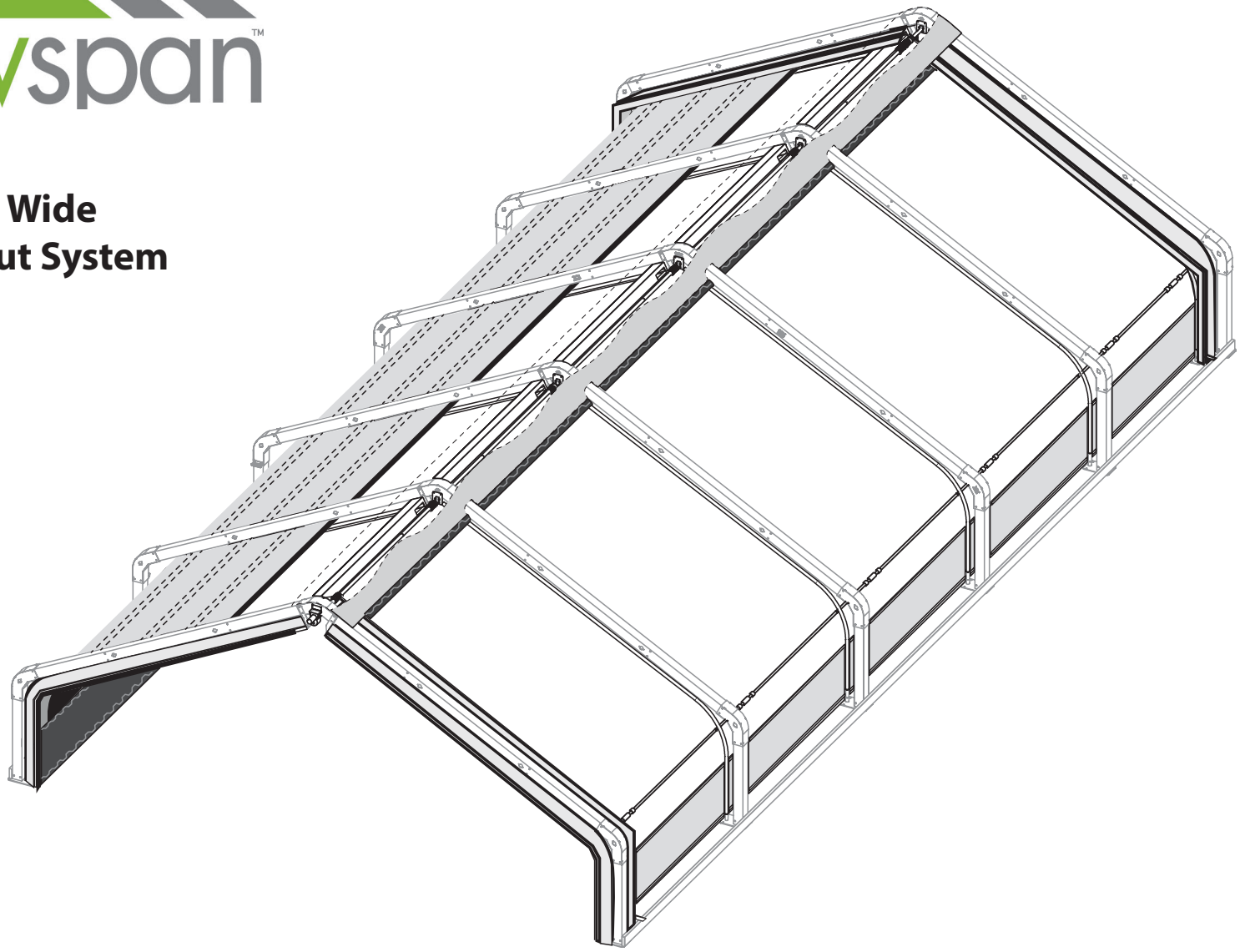
Care & Maintenance Inspection Record

DATE	COMMENTS & OBSERVATIONS	INITIALS

DATE	COMMENTS & OBSERVATIONS	INITIALS

GROWspan™

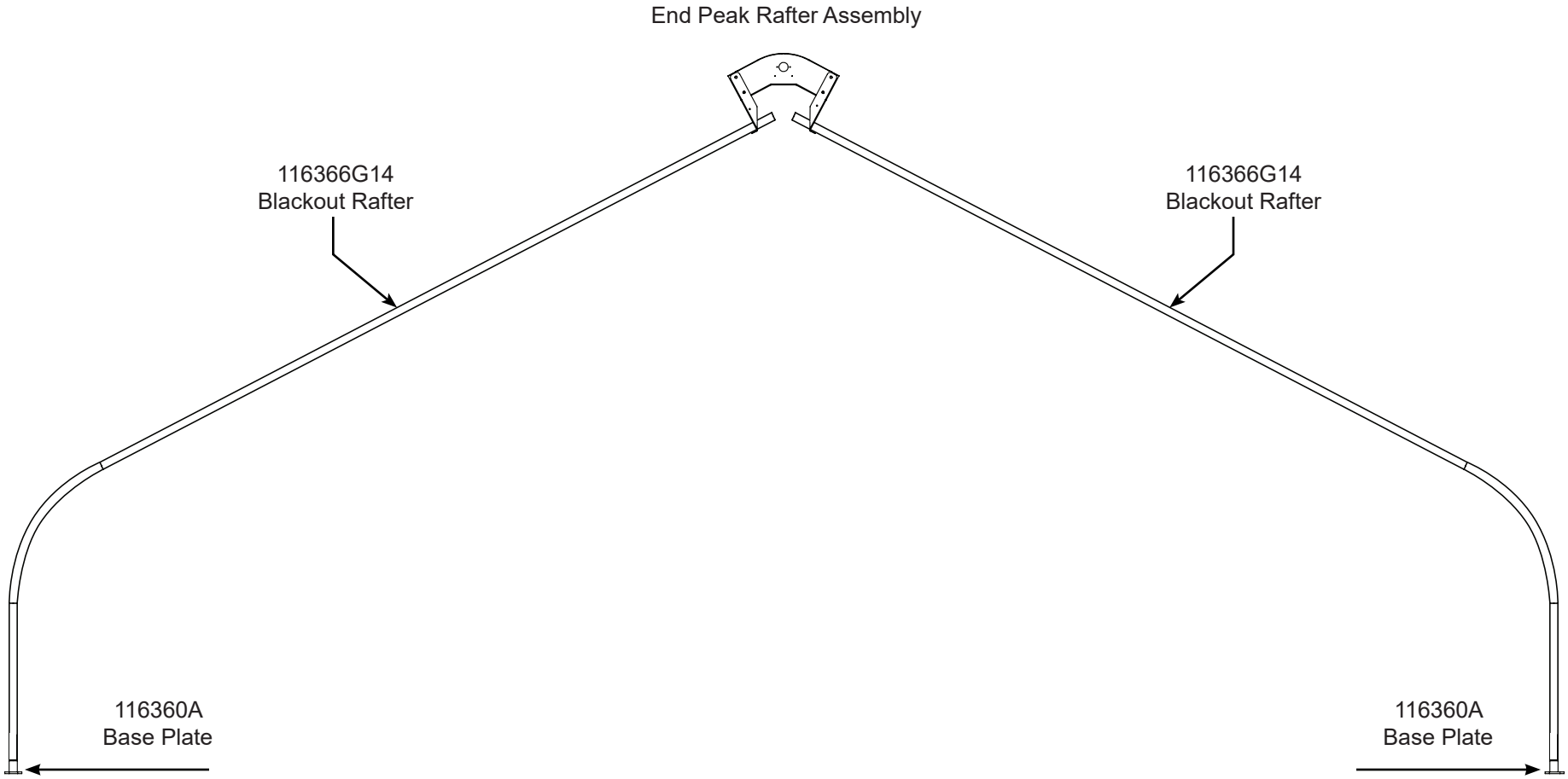
30' Wide
Blackout System



Frame length of actual building may differ from what is shown.

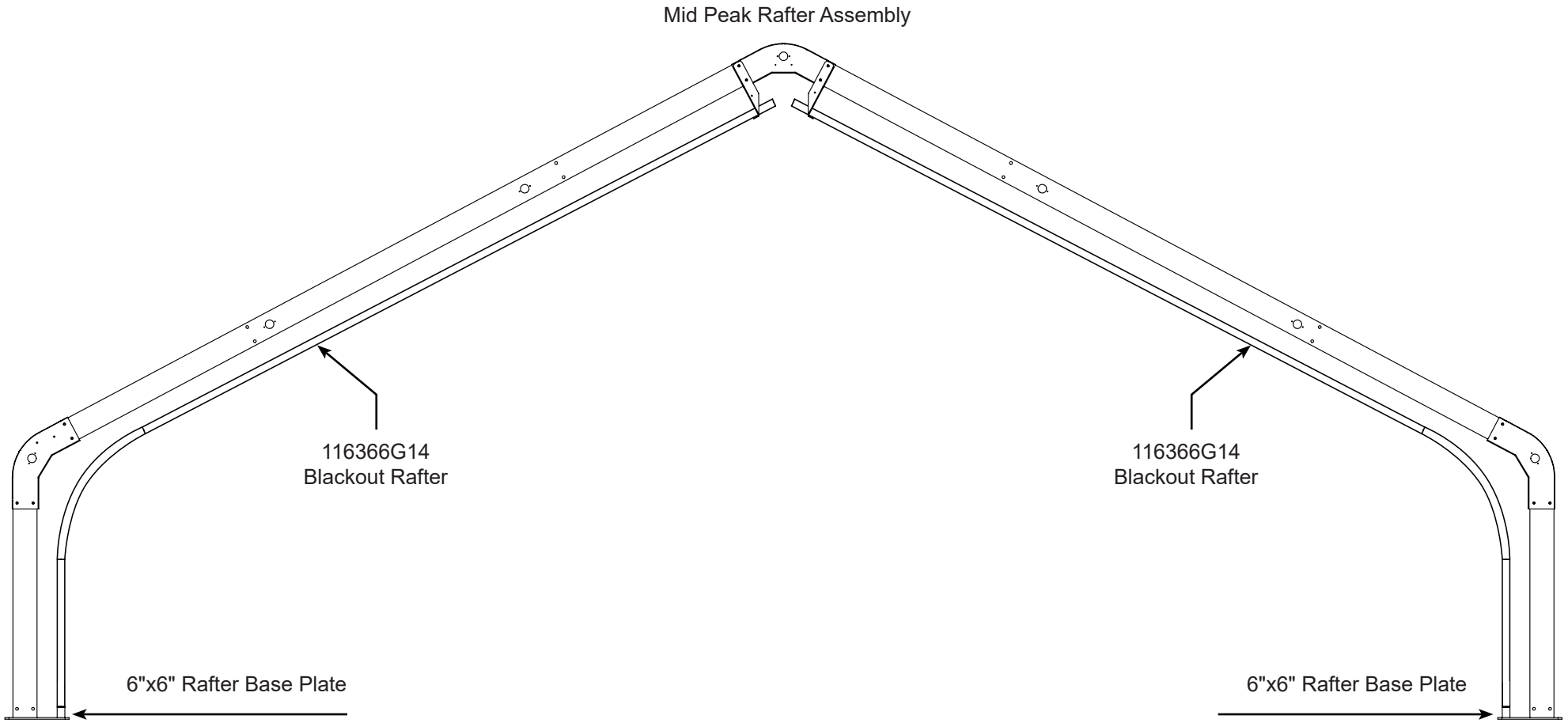
End Blackout Rafter Profile

ATTENTION: End rafters installed 16" inset from under the 6"x6" end rafters.

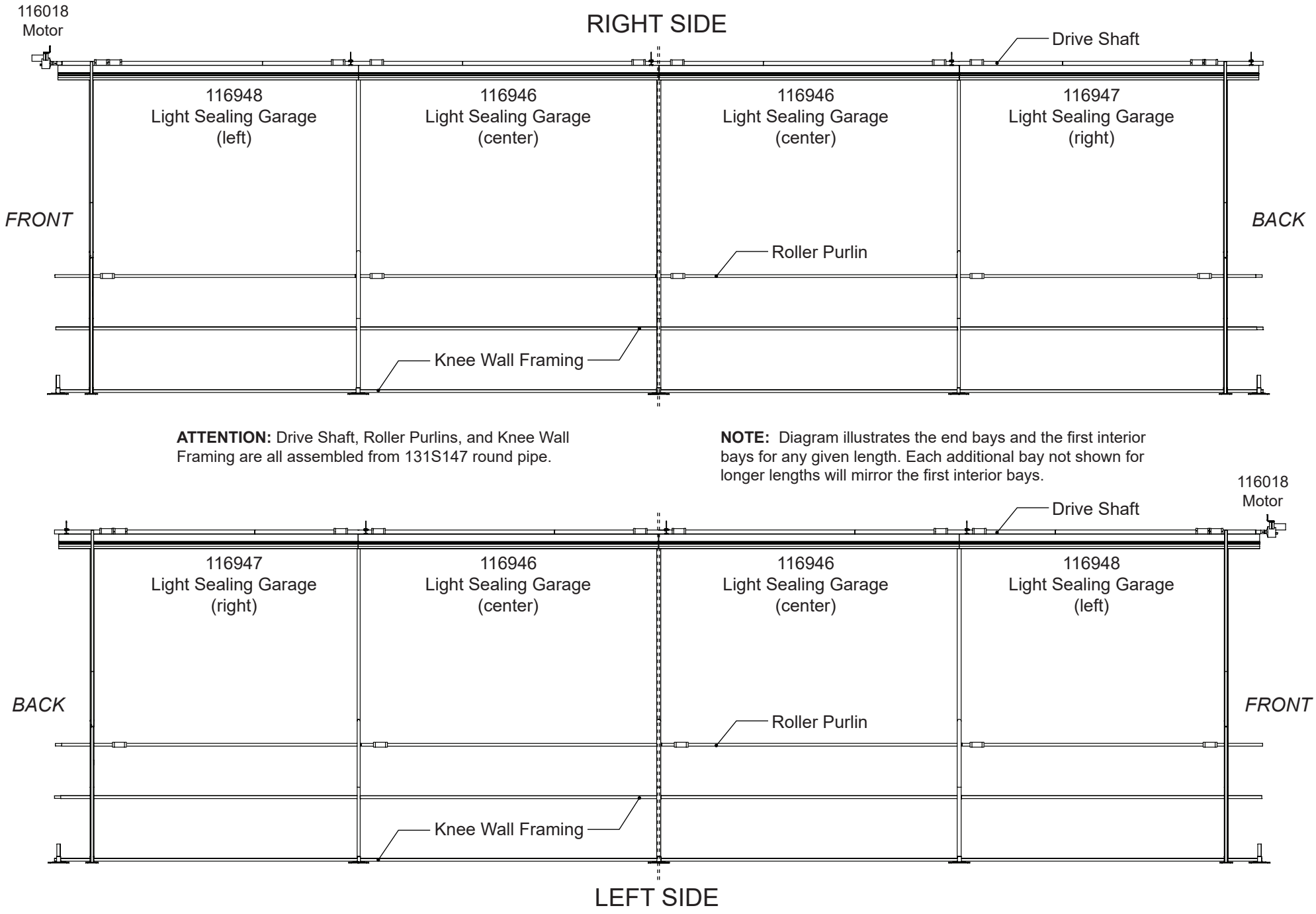


Mid Blackout Rafter Profile

ATTENTION: Mid rafters installed directly under the 6"x6" mid rafters.



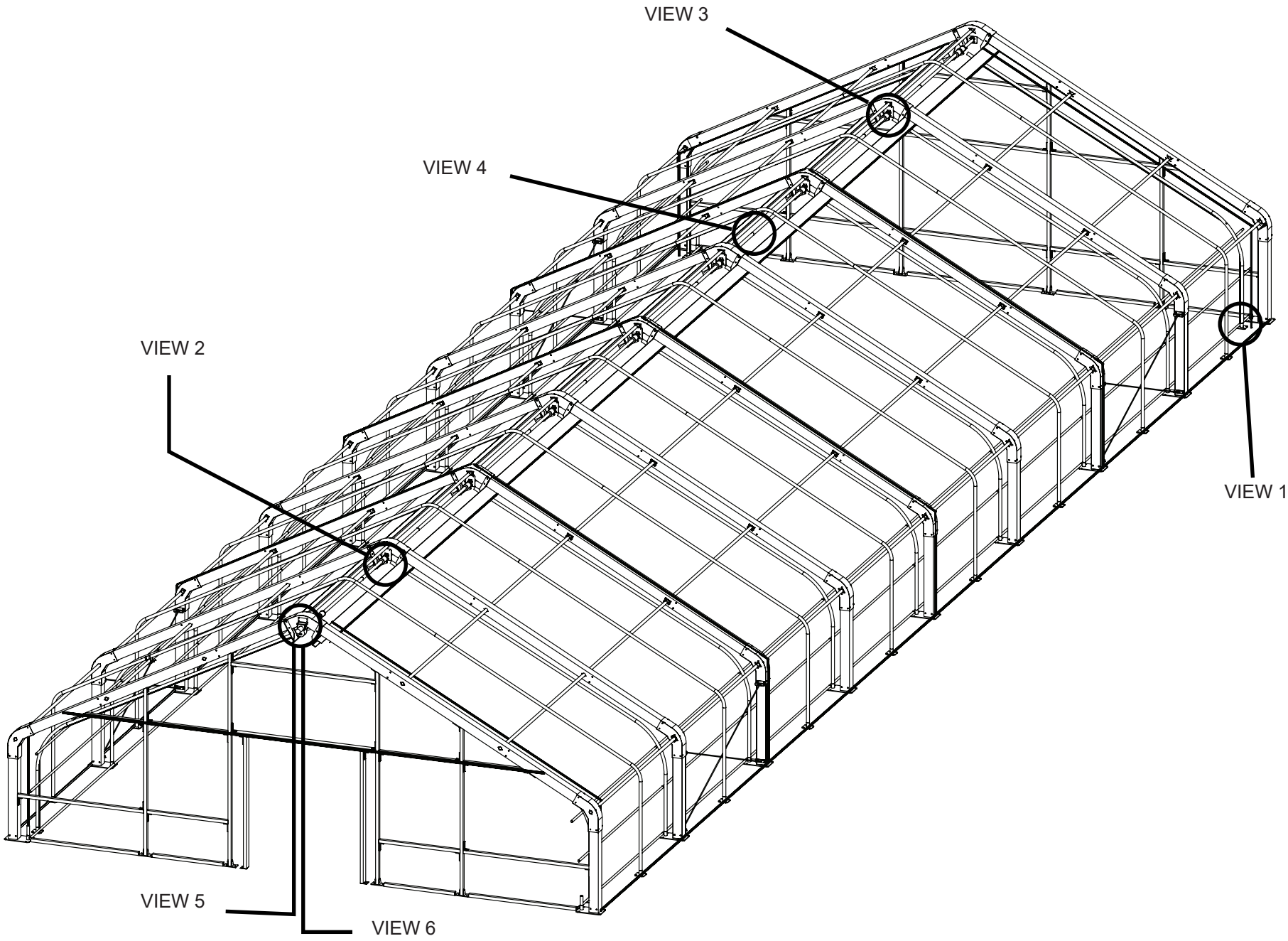
Side Profile



ATTENTION: Drive Shaft, Roller Purlins, and Knee Wall Framing are all assembled from 131S147 round pipe.

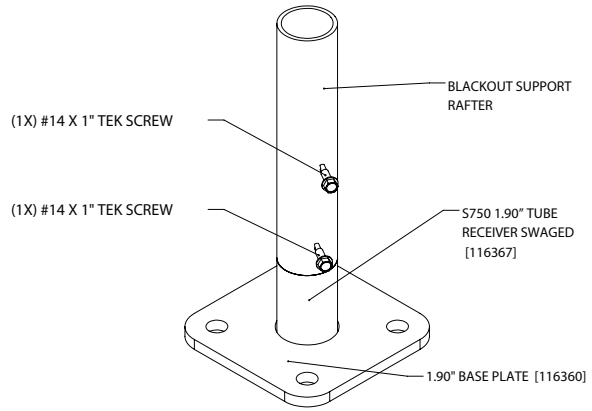
NOTE: Diagram illustrates the end bays and the first interior bays for any given length. Each additional bay not shown for longer lengths will mirror the first interior bays.

Frame Connections (1-6)

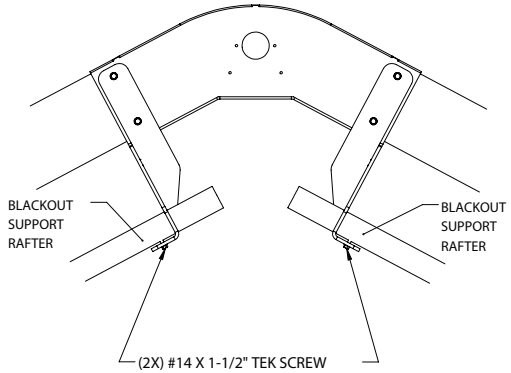


Frame Connection Details (1-6)

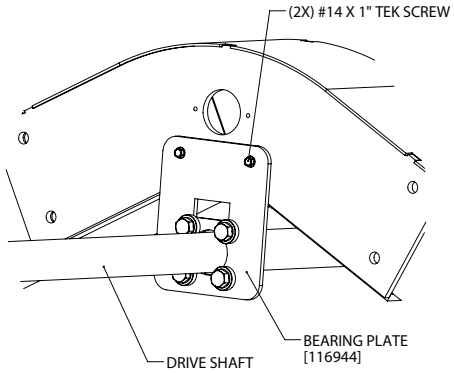
NOTE : USE TEK SCREWS (FA4482B) TO ATTACH THE BLACKOUT SUPPORT TO THE 1.90" BASE PLATE ASSEMBLY



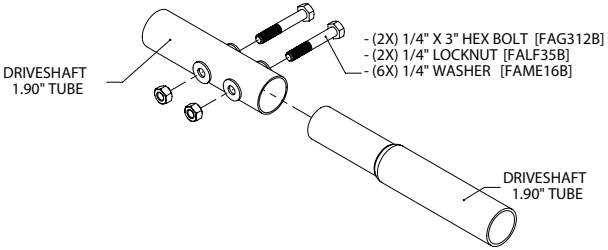
VIEW 1
BLACKOUT RAFTERS TO BASE PLATE CONNECTION



VIEW 2
PEAK SUPPORT CONNECTION

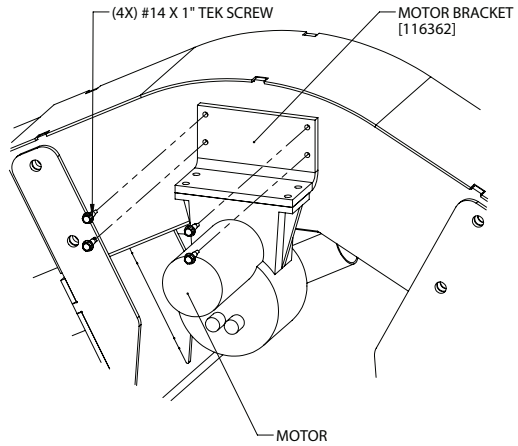


VIEW 3
BEARING PLATE CONNECTION



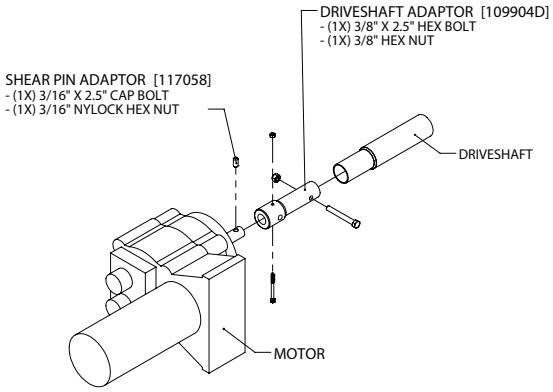
VIEW 4
DRIVESHAFT SPLICE DETAIL

NOTE: USE TEK SCREWS (FA4482B) TO ATTACH MOTOR BRACKET TO THE PEAK JOINT. USE PROVIDED BOLTS TO ATTACH MOTOR TO MOTOR BRACKET



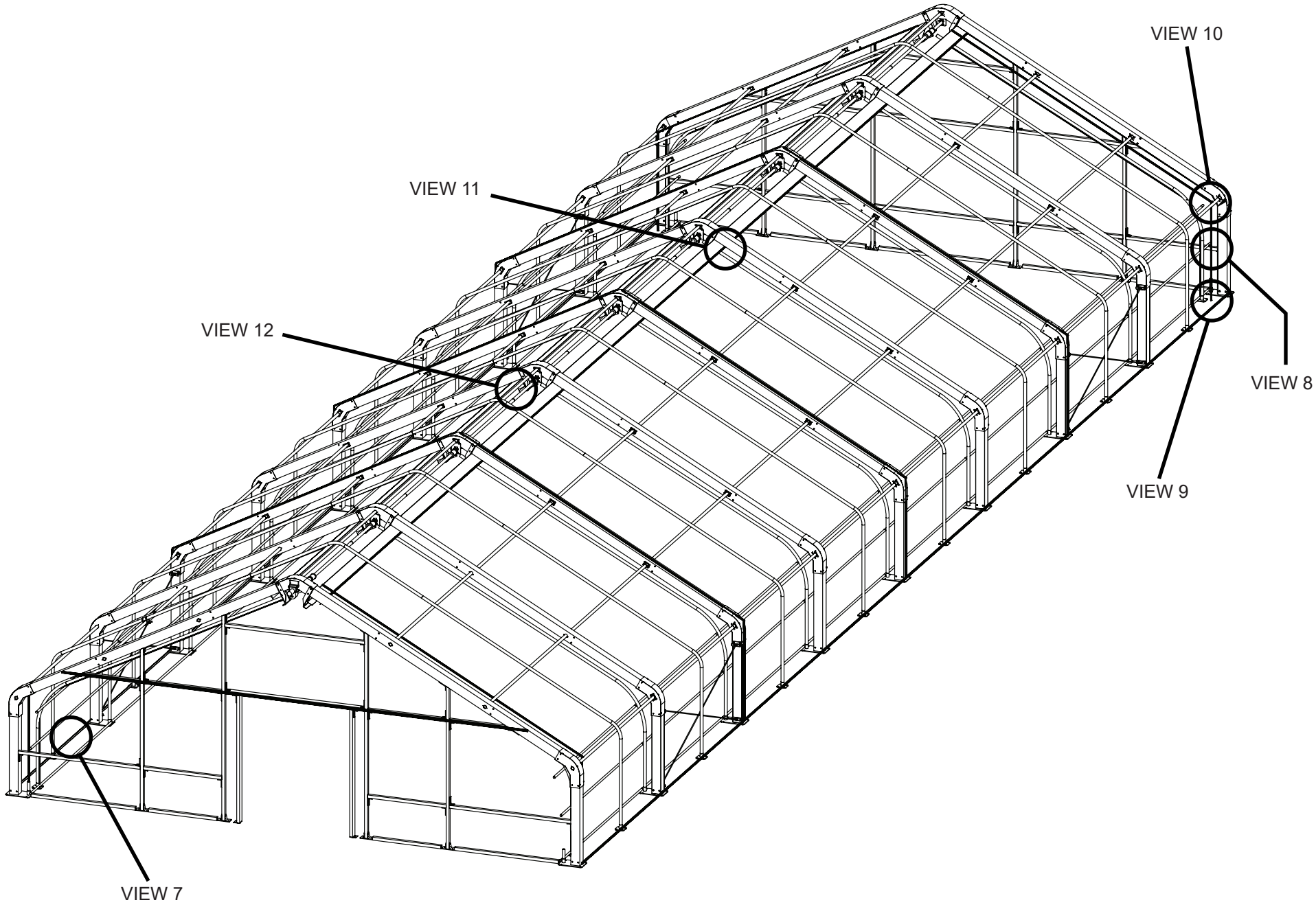
VIEW 5
MOTOR BRACKET CONNECTION

NOTE: USE MOTOR PROVIDED THROUGH BOLT TO ATTACH ADAPTOR TO MOTOR.

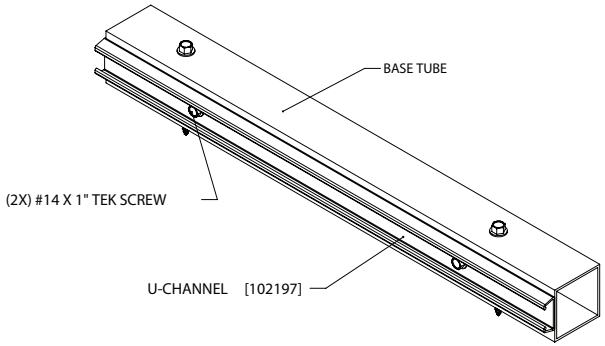


VIEW 6
MOTOR TO DRIVESHAFT ATTACHMENT

Frame Connections (7-12)

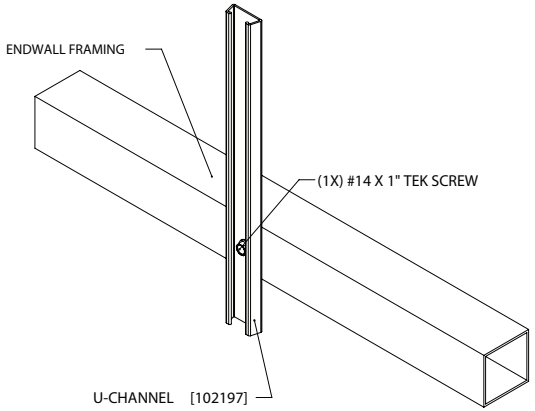


Frame Connection Details (7-12)



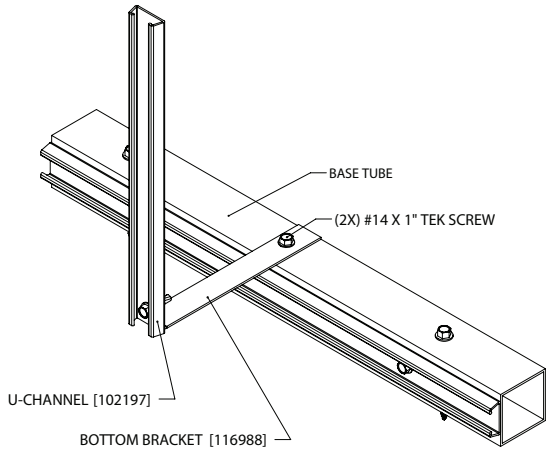
VIEW 7
U-CHANNEL TO BASE TUBE

NOTE: U-CHANNEL TO BE IN LINE WITH BLACKOUT SUPPORT RAFTER AT ENDWALL. NOTCH U-CHANNEL TO BEND AT CORNER TO FOLLOW ROOF SLOPE.



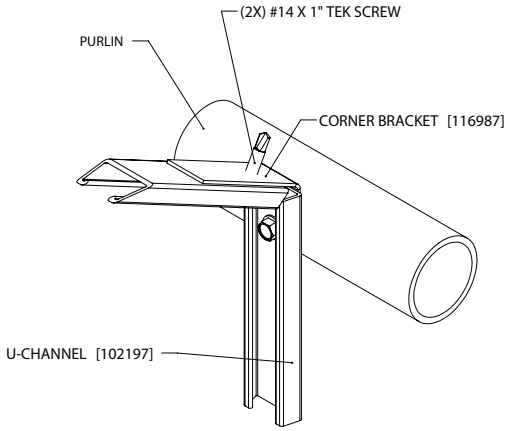
VIEW 8
ENDWALL U-CHANNEL

NOTE: U-CHANNEL TO BE IN LINE WITH BLACKOUT SUPPORT RAFTER AT END RAFTER.



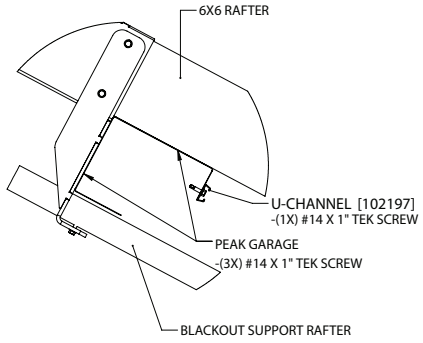
VIEW 9
CORNER BOTTOM U-CHANNEL

NOTE: U-CHANNEL TO BE IN LINE WITH BLACKOUT SUPPORT RAFTER AT END RAFTER.



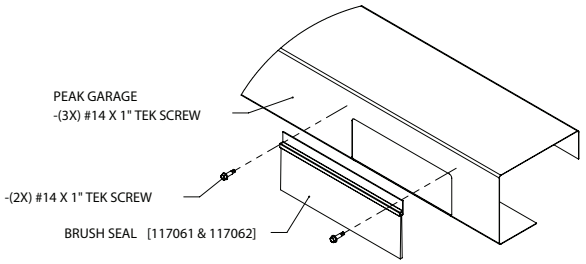
VIEW 10
PURLIN U-CHANNEL AT CORNER

NOTE: U-CHANNEL TO RUN FULL LENGTH OF GARAGE. ATTACH WITH TEK SCREW EVERY 24" TYP.



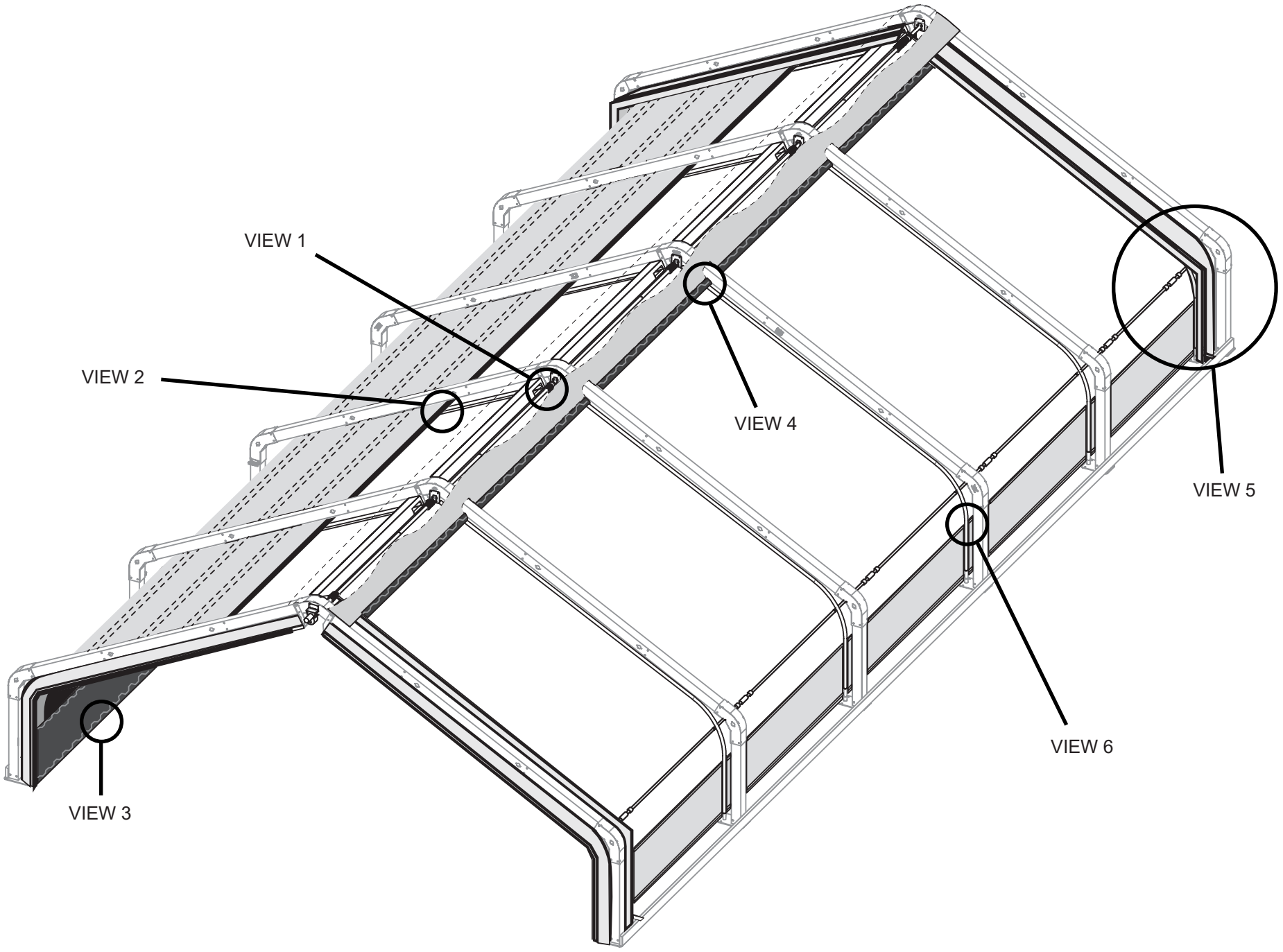
VIEW 11
BLACKOUT GARAGE & U-CHANNEL

NOTE: INSTALL BRUSH SEAL BEFORE GARAGE IS ATTACHED AT THE PEAK.



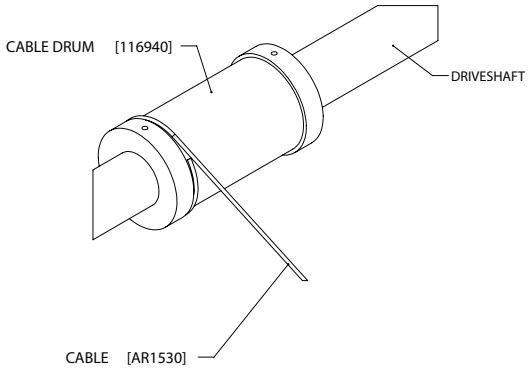
VIEW 12
BRUSH SEAL TO BLACKOUT GARAGE

Blackout Material Connections



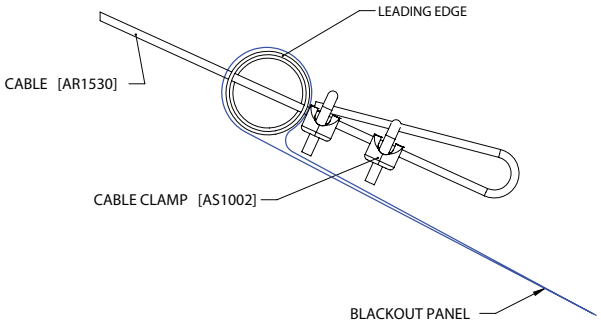
Blackout Material Connection Details

NOTE: CABLE DRUM ATTACHED WITH PROVIDED SET SCREWS AND BAND CLAMPS



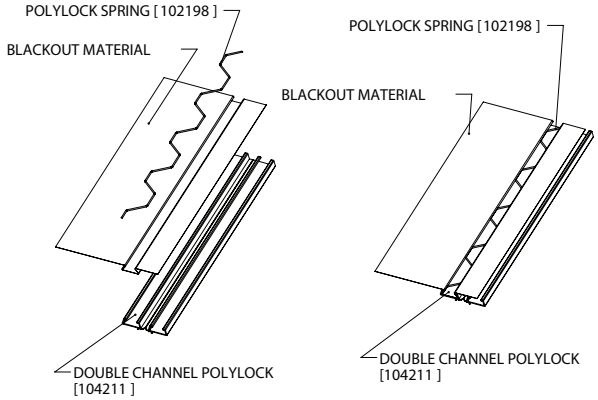
VIEW 1
CABLE DRUM DETAIL

NOTE: CABLE TO BE RAN THROUGH LEADING EDGE AND CLAMPED.



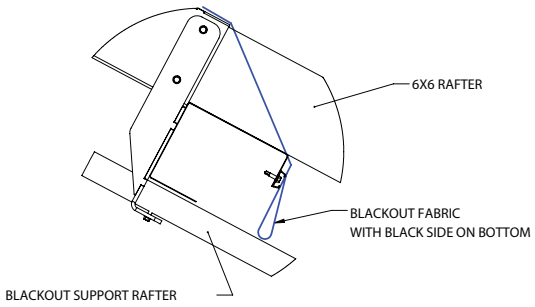
VIEW 2
CABLE TO LEADING EDGE DETAIL

NOTE: PICTURE DEPICTS A DOUBLE U-CHANNEL. THIS SYSTEM USES A SINGLE U-CHANNEL. THE CONNECTION STYLE IS THE SAME.

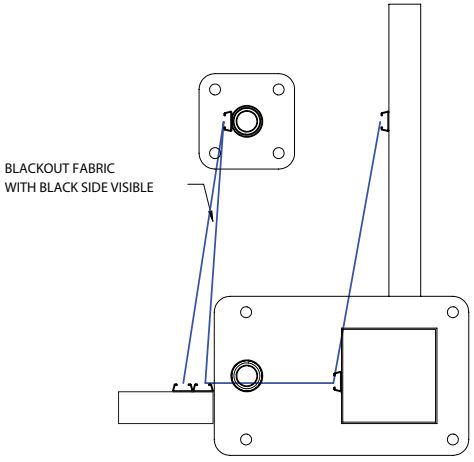


VIEW 3
TYPICAL SINGLE U-CHANNEL POLYLOCK DETAIL

NOTE: PEAK FABRIC TO BE NOTCHED AROUND RAFTERS AND A POCKET CREATED AT THE BOTTOM BEFORE BEING ATTACHED TO THE U-CHANNEL.

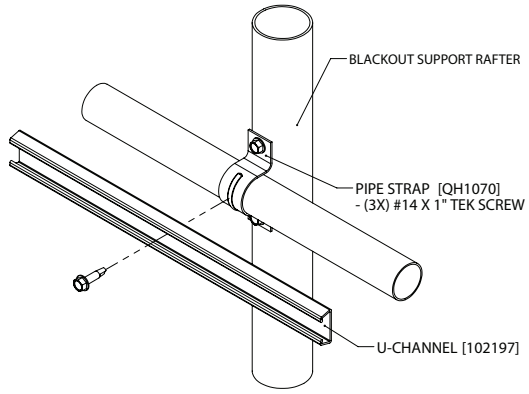


VIEW 4
PEAK BLACKOUT SEALING FLAP



VIEW 5
BLACKOUT FLASHING POCKET AT CORNER

NOTE: KNEE WALL TO BE AT SUPPORT RAFTER GRADE AND 33" UP FROM GRADE.



VIEW 6
BLACKOUT KNEE WALL U-CHANNEL