VULKA

FIRE EQUIPMENT

VTS Field Guide:

Pitched/Peak Roof & Knee Wall Configuration

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 peaked roof is an incredible tool for teaching and practicing multiple vertical ventilation scenarios: walkable pitches, roof ladders, tower ladder/aerial operations, peak cuts, roof construction, and emergency scenarios such as a firefighter fall through a roof.

The Vulka Training System provides a customizable and adjustable roof structure to facilitate roof operations training, with a single slope or peaked roof configuration.

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
    - Lumber length can be 8’ or 12’, with the shorter length giving the greater pitch.
- Sheathing for 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.
- Power drill with 3/8” wood bit and a bit for driving the screws
- 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*)
    - Shingles/roofing materials for added realism

Set Up

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

- Determine desired width of system (8’ or 12’) desired lumber spacing, desired pitch, and whether a single side or a peak roof set up will be used
    - This determines the amount, size, and quantity of lumber
- Drill lumber for hinging
- Set up tube and brackets
- Insert lumber with ¼” bolts
- Attach sheathing and optional roofing materials
- Adjust the pitch as desired

See below for more detailed steps and diagrams.

Set Up Time

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

Material Charts

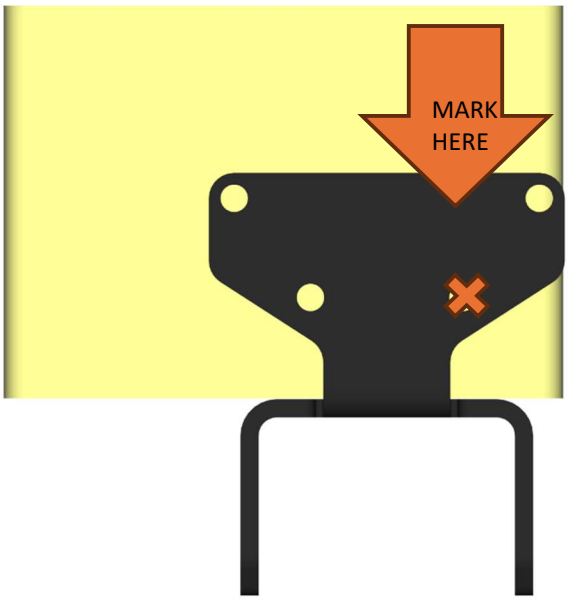
Most real-world floors and roofs are framed at 16 or 24 inch on center. These charts will help you figure out how much material is needed for these common spacings with 8 and 12 foot long pieces of lumber. Obviously, more evolutions will require more sheathing and it's always a good idea to get about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

System Width	Amount of Lumber Needed			
	16" Spacing		24"Spacing	
	Single	Peaked	Single	Peaked
8'	6	12	4	8
12'	9	18	7	14
Note: if using a bottom/top plate, add 1 or 2 for a single and 2 or 4 for peaked roof. Length of bottom/top plate lumber should be equal to system width.				

Lumber Length	4x8 Sheathing Needed			
	8' Width		12' Width	
	Single	Peaked	Single	Peaked
8'	2	4	3	6
12'	3	6	4.5	9

Preparing the Lumber

The sloped/peaked roof configuration of the VTS requires a 3/8" hole be drilled in a specific location to allow each piece of lumber to hinge on a ¼" bolt. Luckily, there is no measuring involved. The VTS lumber bracket has a built-in jig for place the bolt hole in the correct location. Simply place a bracket on the edge of the lumber, as shown, and make a mark at the indicated hole. This should measure 1" up and 1" in from the corner of the lumber. Remove the bracket and drill a hole at the mark with a 3/8" wood drill bit.



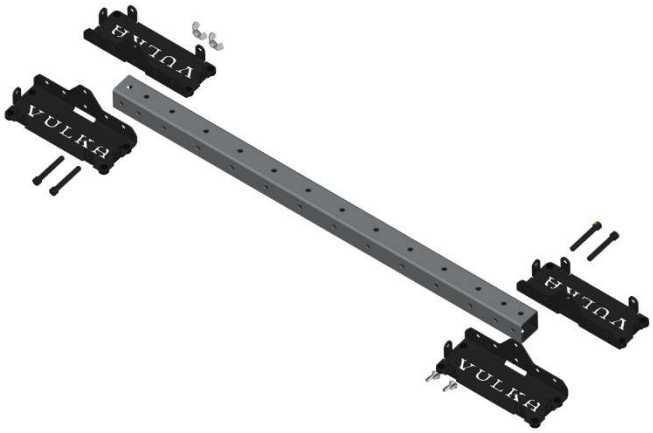
Inserting and Securing Bolts

When securing bolts with wing nuts, bolts should only be hand tight. Using a 3/8” hex key will help snug the bolts tight and reduce play in the system. **Do not overtighten the bolts or use any powered tools on 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.

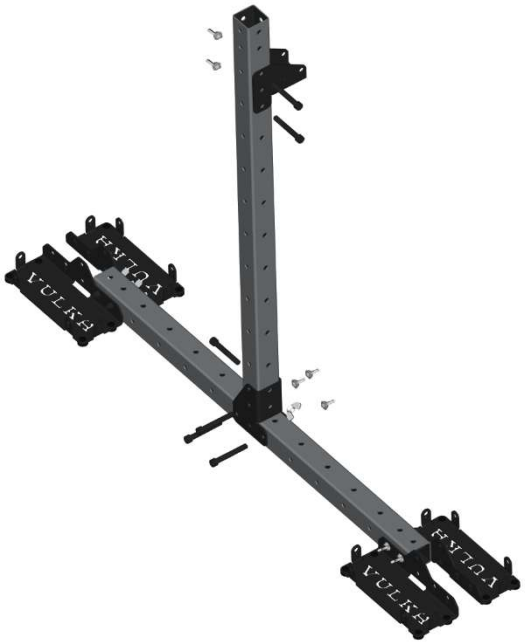
Assembly – Pitched Roof/Peaked Roof

1. Assembling the Structure

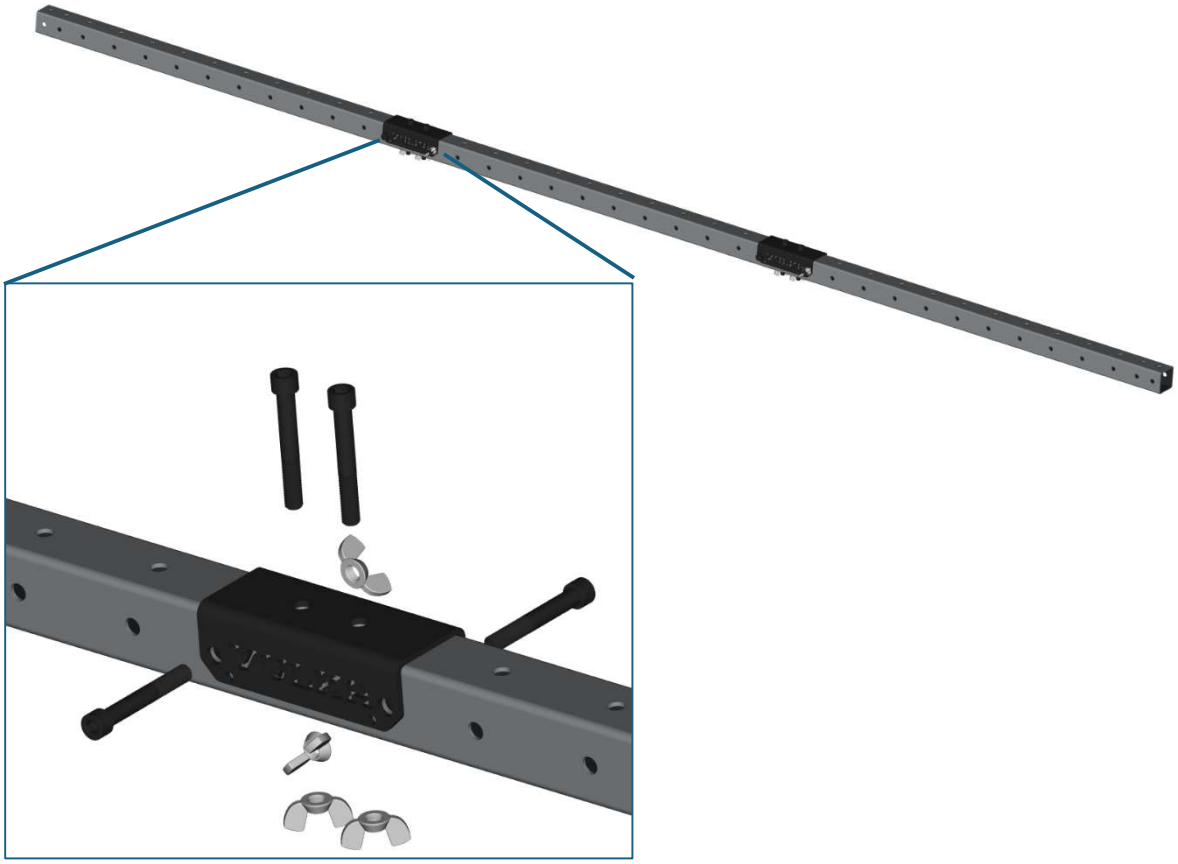
a. Assemble **(2)** base rails in the following configuration:



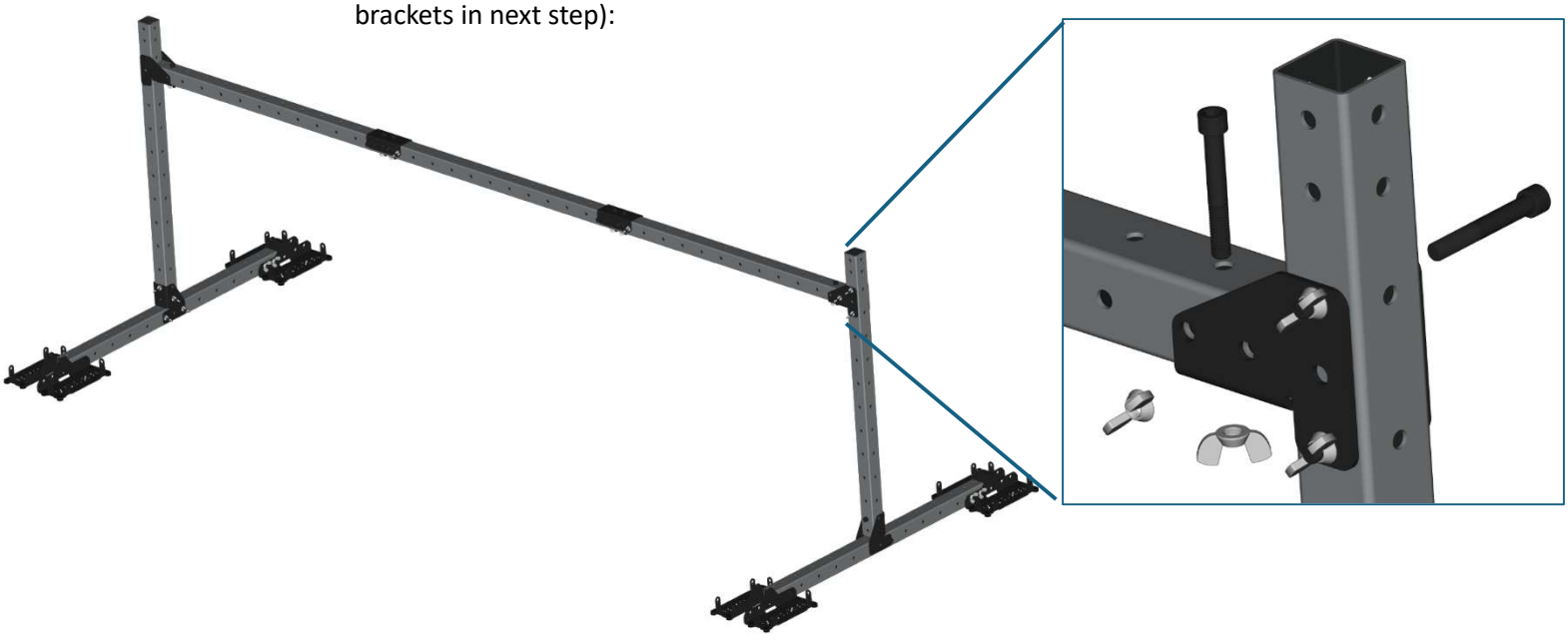
b. Assemble the uprights on each base rail using a tube and elbow. Ensure that both uprights are placed opposite of each other. Place a second elbow for the cross beam. The height of the second elbow will determine the pitch of the roof.



c. Assemble the cross bar at either 8’ or 12’ length using 2 or 3 tubes, respectively. The 12’ configuration is shown here:

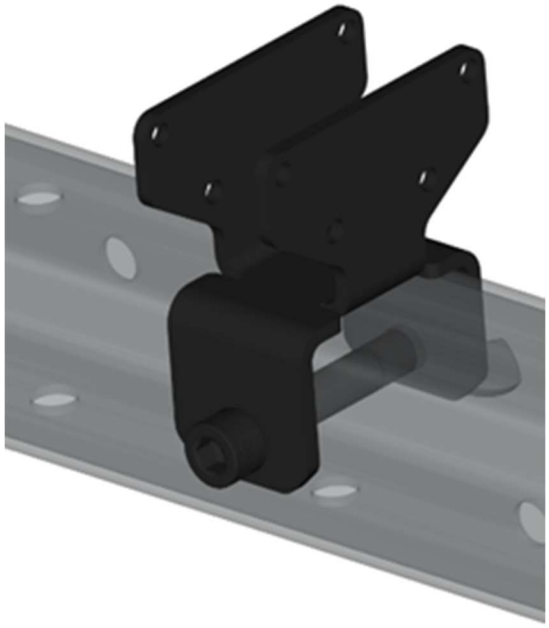


d. Using a minimum of 2 people, place the cross bar into the elbows on the upright segments and secure with bolts (note: connectors are placed on the bottom to facilitate brackets in next step):



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:

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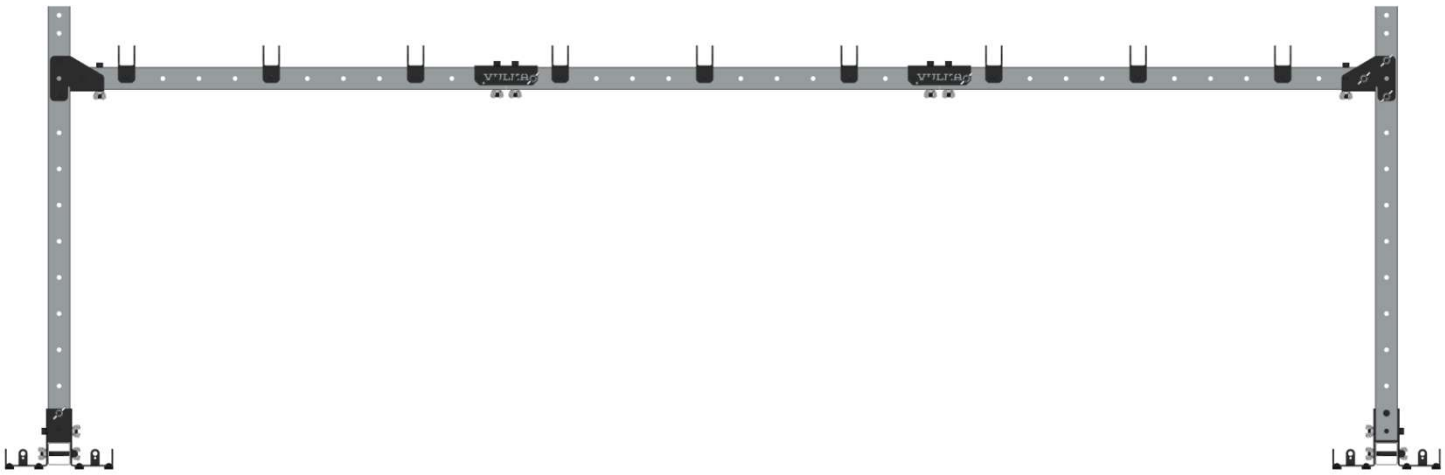
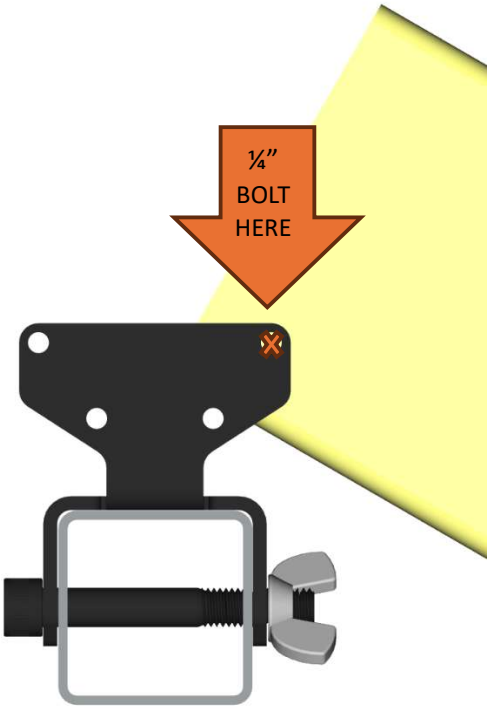
Assembled System (without Lumber):



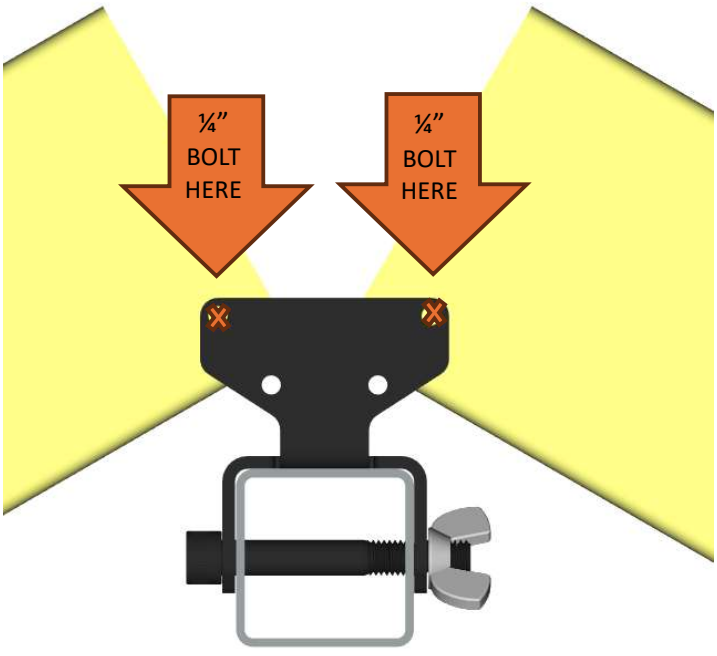
3. (a) Attaching the Lumber (Single Pitch)

To attach the lumber and create the roof structure, simply insert a ¼” bolt through the bracket and lumber hole, and secure with a ¼” wing nut:



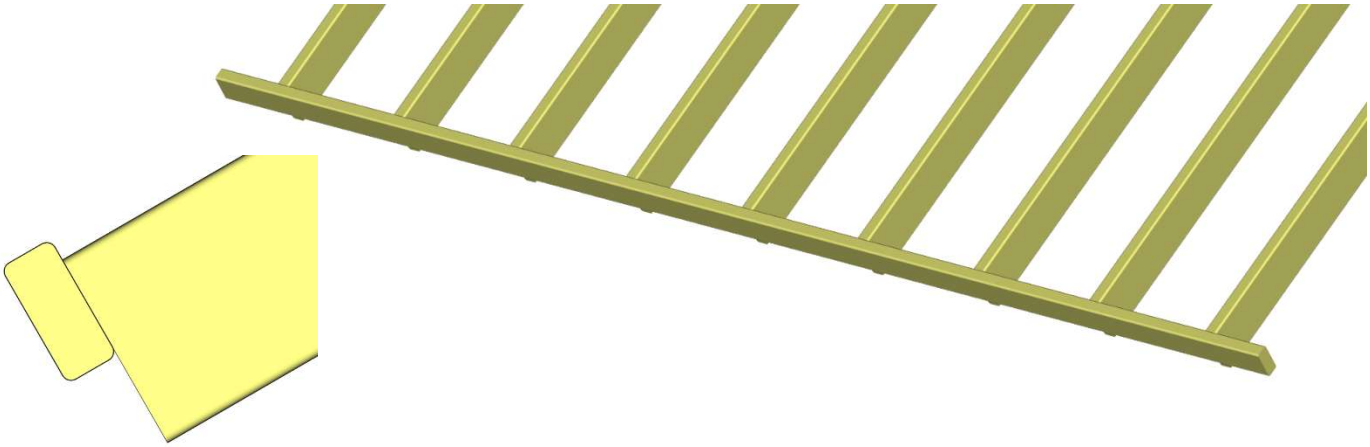
3. (b) Attaching the Lumber (Peak)

For peaked roof, simply add a piece of pre-drilled lumber to the other side as well:



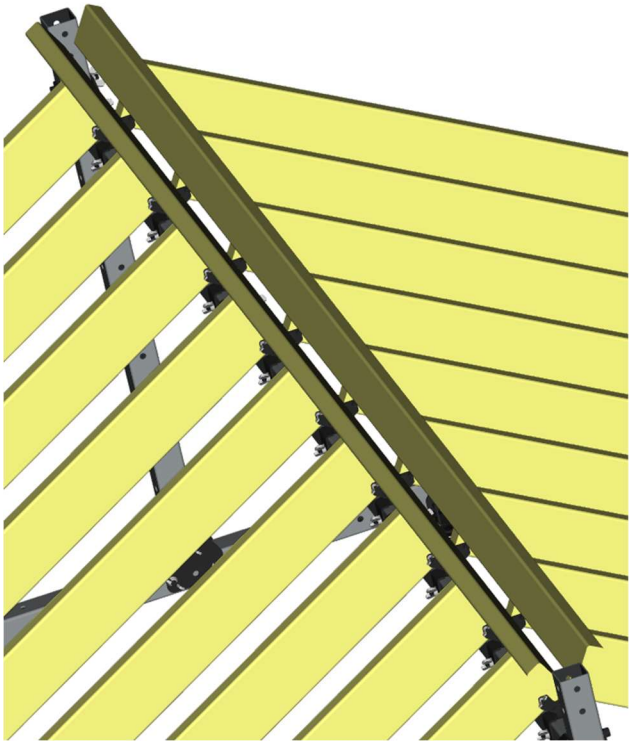
3. (c) Optional Bottom Plate

While not necessary, it's recommended to add a bottom plate that's the same width as the system to the bottom of the pitch using screws on each rafter, 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. This helps square the rafters, keep them together, and provides a ledge to rest the sheathing on while attaching it:

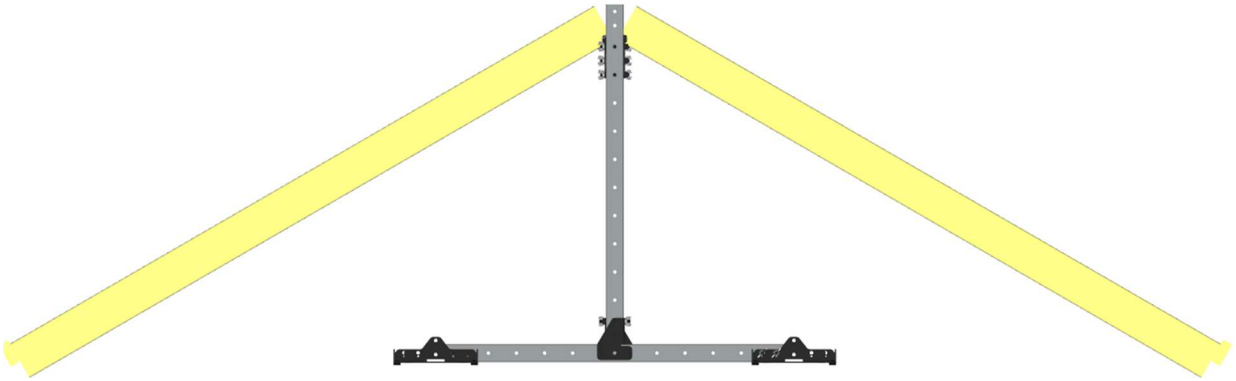


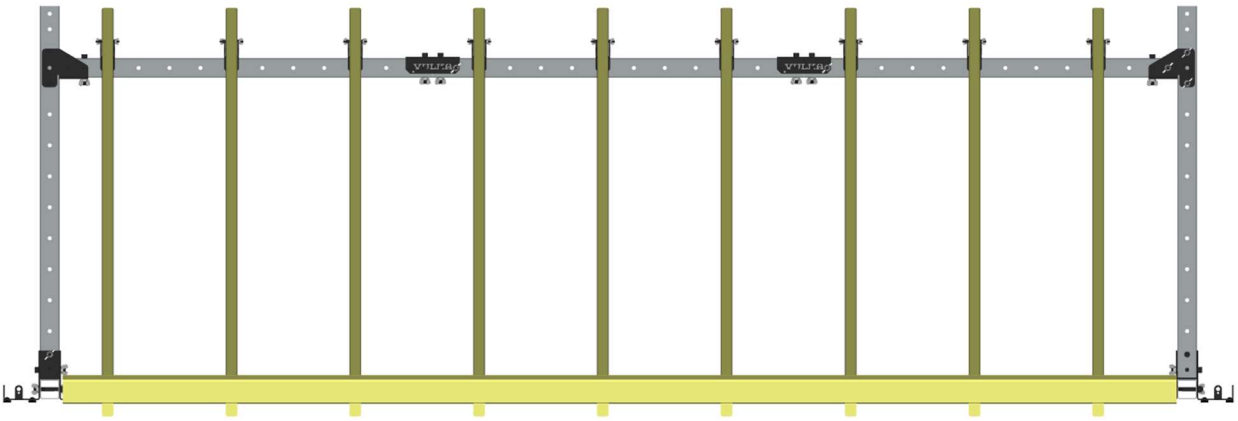
3. (d) Optional Top Plate

Similar to the bottom plate, this step is not always necessary, but 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 damaged caused by roof operations could weaken the structural integrity.



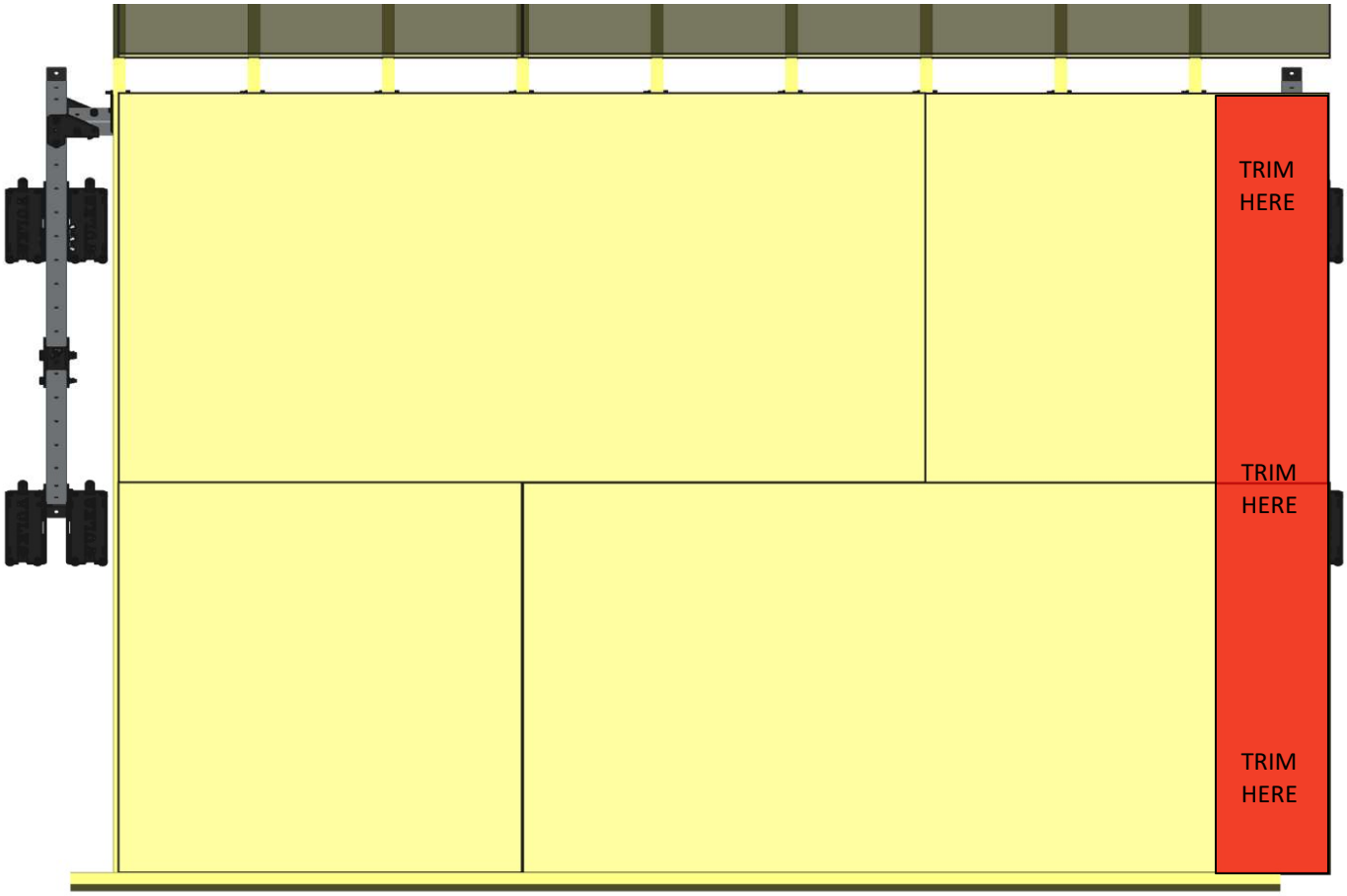
With lumber attached, your system should look something like this (or one-sided for a single pitch):





4. Attaching the Sheathing

When attaching sheathing, it can be attached vertically, or horizontally as shown below. In either case, it's important to ensure that the edges of the sheathing in the center of the structure are supported by a piece of lumber, especially if personnel will be putting weight in these locations. This will likely result in some overhang on one side of the structure, as seen below, but this can be trimmed off I desired. Trimming is not needed at steeper inclines, but may be necessary at very low angles to avoid contact with the upright.



Final Assembly

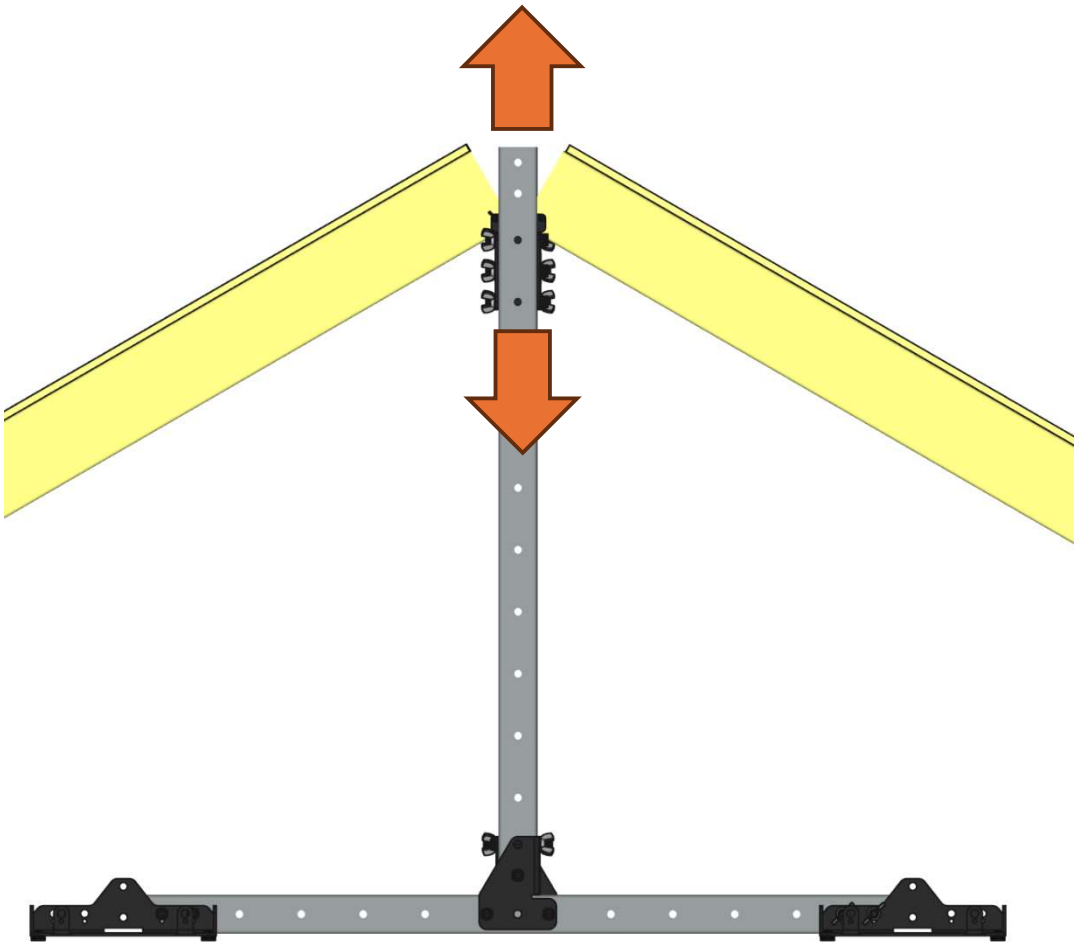
Before use, be sure to verify that all bolts are in place and hand tight, and all lumber is secured with screws.

At this point, the VTS is ready for use. Additional roofing materials (shingles, 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.

Adjusting the Pitch

Adjusting the pitch can be done while the system is fully assembled. To adjust, have at least one person on each side of the system to remove the bolts connecting the elbows to the uprights, while supporting the center cross bar. Once the bolts are removed, the cross bar 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 3-4 people to support the weight and adjust the pitch. Always err on the side of caution and have additional personnel on standby to assist.



Adding a Ceiling Below

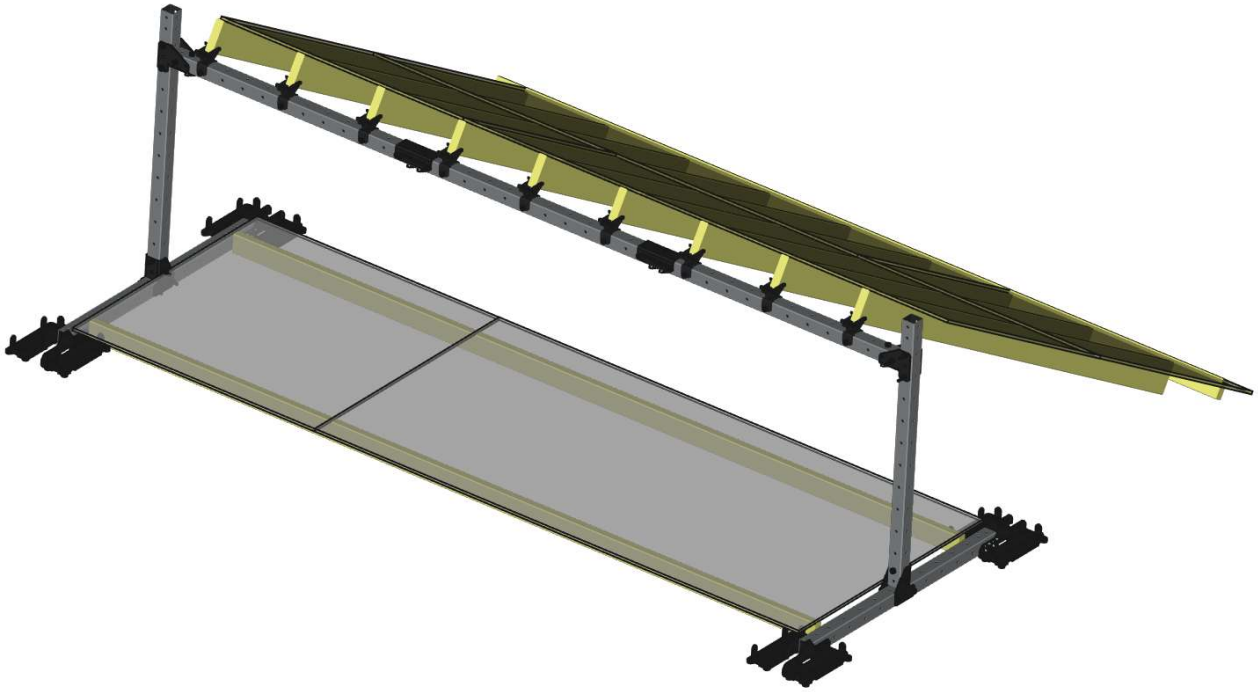
A ceiling structure can be added under the roof to simulate an intact ceiling below the roof cut that needs to be breached.

Materials Needed:

- Lumber (x2) that is the same or greater length as the tube segments (8’ for 2 tube segments, 12’ for 3 tube segments). Can be 2x4 since this is non-load bearing.
- Drywall (½” or ¾”)
- 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.
- Drywall screws

To assemble, simply use the side tabs on the bases to connect the lumber using the metal-to-wood roofing screws, as shown below:

Add drywall on top of the lumber. Drywall can be placed perpendicular or parallel to the cross bar. Perpendicular will result in a greater overhang and may need to be supported with a section of lumber on the edges. Parallel orientation is shown below.



Knee Wall Configuration

The roof configuration can easily be modified to include knee walls, as are typically found in Cape Cod style houses or in attics. Understanding and opening these void spaces is essential to stop fire spread. This knee wall configuration can be used to demonstrate building construction or opening the void space from the inside or outside.

Materials Needed:

- Lumber for studs, 4’ length. Can be 2x4 since this is non-load bearing. Amount is dependent on desired spacing and system width.
- Lumber for bottom plate (1 piece) – length equal to system width (4’ per tube). an be 2x4 since this is non-load bearing.
- Drywall (½” or ¾”)
- 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.
- Drywall screws

Set Up

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

- Determine desired width of system (8’ or 12’) desired lumber spacing, desired pitch, and whether a single side or a peak roof set up will be used
    - This determines the amount, size, and quantity of lumber
- Drill lumber for hinging
- Set up tube and brackets
- Insert lumber with ¼” bolts
- Attach sheathing and optional roofing materials
- Adjust the pitch as desired

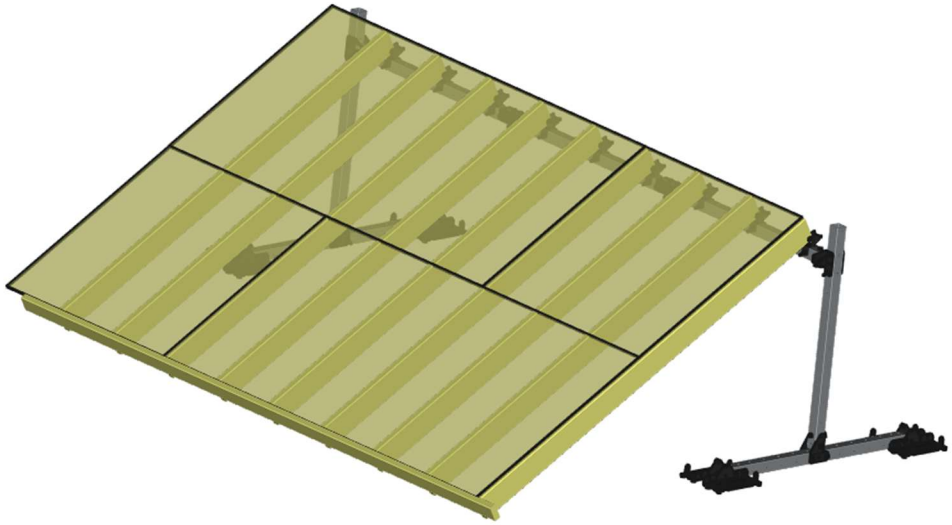
Set Up Time

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

Assembly – Knee Wall:

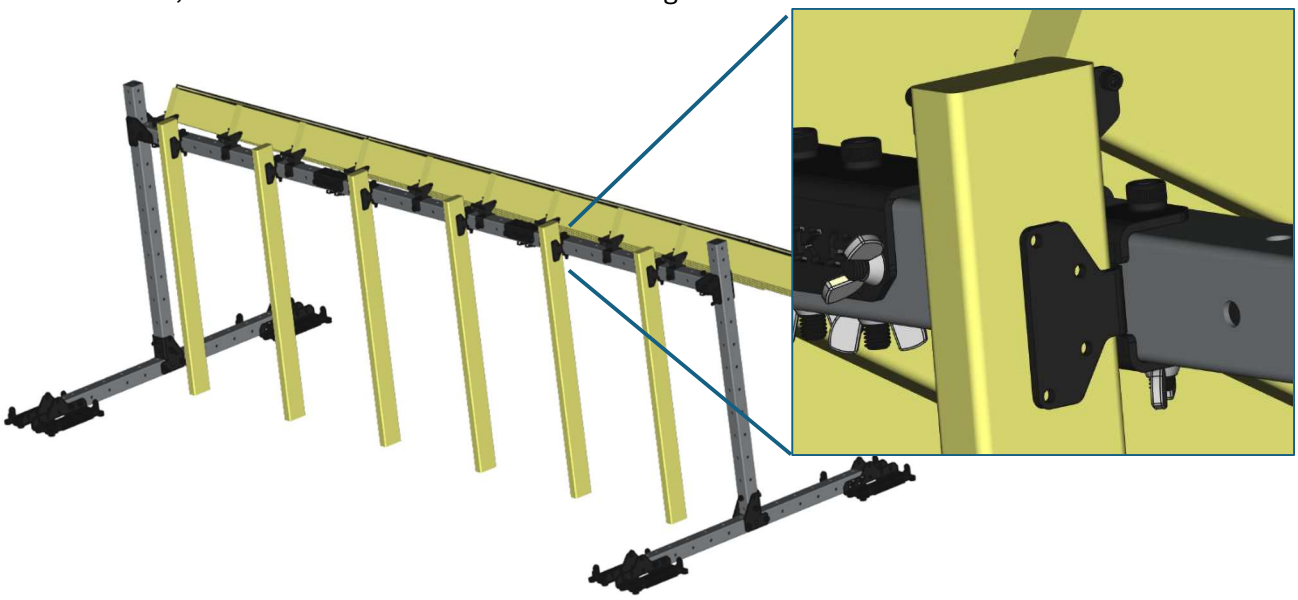
1. Assembling the Structure

Start with a single sided pitched roof, as described earlier in this guide:



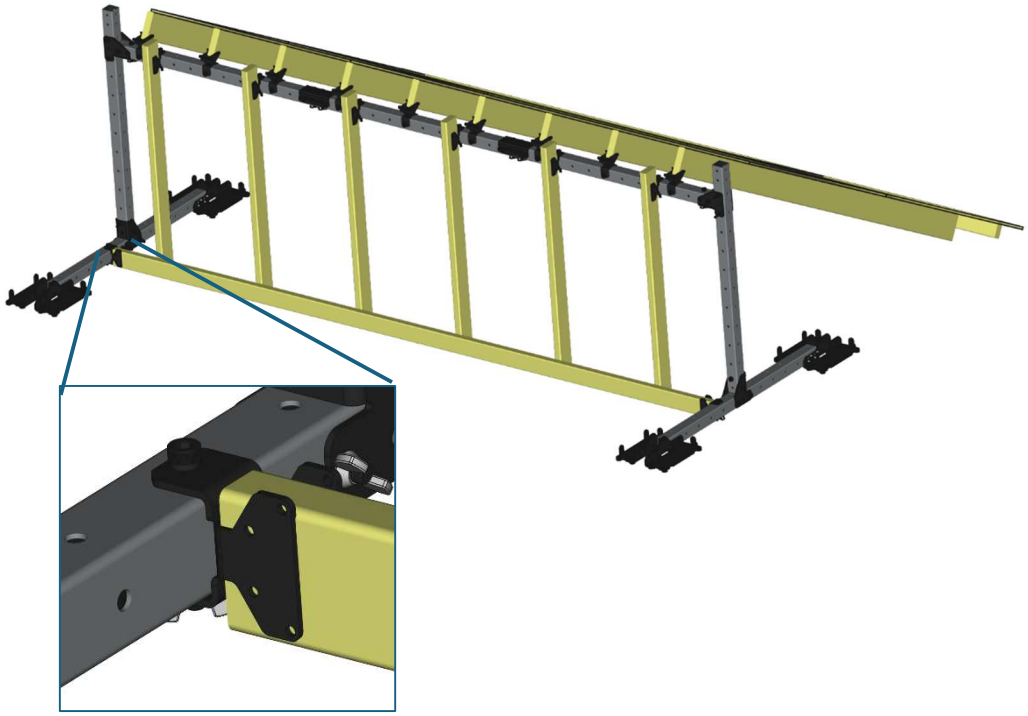
2. Add the Studs

Place brackets on the horizontal tube structure at the desired spacing and secure with a bolt and wingnut. This example shows 24” spacing. Add the 4’ sections of lumber to the brackets vertically, as shown below, and secure with metal-to-wood roofing screws.



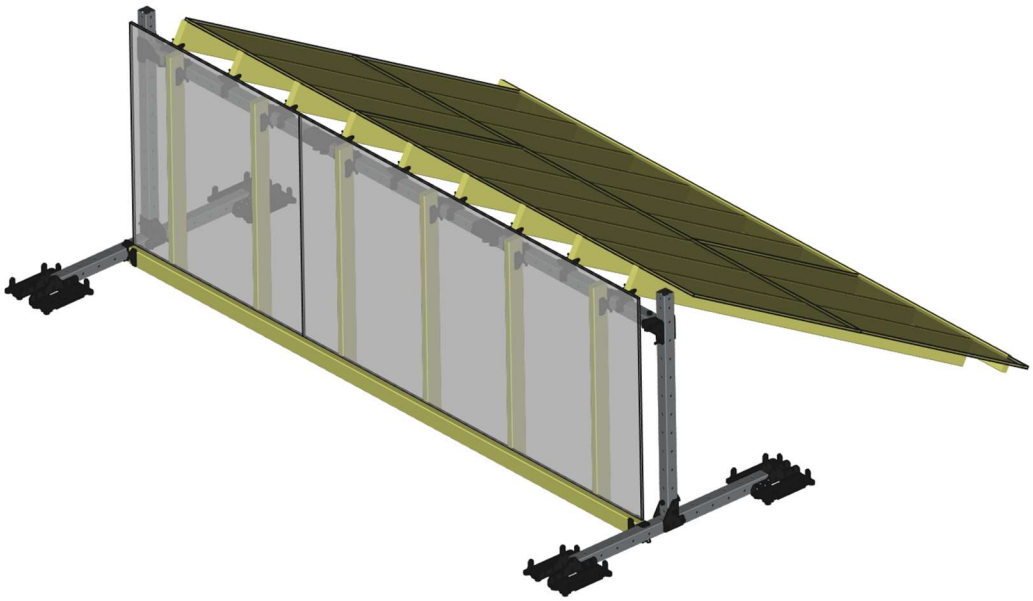
3. Add the Base Plate

Secure 2 brackets on the base rails in a location that will allow the base plate to be close enough to the studs to secure together. Insert the lumber and secure with metal-to-wood roofing screws. Use drywall screws to secure the base plates to the studs. Use at tape measure or the Vulka Spacing Jig *included in Convenience Pack Add-on)* to get the studs square.



4. Add Drywall and Sheathing as desired

Depending on the scenario and desired use of the system, drywall can be added to the studs and sheathing to the roof for a realistic and destructible assembly, as seen below:



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