

VULKA



FIRE EQUIPMENT

VTS Field Guide:
Combi-Roof







SAFETY PRECAUTIONS



ALWAYS Use Personal Protective Equipment

Always wear appropriate P.P.E. including helmet, gloves, and eye protection when setting up and operating this equipment. Wear hearing protection during the operation of powered equipment.

Never Exceed Weight Limitations

Weight limitations for this equipment are available in this guide. Under most circumstances, this equipment can support 1500 pounds, inclusive of the weight of lumber/sheathing/materials used.

Never Use Damaged Parts

If a part is bent, cut, dented or otherwise damaged, DO NOT use that part. Replacement parts are available by contacting support@vulkafire.com. Paint/powder coat chipping and scratching are expected during normal use and will not affect the equipment operationally.

Always Use Official Vulka Parts and Hardware

Only use parts and equipment designed for this product. Using anything other than Vulka Fire Equipment approved parts will void the warranty and could lead to failure of the system and subsequent injury. Replacement parts are available by contacting support@vulkafire.com.

Do Not Practice Techniques You Have Not Been Trained On

Firefighting is a dangerous job and the techniques involved could lead to injury, even in a controlled environment, if executed poorly or improperly. Always ensure that instructors are trained and competent in the subject matter being practiced and are appropriately trained to instruct.

Do Not Operate Power Tools or Equipment You Are Not Familiar With

Always follow the manufacturer's recommended operating procedures and safety precautions when using power tools and equipment. Failure to do so could result in injury.

Always Use Fall Protection When Operating at Height

Most configurations of this system will not place the user above 4' off the ground. If using a configuration that places personnel above 4', ensure fall protection is provided per OSHA requirements.





Overview

The Vulka Training System provides a customizable flat training structure for several firefighting and RIT scenarios. This includes a traditional flat roof, as well a floor (for training firefighter-through-the-floor scenarios) or a crawlspace with different height settings. A peaked roof can be easily added to the 8' width configuration to provide a multi-functional training system.

Tools & Materials

The following parts and materials will be needed:

- (1) VTS Unit
- Lumber for rafters. Quantity depends on roof size and desired spacing – typically 16" or 24" on center. Chart below shows required lumber depending on spacing.
 - 2x6 lumber at a minimum
 - See span chart for lumber length
- Sheathing for floor/roof. OSB or plywood. Generally ½" or ¾". Chart below shows amount needed to cover 1 evolution, depending on system width and lumber length.
- Screws for attaching sheathing to rafters. Drywall screws (2" or greater) are typically okay.
- Screws for attaching lumber to brackets. Metal to wood roofing screws (#8-#14, 1.5" length) are recommended since they provide a gasket to cushion the metal bracket.
- Power drill with bits for roofing screws and drywall screws above.
- Pencil/marker
- Tape measure
- Circular saw with wood cutting blade
- 3/8" hex key (*included in Convenience Pack Add-on*)
- Rubber mallet (*included in Convenience Pack Add-on*)
- OPTIONAL:
 - Vulka Spacing Jig (*included in Convenience Pack Add-on*)
 - Metal decking/roofing materials for added realism

Set Up

This Field Guide will cover how to set this configuration up properly:

- Set up 8' width flat roof/floor configuration
 - Set up tube and brackets
 - Attach lumber
 - Attach sheathing and optional roofing materials
- Add 1 or 2 peaked roofs
 - Set up tube and brackets
 - Attach lumber
 - Attach sheathing and optional roofing materials

Set Up Time

Set up time should take approximately 20-30 minutes with at least 2 people.



Material Charts

Most real-world floors and roofs are framed at 16 or 24 inch on center. These charts will help you figure out how much material is needed for these common spacings with 8 and 12 foot long pieces of lumber. Obviously, more evolutions will require more sheathing and it's always a good idea to get about 25% more lumber than expected.

Amount of Lumber Needed		
System Width	16" Spacing	24" Spacing
8'	12	8
12'	18	14
Note: add 2 extra pieces of the same length lumber for tying the bases together, and 1 or 2 extra if cross-brace is needed		

4x8 Sheathing Needed		
Lumber Length	8' Width	12' Width
8'	4	6
12'	6	9

Other spacings (for example, 12" or 20") and different lengths of lumber are possible. Refer to the allowable spans chart in the General Information Field Guide.



Inserting and Securing Bolts

When securing bolts with wing nuts, bolts should only be hand tight. **Do not overtighten the bolts.** Overtightening the bolts could lead to permanent bending of the brackets and difficulty removing the bolts. Though uncommon, a bolt may require light tapping with a rubber mallet when inserting or removing due to slight hole size variance and/or powder coating thickness – if this is needed, be sure to use as little force as necessary to get the bolt through.

It is recommended to use the 3/8" hex key to tighten bolts until brackets are firmly in place with little play.

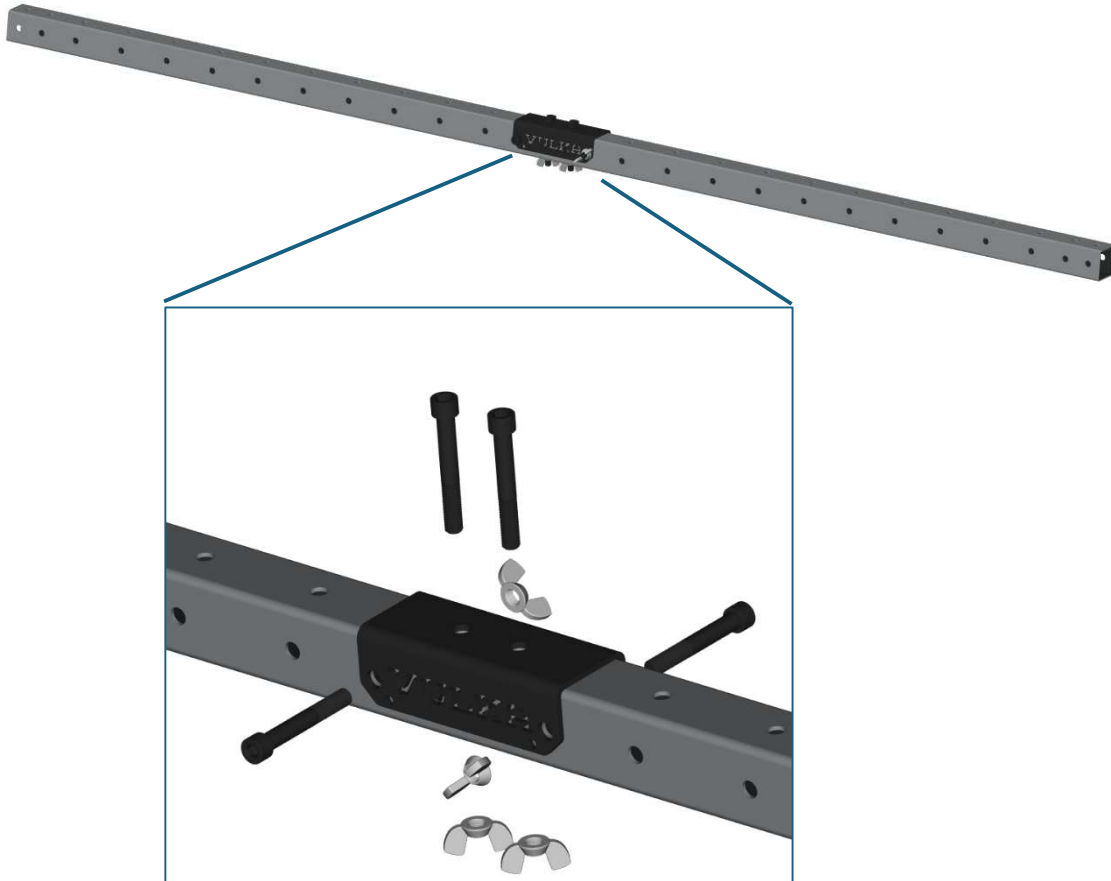
Assembly – Flat Roof

1. Assembling the Structure

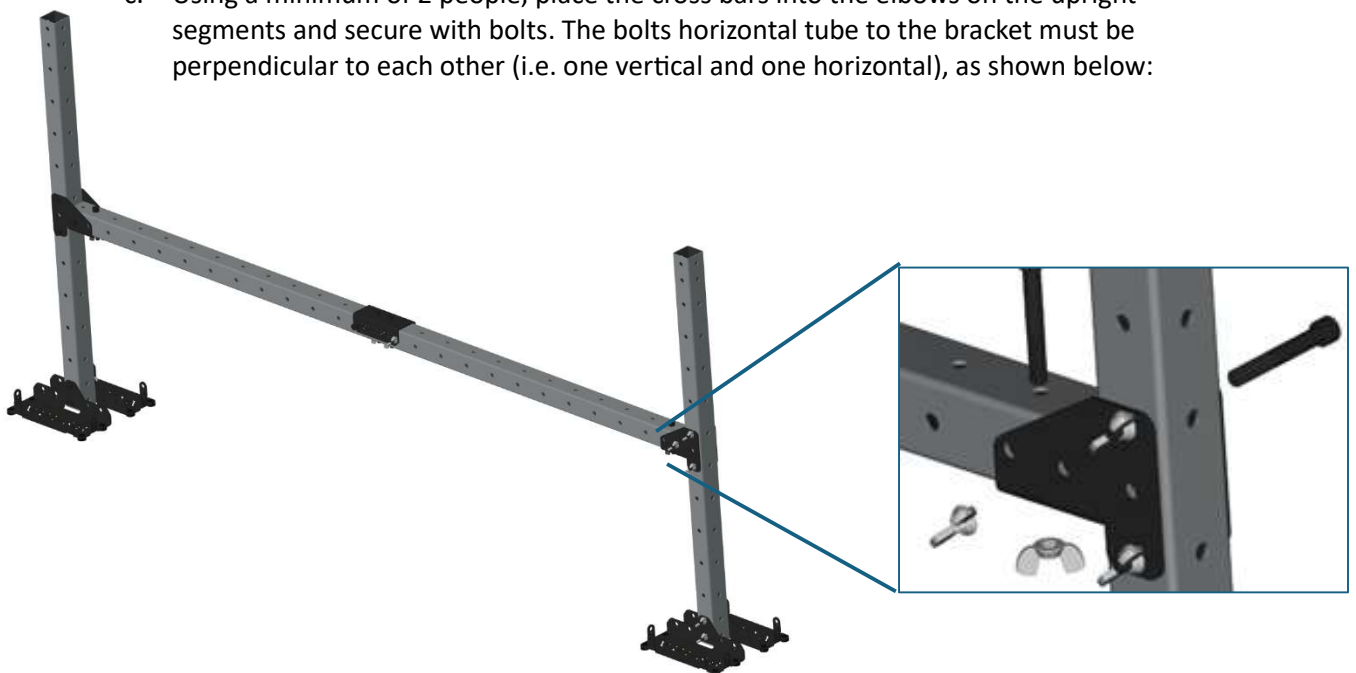
- a. Start by assembling (4) upright structures with elbows mounted at the desired height. Remember that the lumber will add to final height of the roof/floor structure:



- b. Assemble (2) cross bar brackets at either 8' or 12' length using 2 or 3 tubes, respectively. The 12' configuration is shown here:

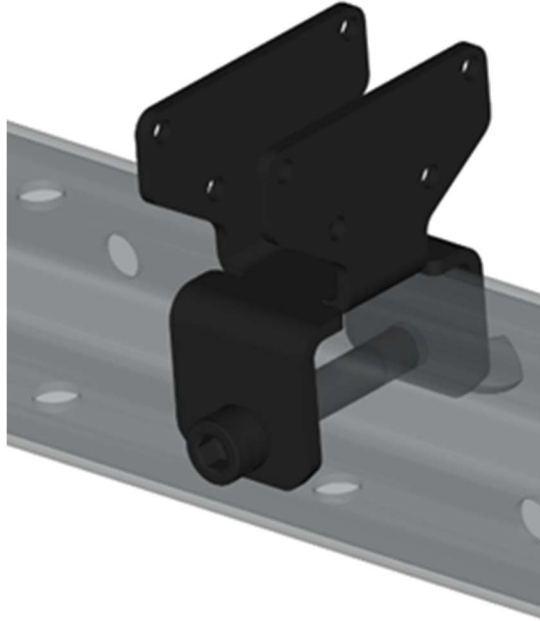


- c. Using a minimum of 2 people, place the cross bars into the elbows on the upright segments and secure with bolts. The bolts horizontal tube to the bracket must be perpendicular to each other (i.e. one vertical and one horizontal), as shown below:



2. Attaching the Brackets

The lumber brackets are designed to hold any lumber with a width of 1.5" (i.e. 2x4, 2x6, 2x8...). The brackets are attached to any hole on the tube (except those used by bases, connectors, and elbows):



The lumber brackets can be attached at any interval of 4 inches, but typical construction (floors, roofs, and walls) uses either 16 or 24 inches on center. The following diagrams show example configurations to achieve those spacings:

16" O.C. Spacing:



24" O.C. Spacing:



Note: a "cheater" is used on the right side above to reduce the unsupported overhang when sheathing is attached. If an unsupported overhang is acceptable for the training scenario, this can be removed and all brackets can be shifted over, resulting in the following:



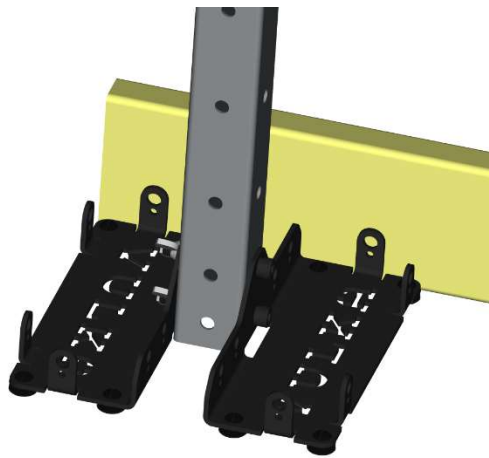
Assembled System (without Lumber):



3. Connecting the Bases

The first step is to tie the two assemblies together at the base using 2 pieces of nominal lumber that are the same length as the pieces to be used for the spans. These won't be weight bearing, so it does not need to be the same dimension lumber as the floor joist pieces. These pieces are only needed parallel to the floor joists of the system.

The lumber should be attached as shown below, with roofing screws through the $\frac{1}{4}$ " tab holes and into the lumber using both tabs on each base, with the end of each piece of lumber lined up with the far edge of the base:

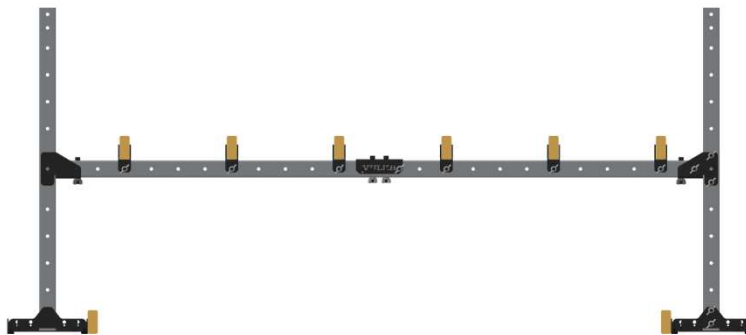


With both sides tied together it should look something like this:



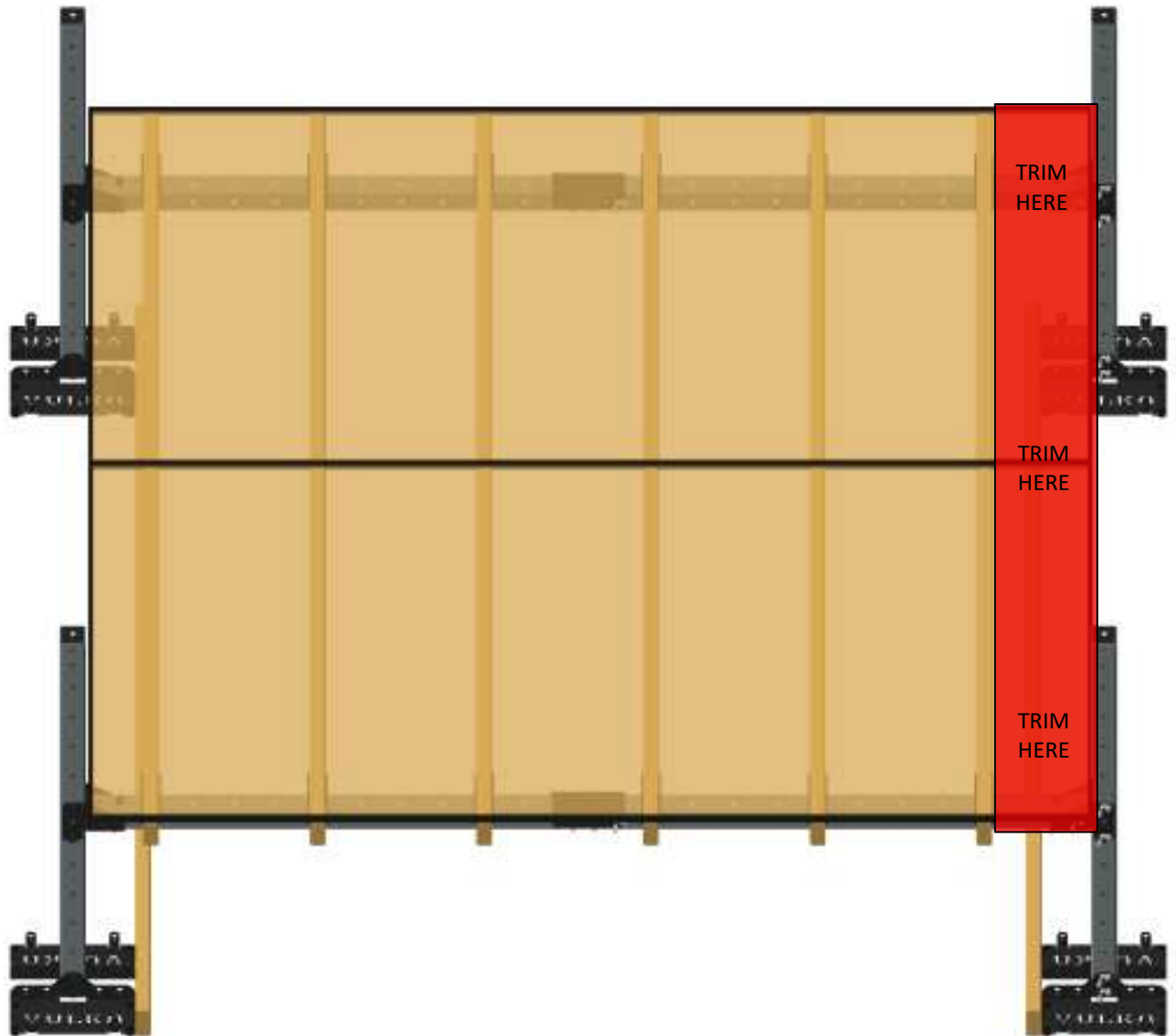
4. Attaching the Lumber

Lumber is then placed directly into the brackets and secured with at least 2 roofing screws for each bracket - one screw on each side. The lumber should be even and overhang the tube on each side. With each piece of lumber secured with 4 screws, the system will look something like this:



5. Attaching the Sheathing

When attaching sheathing for an 8' width, it's easiest to attach perpendicular to the joists as shown below. There may be some overhang on one side of the structure, as seen below, but this can easily be trimmed off with a circular saw or reciprocating saw to prevent personnel from stepping on this weak area.



6. Adding the Pitched Roof Structure

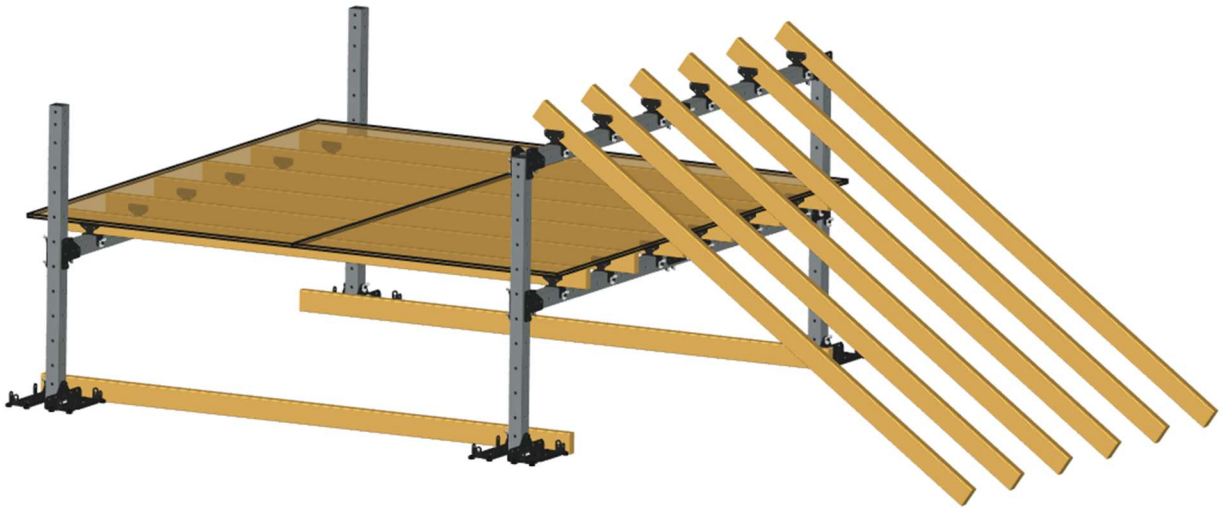
Steps 1 & 2 are repeated to add the cross-bar for the pitched roof structure. The height of the crossbar will determine the pitch. Adding the cross-bar to the flat roof structure will result in something like this:



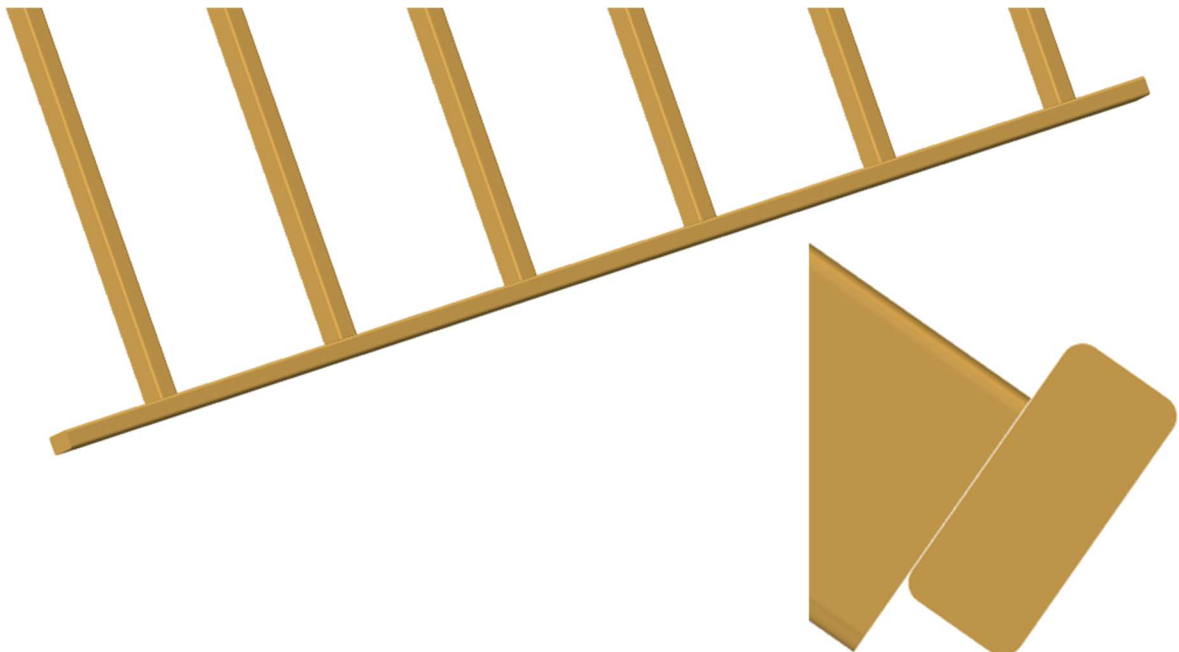
7. Adding the Pitched Roof Lumber

Note: if a hinged, adjustable pitch is desired, skip this step and refer to the pitched/peaked roof Field Guide for lumber prep and attachment instructions.

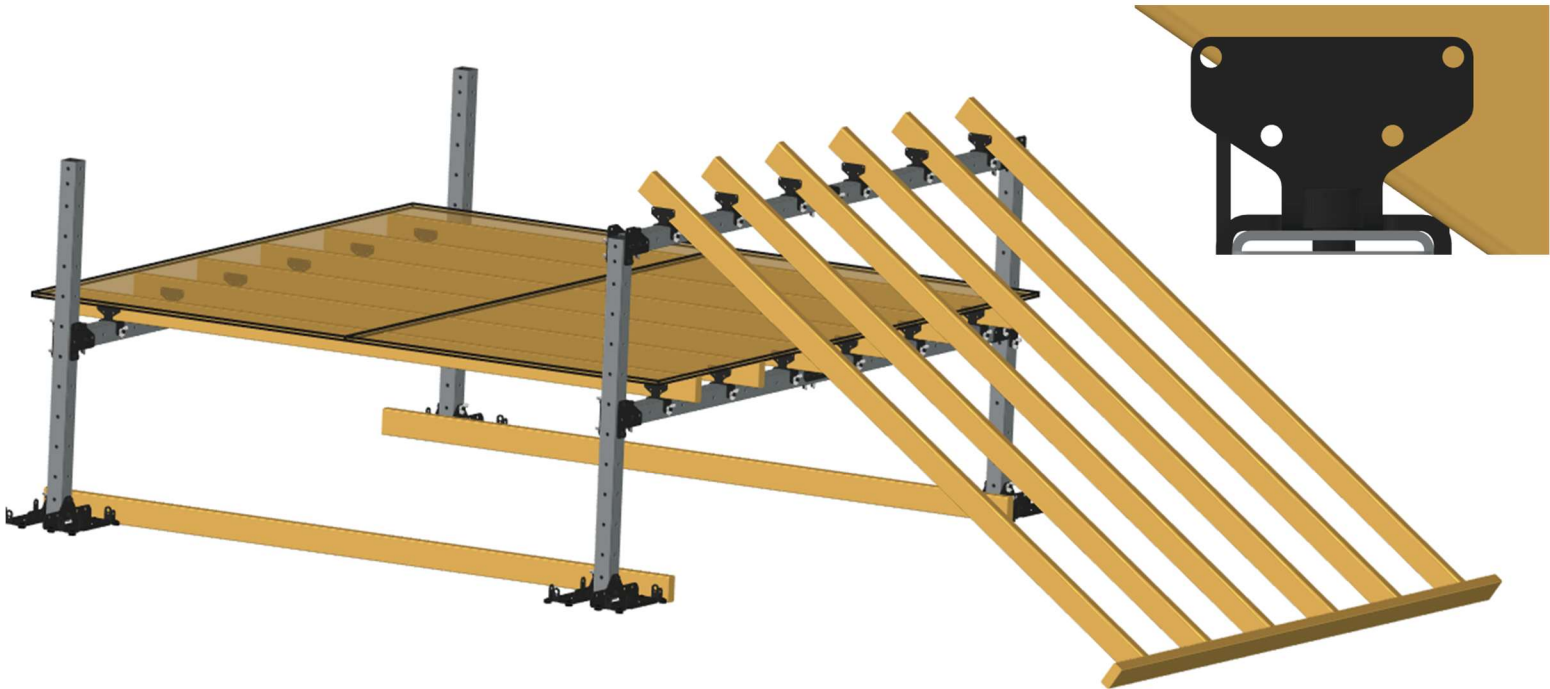
Lean the lumber into the brackets but don't secure yet.



Using lumber (2x4 is fine) that is the same length as your system width (in this case, 8'), secure the bottom of each roof joist together as shown below. Using a tape measure, or the Vulka Spacing Jig (*included in Convenience Pack Add-on*), helps ensure the spacing remains the same as the bracket spacing. Off-setting the lumber slightly will provide a ledge for the sheathing to rest on while attaching.



The roof joist should now be secured to the brackets with 2 metal-to-wood roofing screws – one on each side of the bracket. The lumber should be resting on the bracket itself prior to securing (this ensures the majority of the weight is carried by the system and not the screws). The resulting system should look something like this:

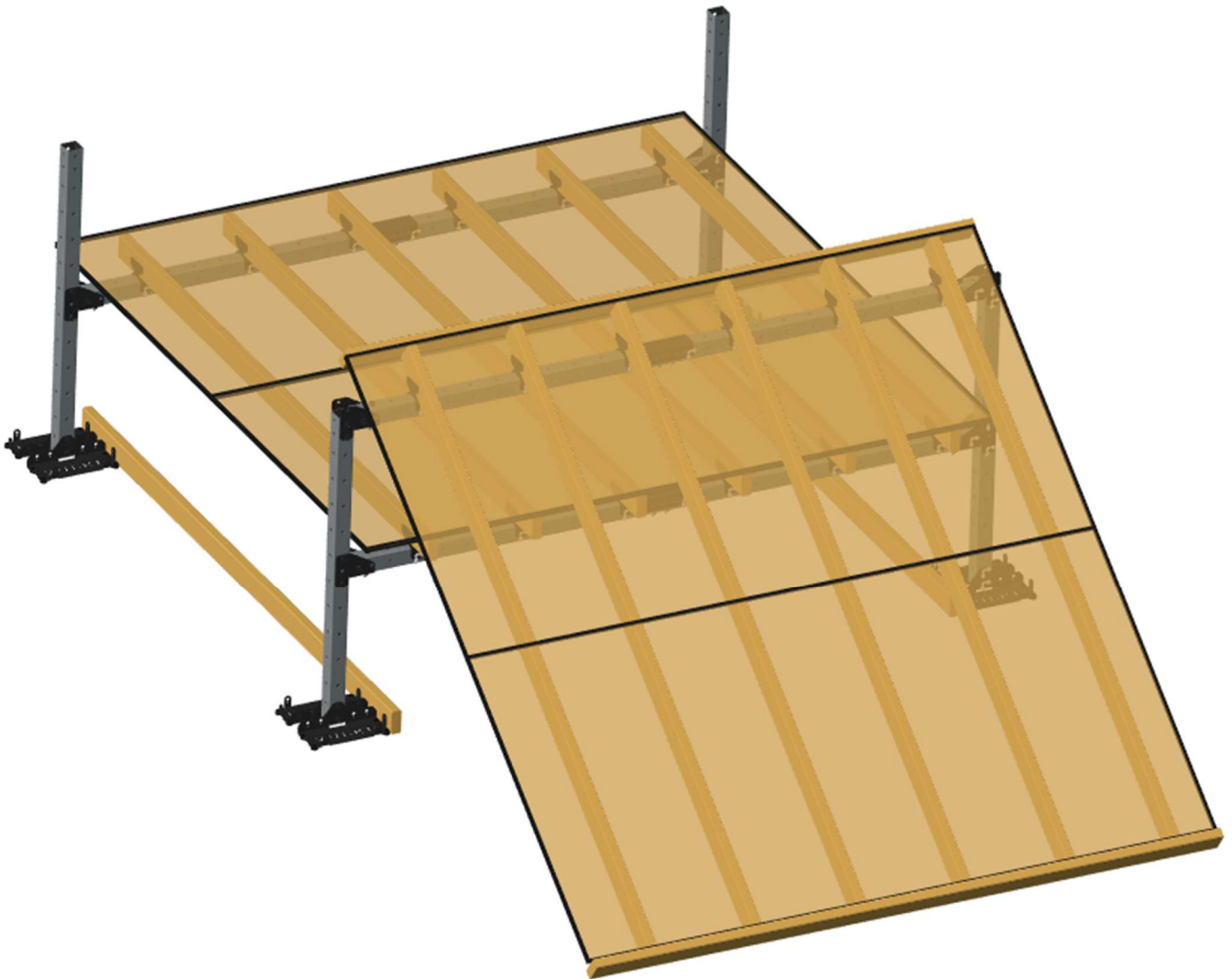


Similar to the bottom plate, this step is recommended if a roof ladder will be used. The top plate gives the hooks of the roof ladder more structure to hold onto. While the plywood is generally strong enough to hold a roof ladder, the damage caused by roof operations could weaken the structural integrity.



8. Attaching the Sheathing

When attaching sheathing for an 8' width, it's easiest to attach perpendicular to the joists as shown below. There may be some overhang on one side of the structure, as seen below, but this can easily be trimmed off with a circular saw or reciprocating if needed saw to prevent personnel from stepping on this weak area.



Add Cross Brace (if Needed)

Depending on the height and size of the system, there may be some sway in the direction of the lumber. This is normal and will not result in failure of the system under normal operating conditions. If using this system for a scenario where sway needs to be reduced, adding a diagonal cross brace connecting a joist to the base lumber with screws will eliminate this sway. Typically, one cross brace is enough, but two can be provided in opposing directions on opposite sides if needed.

Cross braces may have to be shortened from nominal lumber lengths depending on system height.

NOTE: This is required for safety if operating at a height above 4' (a single tube length).



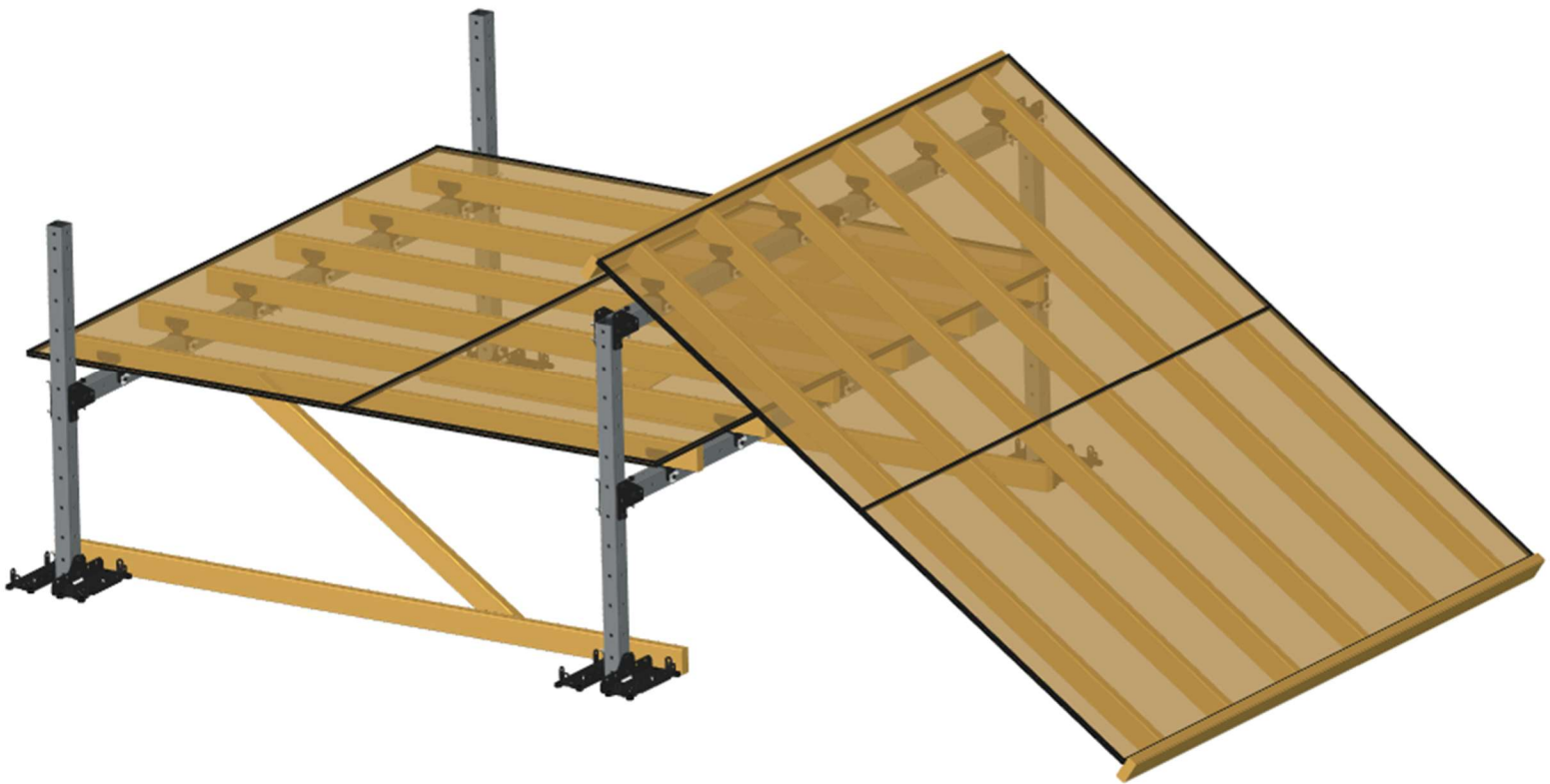


Final Assembly

Before use, be sure to verify that all bolts are in place and tight, and all lumber is secured with screws or bolts.

At this point, the VTS is ready for use. Additional roofing materials (metal roofing, roof foam, etc.) can be placed if desired. Sheathing can be replaced as needed by simply backing out the screws and placing new sheathing. Replace the rafter lumber if it has been compromised. Review safety precautions before training begins.

This example assembly shows 2x6 nominal lumber, spaced at 16" O.C., with 8' length. The tube cross bar is 2 tube lengths (8') wide.

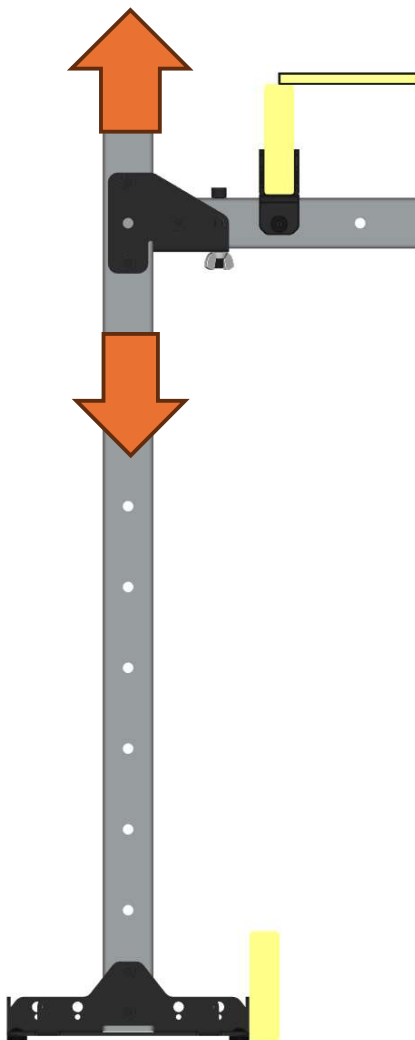


Adjusting Roof/Floor Height

If the hinge and bolt method was used to secure the roof joists as shown in the pitched/peaked roof Field Guide, the height can be adjusted without disassembly.

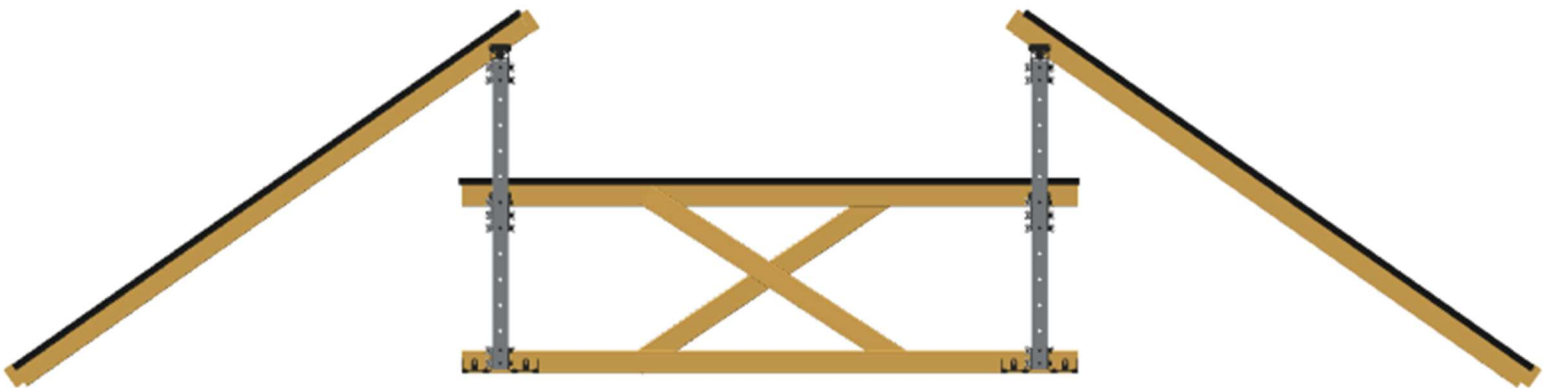
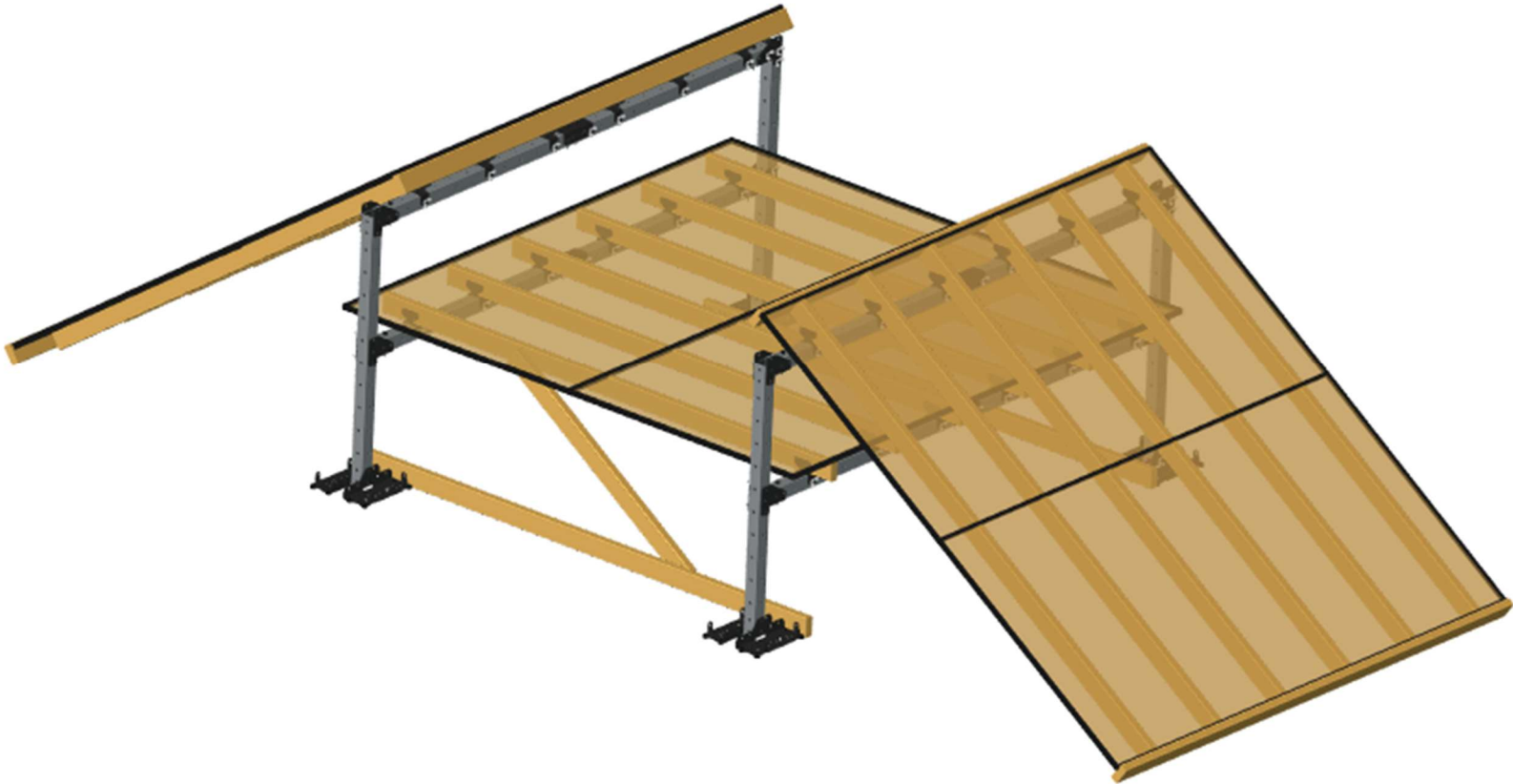
Adjusting the height can be done while the system is fully assembled but is a 4 person operation at a minimum. To adjust, have at least one person on each corner of the system to remove the bolts connecting the elbows to the uprights, while supporting the cross bar. Once the bolts are removed, the cross bars can be raised or lowered to adjust the angle to the desired pitch. Resecure the elbow with the bolts.

Note that larger systems may require more than 4 people to support the weight and adjust the height. Always err on the side of caution and have additional personnel on standby to assist.



Adding a Second Pitch

A second pitch can be added to the opposite side of the flat roof structure by repeating steps 6-8 but will require additional brackets than what come with the base VTS unit. Additional brackets are available at VulkaFire.com.





Question? Concerns? Improvements?

Please be sure to reach out to us at support@vulkafire.com !

General information and additional configurations are available in their own Field Guide. Please be sure to check vulkafire.com.

Add-ons for the VTS are also available at vulkafire.com!

END OF GUIDE