

Here's everything you wanted to know (and then some) about building **Black Rock Shade Structures** for Burning Man.



These simple, modular structures have provided excellent shade and survive the conditions of Black Rock City well, especially if you follow all the recommendations in this guide.



Zoom into any aerial photograph of Burning Man and you'll find these

characteristically flat-topped shade structures everywhere. There are many variations and a lot of ways to build them correctly. This document reflects everything I've learned building these for seven years under various conditions. I've made a lot of mistakes. I hope this document helps you avoid some of them.

Even though I have very specific opinions about building shade structures, Burning Man is a city of experimentation and creativity. If you have ideas to build shade that is better, more creative, or attractively jankier, please go for it!



## General Principles

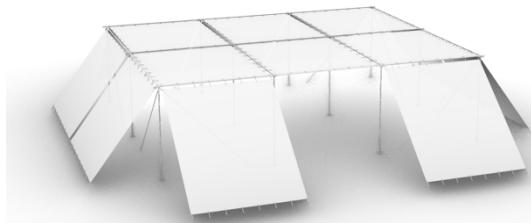
This shade system is designed to be relatively inexpensive, made from

commonly available parts, able to be assembled and taken apart quickly, stored in a small space, providing good shade, especially that secondary shade that keeps sun off of tents so that tents are much cooler, and able to survive most Black Rock conditions. It will probably survive wind up to about 50mph if built correctly with all the bungee cords, ratchet straps, and lag screws that this guide specifies.

**It does not do so well in the rain**, as the tarps will collect puddles of water in the middle and sag, threatening the entire structure with collapse (this happened in 2023 and 2025).

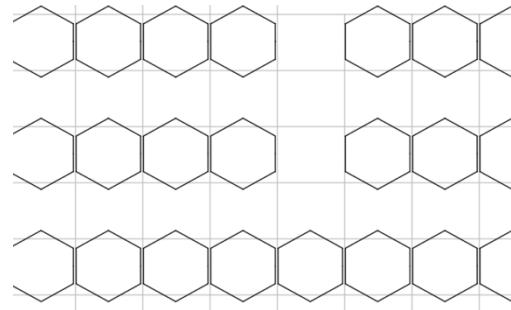
Don't be tempted to slope the roof. **The flat roof is a critical part of the design**. This allows the wind, which is mostly horizontal, to pass through without lifting up the entire structure and flinging it around dangerously.

# Layout



The design is completely modular. You can build a tiny shade structure that is 8' x 8' consisting of a single tarp, or a giant one that is 100' x 100' with a 10 x 10 grid of tarps. You can make it as short as 6' or as high as 12'. The roof tarps are readily available in six or seven boring colors, but combinations of those colors can be really cool. The sloping tarps on the sides are optional.

A lot of burners use Shiftpod tents, which are hexagonal shaped. They require 11'-7" in one dimension and 13'-4" in the other dimension. Practically, that means that if you use a 10' x 10' grid, the upright poles will get in the way. Thus, many camps **standardize on a 10' x 12' grid**, which fits Shiftpods well and provides a comfortable walkway between.



*Shiftpods in a 10' x 12' grid*

The next question to consider is how high you want your shade structure.

## 8' height

The **most common height is 8'**.

This became the “standard” height because the poles are usually sold in 10’ lengths. If you are making a 10’ x 12’ grid, you need to cut one of those poles to get a 2’ piece to make the 12’ side of the grid, and, hey presto! This leaves you with an extra 8’ piece to use for the vertical pole.

You’ll need two step ladders to assemble an 8’ high structure.

## Under 8' height

Some camps have experimented with a height shorter than 8’ because it is easier to assemble without using step ladders; tall people can reach the ceiling to attach bungees without standing on a step

ladder. Still, if you go much lower than 8’, you’ll have trouble with popular Shiftpod or Kodiak tents. Your taller tents will be touching the hot ceiling and not getting any benefit of the shade.

## 10' height

This is overkill for tent areas, but is often used in public areas like interactivity areas because it feels quite grand.

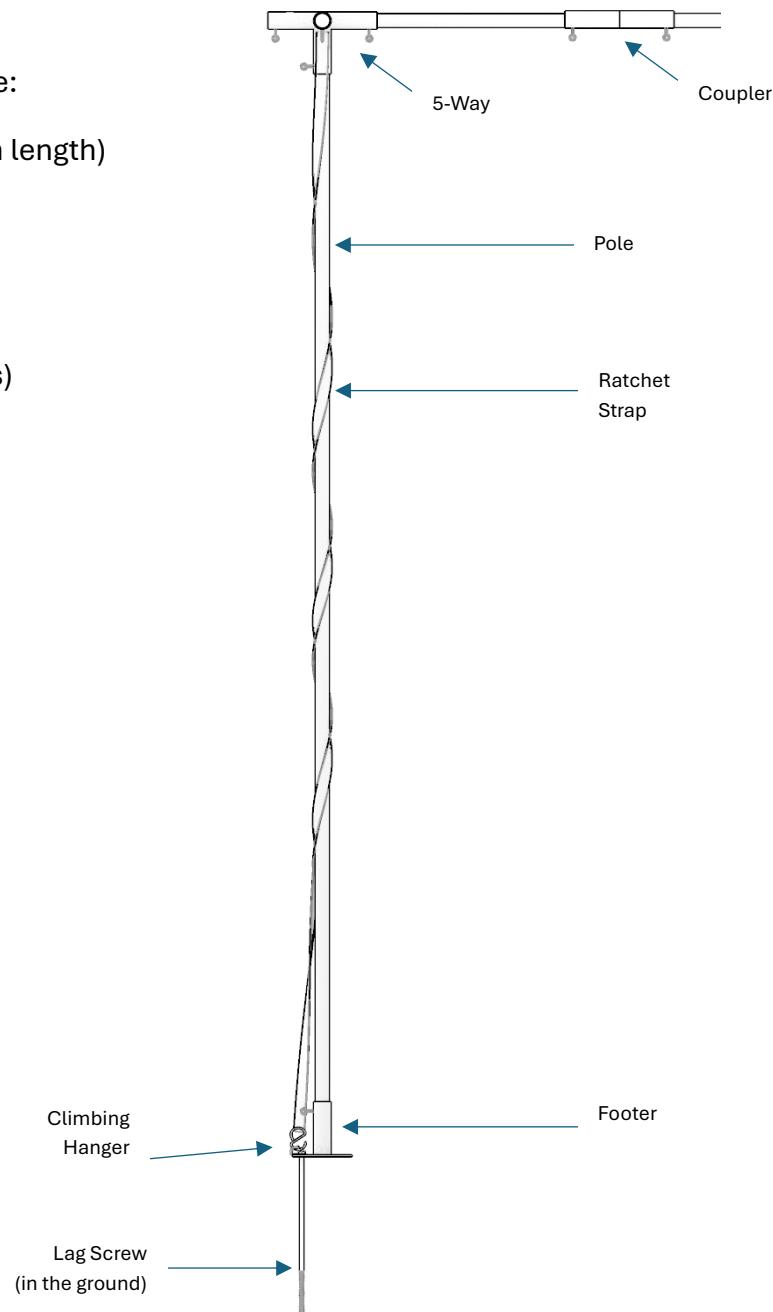


You will need to bring at least 2 six-foot ladders to assemble a 10’ high structure.

# Parts

These are the parts you'll use:

1. Poles (2', 8', and 10' in length)
2. Footers
3. 5-Ways
4. Couplers
5. Tarps (Solid, for roof)
6. Tarps (Mesh, for sides)
7. Lag Screws
8. Climbing Hangers
9. Bungees
10. Ratchet Straps

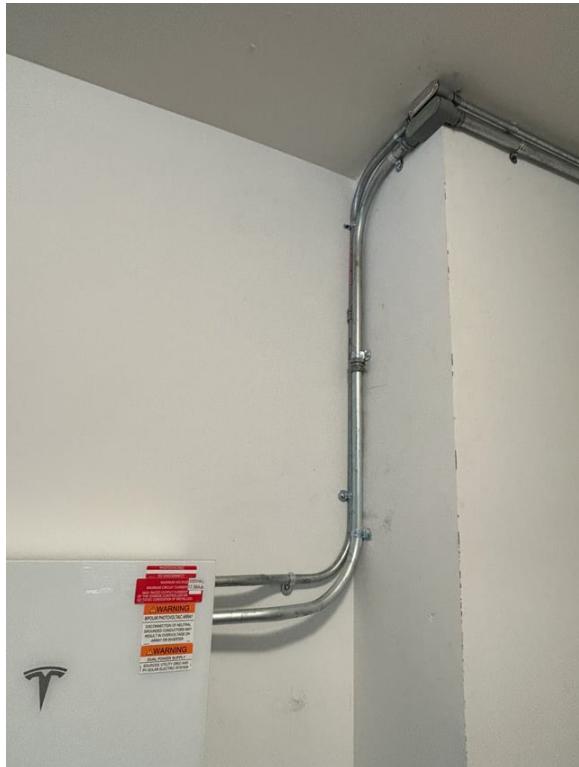


## Poles

There are two reasonable options for all your poles: 1" EMT or 1-3/8" fence rail.

The most common type of pole is a 10' long, 1" diameter EMT pipe.

These are readily available at big-box hardware stores (at the time of writing, they are about \$23 for a 10' pipe). You can also get them from electrical supply stores.



EMT stands for “Electrical Metallic Tubing” and these are normally used by electricians to protect wires.

One thing you might notice about the EMT in the picture at left is that it’s bent. Yep, EMT is designed to be flexible enough to bend and in fact electricians have these tools that are literally designed to bend EMT. You might think it is a surprising choice for structural material in the windy environment of Burning Man. You would be right. It will bend under harsh conditions if not ratcheted correctly.



Don't even think of using ¾" EMT. It is way too thin for the conditions out there.



A significantly stronger option is Chain Link Fence Top Rail Post. It is 1-3/8" in diameter and is much, much stronger than EMT as it is not intended to be bent. This is also readily available at the big-box stores for about \$24 per 10' stick.

Why, you might ask, is everyone at Burning Man using bendable weak EMT instead of much stronger Top Rail Post? To be honest I think it's because EMT used to be substantially cheaper (\$9 as opposed to \$20). Now that the prices are so much closer, I think it's worth the extra money to use Top Rail Post if you haven't already invested in EMT.

# Cutting Poles to Length

Whichever pole you choose, you will probably be cutting it.

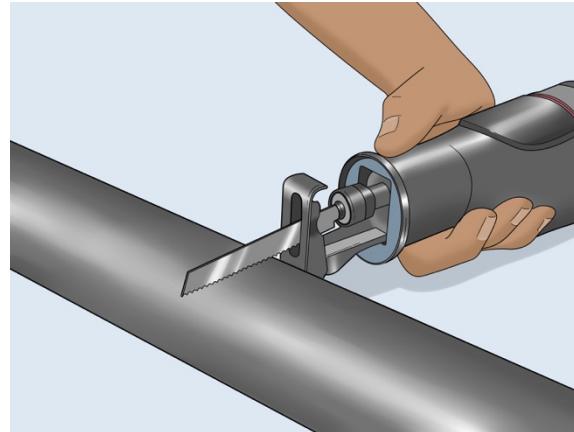
If you are cutting EMT, your best bet is with a **Conduit Scoring Tool**:



All you have to do is twist this around the pipe about ten times and it will create a groove or “score” in the pipe. Then you can simply break the pipe on your knee and the two parts will break away cleanly, without leaving any sharp burrs.

For 1-3/8" fence rail, you'll need something sturdier to make the cuts. A reciprocating saw or SAWZALL works fine, or if you have access to a miter saw that's even better. There will be sharp burrs so make sure to use a deburring tool to clean them all off before you come to playa.

**Wear eye protection while cutting!**



**Salty Old Burner Tip:** Paint the ends of your 8' poles a unique color so it's easy to tell the difference between 8' and 10' poles in storage.

## Pipe Fittings

You'll use three parts to connect all your poles together: Footers, 5-Ways, and Couplers.



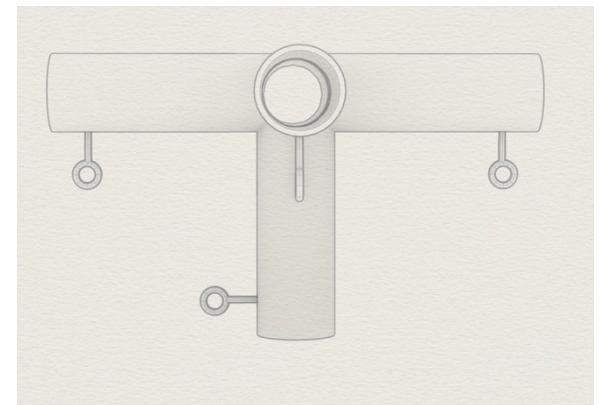
Footers are used at the base of a vertical pole, mostly to keep the pole from sinking into the playa but also to keep it from slipping around horizontally.



5-ways are used to connect poles at the roof of the structure.

Theoretically, you could buy 3-ways

for all your corners, and 4-ways for all your edges. In practice, this makes it harder to find the part that you need. It's a lot easier just to standardize on 5-ways.



When you look closely at a 5-way, you'll see that it's open in one direction, which makes it closed in the other direction. Roof poles going in open sides will be touching while roof poles in the other direction will be over 1¼" apart. This gap is enough to make your whole structure uneven and cause problems stretching tarps. Thus, you must **always align all the 5-ways the same way**. An easy rule to

remember is to **line them up so you can see the Man through the 5-way**. My camp is usually on 7:00 so the 5-ways are aligned so that their open pipe is parallel to 7:00, and thus, you can “see the Man” through them.



Couplers are used to connect two horizontal poles together. If you are building a standard 10' x 12' grid, you will use a 10' pole and a 2' pole connected with one of these couplers for the 12' side.



These parts are available from a variety of online vendors where they are usually sold as “canopy pipe fittings.” Make sure to match the size to the type of poles that you are using (1” EMT vs 1-3/8” fence rail).

Each of these fittings has a little eye bolt which you twist to grip onto the pole. The eye bolt should always be hand-tightened. If you are having trouble

removing an eyebolt, put a screwdriver through the hole and rotate.

The eye bolt, no matter how hard you tighten it, will not hold the pole very well—certainly not enough to survive Burning Man conditions. It is only to help hold the poles together before you ratchet them in place. **You must depend entirely on ratchet straps, not eye bolts, to keep the shade structure attached to the ground and in place.**

## Ratchet Straps



Ratchet straps are a very important part of holding your shade structure together. In fact, they are the only thing that will hold your entire structure to the ground and prevent it from flying off, tossing

around the playa for miles until it impales some sparklepony on a bike. Putting ratchet straps in all the right places and making sure they are tight is the difference between a wind-proof shade structure and a deadly weapon.

As important as ratchet straps are, they don't have to be super strong. **A basic 15'-long, 1"-wide strap with 1500 pounds of break strength will work fine.** Make sure it has S-hooks at the ends.

You will use a ratchet strap at every single vertical pole, and additional angled ratchet straps at the corners of your shade structure. If you have not worked with ratchet straps before, take a minute to watch a video online about how they work and how to tighten and release them.

## Lag Screws

For many years burners banged rebar into the playa with big hammers to hold things down, until someone figured out you could use long screws called Lag Screws and drill them into the playa with an impact wrench.

The top 6"-8" of playa can be flaky or dusty, so nothing really stays in place unless you get it at least 12" deep. Thus, the playa standard for lag screws is 14" long and 3/8" in diameter.



Even a cheap impact driver will eventually get one of these into the ground, but spending more to get a more powerful impact wrench (like the kind that comes with a 1/2" drive) will save a ton of time on playa. Larger camps will often have multiple impact wrenches on hand with plenty of spare batteries.



Make sure you have the right sockets before you leave home. A typical lag screw has a 9/16", 6-sided socket head. You will need to buy the right size sockets for your socket wrench (9/16" is very common, but it won't come with the wrench). Don't buy 12-sided sockets as they will slip around and eventually round the socket heads.

## Climbing Hangers

A climbing hanger is the perfect piece of strong steel that you can screw into the playa with a lag screw and attach the S-hook of a ratchet strap.

Here is what it looks like:



They are commonly available with 10mm holes which is just the right size for that 3/8" (9.52mm) diameter lag screw.

You can find these online for about \$4 each.

One money-saving technique is to replace the climbing hanger with two links of chain. Getting the right size chain and then cutting it every three links can be a bit of a project compared to just buying the climbing hanger.

## Tarps

The shade itself comes from tarps. Tarps are available in a wide variety of sizes, colors, and qualities. Although it might be tempting to mix-and-match tarp sizes to construct interesting shade structures, finding the right tarp in that big dusty box

in the back of a truck on playa is one of those things that makes a simple project take hours, so I would strongly recommending that you **pick one tarp size and stick to it.** For almost every situation, if you just stick to 10x12 size tarps, you'll be happy.

Usually, when a tarp is advertised as 10' x 12', it is actually 4"-6" shorter in each direction, because the edge has been folded over and sewn to make it stronger. That will actually work out well for you, because you're going to use bungee cords to stretch it out, leaving a bit of a gap between your poles, which are spaced at exactly 10' x 12'.



**Solid or Mesh?** Roof tarps should be solid; they are meant to make shade and the 100% solid ones just make better shade than the 80% mesh style. On the roof it is not important to provide ventilation (there's enough already) and you do not need holes so "the wind can go through" as wind at Burning Man will be mostly horizontal.

That said, any non-horizontal tarps like the slopes you construct for **walls must be mesh.** Solid tarps that are used as walls will become sails in the wind and

put destructive amounts of force on the shade structure.

**Color?** Although silver is popular and thought to reflect the most sun, we've actually found that white tarps will reflect more sun and be measurably cooler. That said, it doesn't really matter that much if the tarp itself absorbs sun and warms up, as long as it is a couple feet above your head, so if you want to use nice colors for your tarps and avoid being boring, go for it.



### Identifying High Quality Tarps

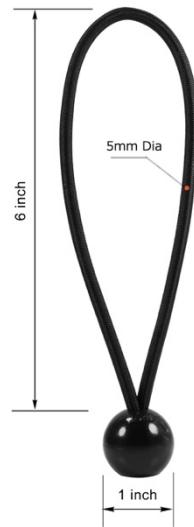
The first thing to go on playa is always going to be the grommet ripping off, especially at the corners. Look for a tarp that has a folded edge and solid reinforced corners. Good tarps also have a rope reinforcement woven into the entire folded edge. If the grommet rips off,

this serves as a backup to keep the tarp from failing completely.

Ideally, look for 12-mil thick tarps, with UV protection and mildew resistance, and around 6 ounces per square yard.

## Bungees

Tarps are connected to poles using ball bungees, which commonly come in 6" or 9" lengths. There will be a bit of variation in the spacing between your tarps and the poles, so I recommend getting a bunch of both lengths.



## Putting It All Together



Extremely strong winds producing whiteout dust storms at Burning Man can arise at any moment and with absolutely no warning. Once the wind starts, it can reach tropical storm level of 50mph plus. You usually think it's going to pass quickly and then it lasts a surprisingly long time: eight, twelve hours, even longer. When it is windy, it is completely impossible to maneuver tarps no matter how hard you fight. A single tarp catching 50mph wind

vertically will create a force of 770 pounds. Almost every problem people have had with their shade structures at Burning Man have been caused because there are tarps attached to a metal frame that is not extremely rigid and well-anchored.

Thus the most important thing to keep in mind is that you absolutely must not attach tarps until the structure is fully installed, anchored, and ratcheted in place. **Install the entire frame with all ratchet straps and lag screws before you attach any tarps.**

To think about why this is important, look at the frame on the left, and imagine for a second that you install a tarp *before* one of the vertical ratchet straps is installed. A single gust of wind is going to lift up that tarp. If you have no ratchet straps, your whole frame is going to fly dangerously like a tumbleweed around playa. If you have some ratchet straps but one is missing, that vertical pole will fly up causing all the steel poles that are attached to bend.

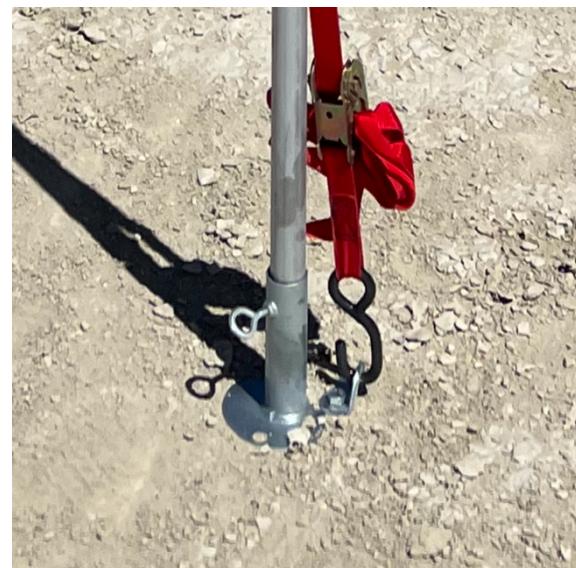
The architecture of every vertical pole in your shade structure is the same. At the top, you have a 5-way connector. Notice

how the ratchet strap loops over the 5-way to pull it down towards the ground.

This ratchet strap is what keeps your shade structure attached to the playa: those eye bolts are not strong enough to hold anything.



At the bottom, you've got a footer which keeps the pole from digging into the ground. It is drilled down to the playa with a single lag screw, which keeps it from sliding left and right. The lag screw is also holding down a climbing hanger, which provides a point for the S-hook of the ratchet strap to hook in.



When you think about it, the ratchet strap now creates a tension pulling the top of the 5-way down into the earth where it is screwed in with that 14" lag screw. This is the key force that holds your pole in place and keeps everything from blowing away.

You do not need more than one lag screw per footer, even though there are three holes, and extra screws won't help,

because the footer is not holding anything down.

We have discovered that ratchet straps that go directly from the 5-way to the climbing hanger can vibrate and twang quite loudly in the wind. This can be avoided by twisting the ratchet once or twice around the pole. Don't twist too many times or you'll find it hard to properly tension the ratchet.

You can build your metal structure completely even in heavy winds, as the wind does not exert much force on these thin poles. However, you should wait for the wind to drop before you try to install tarps.



# Step By Step Overview

Before we go into details, here's the overall plan for your build:

**1)** Gather all your poles, footers, five ways, and couplers. Lay them out on the ground approximately where they are going to be installed.

**2)** Set up one cube at a time. During this step, you'll rely on the eye bolts to hold everything approximately in place.

**3)** Align all the poles perfectly. Once they are in the correct positions, drill the lag screws to fix the position of every vertical pole.

**4)** Reinforce with ratchet straps. Connect all the vertical ratchet straps and then add diagonal braces.

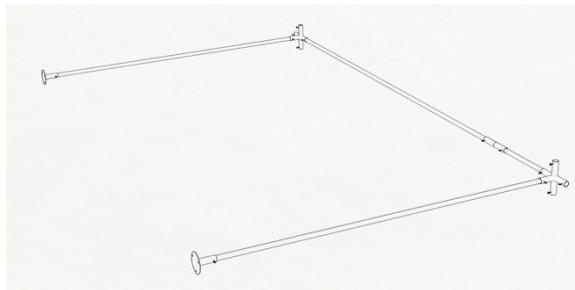
**5)** Install roof tarps.

**6) (Optional)** Install side mesh tarps.



## Building The First Cube

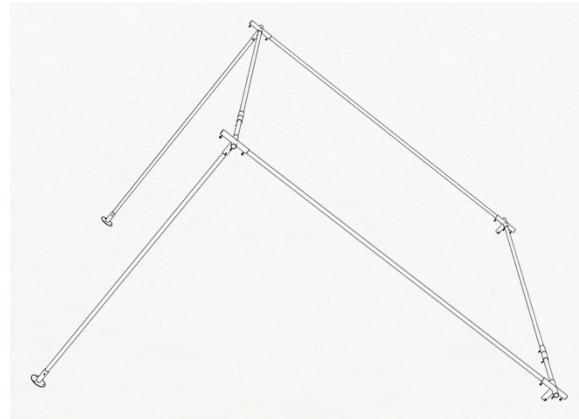
To start, assemble one wall on the ground:



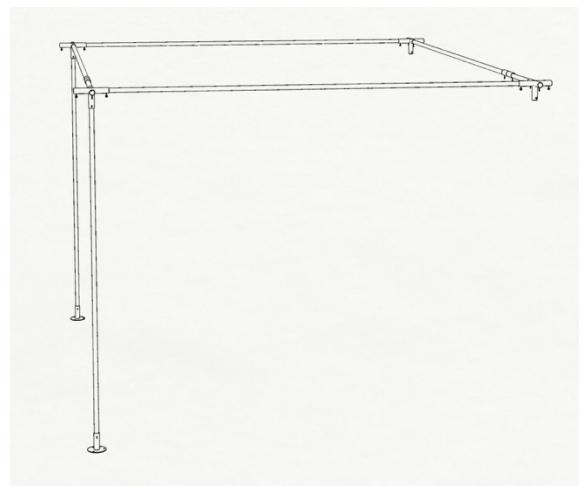
Next, prop up this wall by inserting two more poles:



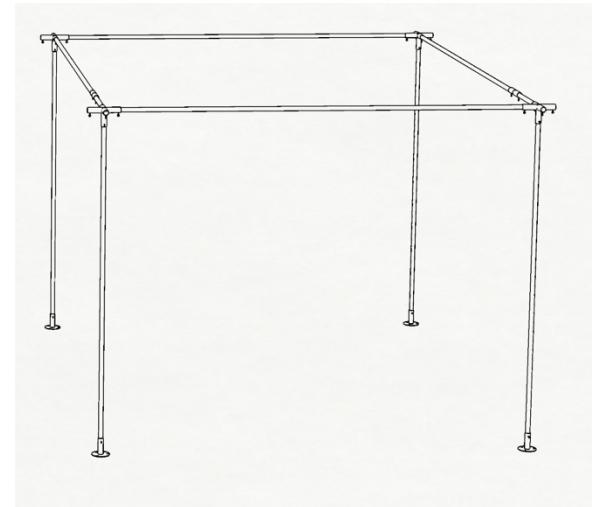
Assemble the remaining pole of the roof:



Now you'll need a friend with a step ladder to hold up the corners...



...while you insert the remaining two vertical poles:



**Remember!** Every 5-way should be oriented in the same direction.

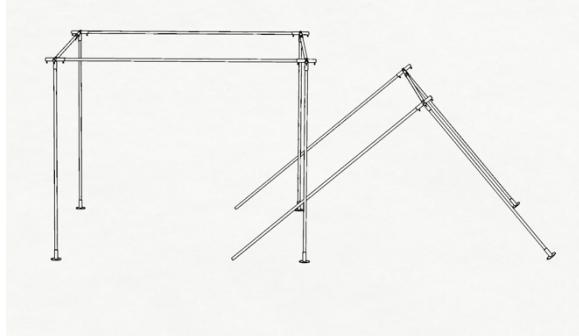


## Adding Additional Cubes

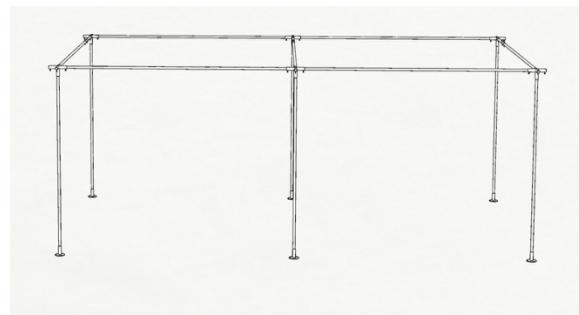
Build another wall on the ground near your first cube:



Prop it up by inserting two more poles:

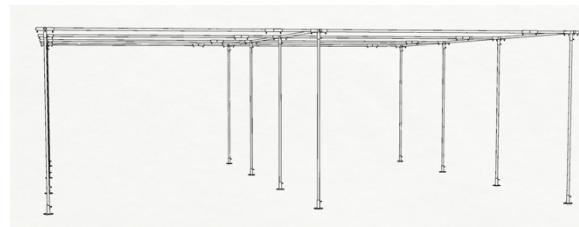


Now you'll need one person at each free end with a step ladder to join them together:



## Aligning everything

Once your basic structure is complete, but before anything is anchored down, you'll want to align everything perfectly. The easiest way to do this is to stand in front of a line of poles and close one eye. If the poles are aligned, the line of poles should disappear behind the front one.



Have a friend move the poles to straighten them out while you do this. Make sure that every row and every column of poles is perfectly straight and plumb. Be

prepared to loosen and re-tighten eyebolts a bit to get everything square and into position.

After the great storm of 2025, the camps with perfectly aligned shade structures had much less wind damage. This is because the wind forces on tarps were spread out perfectly evenly.

## Drilling Down

Once you are certain everything is aligned perfectly, drill each of the footers to the ground with a lag screw and climbing hanger combination.



## Ratchet Straps



Install, and tighten, a vertical ratchet strap at every single vertical pole.

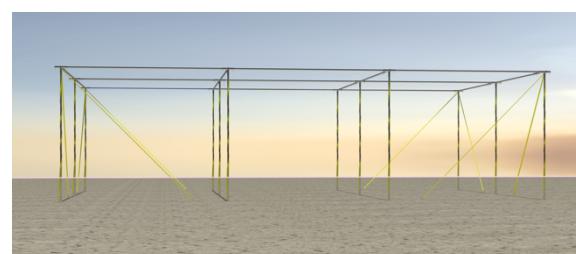
Remember that this is the only thing holding your structure to the ground – the eyebolts are just not going to hold anything once you get some tarps attached.

## Diagonal Ratchet Straps

If you were only putting tarps on the roof horizontally, this structure can withstand quite a lot of wind, so those vertical ratchet straps would be all you need.

However, most camps want some kind of side tarps for better shade when the sun is low in the sky and some wind protection. Unfortunately, those side tarps tend to act like sails, receiving the brunt of the force of the wind which they transmit to the metal shade structure putting a lot more pressure on your shade structure.

If you have any side tarps at all, you will need additional, diagonal ratchet straps to hold the shade structure in place horizontally.

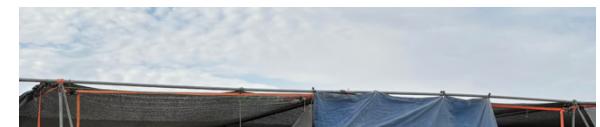


These diagonal straps can either be installed internally or externally. What you will find in practice is that in very heavy wind, poles tend to pop out of the five way

headers. That is why I think you need some kind of compressive force that is essentially pulling your whole shade structure together, which is why I prefer internal diagonal ratchet straps. This also gets them out of the way of passing burners and removes them as a trip hazard.

## Horizontal Roof Ratchet Straps (Optional)

Some camps have reported that adding horizontal ratchet straps at the roof to pull the structure together also helps keep poles in the 5-way, especially if you want to use external diagonal ratchet straps.



## Roof Tarps

Once your structure is rock solid, you can install roof tarps.

Use the same size bungee for each tarp edge. If you have a line of 6" bungees but one 9" bungee in the middle, that 9" bungee will be slack and immediately fall out to become moop. Once you have a single missing bungee, the nearest bungees will start to slacken, and eventually the whole thing falls apart.

## Side Tarps (Mesh)

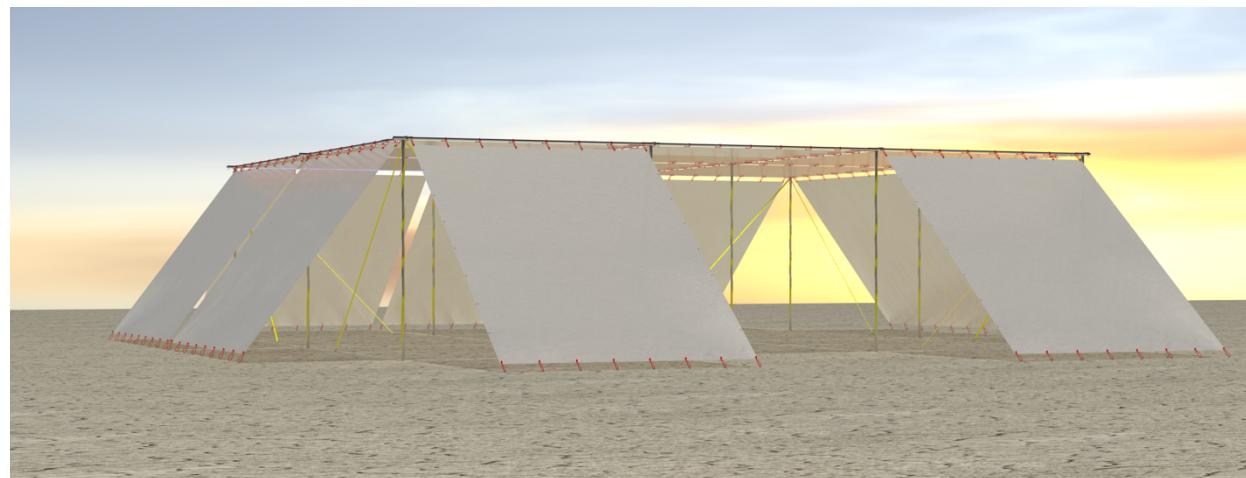
You can install sloped side tarps by drilling one lag screw with a climbing hanger outside the landing point of every grommet.

For side tarps, **always install at a slope** so that the wind has a chance of going over the tarp instead of trying to push through it like a sail.

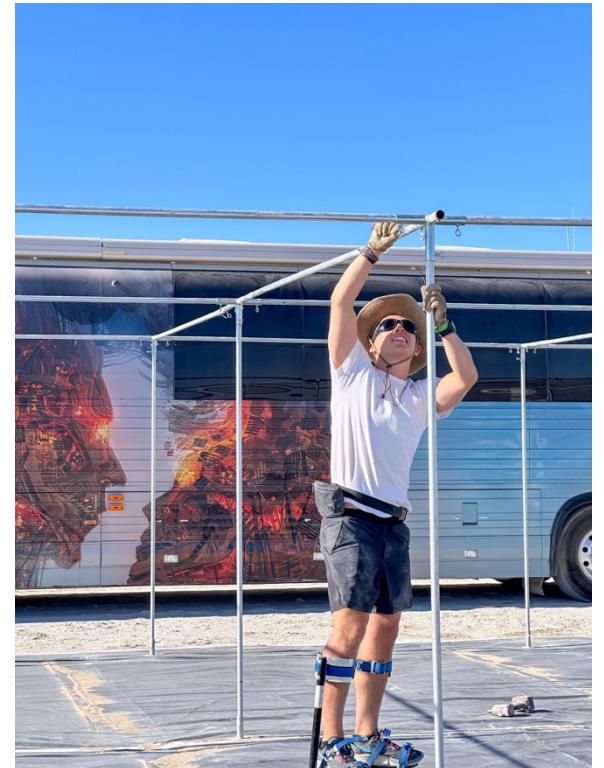
**Always use mesh** instead of solid tarps at the sides so some wind can go through.

**Always use every single gromet with a bungee** to connect the tarps to the roof and the ground. If you get lazy and only connect half the gromets, you'll find a massive amount of wind being held back by a small number of gromets which will rip, leaving even fewer gromets to hold the shade, until it rips completely.

Make sure to position the lag screws so as to pull the side tarps super tight. If the tarp is held taut, the wind will glide up and over it. If a tarp is even a tiny bit loose, the



wind will push into it creating a sail shape which will start putting an incredible amount of pressure on your shade structure.



*Drywall stilts are cheap, easy to use, and make it much faster to install tarps*

## Yikes, It's Raining!

Rain will puddle up in your solid roof tarps. If you get a lot of rain, this will start to pull downward and exert a lot of stress on your shade structure. A quick fix is to **remove two of the bungees from the center of one edge (not the corner) to create a spout where the water can flow.** Then gently press the center of the tarp with a broom to push the water out.



## OMG, It's Windy!

Never expected that one, did you?

In heavy wind conditions at Burning Man, understand that you will never be able to manipulate, hang, fix, or stretch tarps. It's not possible. If you have tarps that are serving as sails and threatening to pull apart your shade structure, remove the bungees and take them down. You are not going to be able to fix anything and will probably just hurt yourself.

In most of the wind events I've been at in Burning Man, I've seen a lot of heroics where people try to secure or repair their shade structures. I've watched them struggle for 10 minutes with a tarp to get one bungee cord back in place. It's fun but kinda dangerous and doesn't really accomplish much. The only thing you should be doing is removing any tarps creating danger, and then get yourself into a shipping container or truck to wait it out.

## Thunder!

Steel structures on playa can be hit by lightning. If you see lightening or hear thunder, get yourself and anyone you find

away from metal shade structures and into a vehicle, RV, truck or shipping container.

## Shopping

Before you spend a lot of money, make sure you are connected to online groups where Theme Camp Organizers tend to hang out. Every year camps disband and sell their old gear, and you may be able to save a ton of money by taking over a perfectly serviceable shade structure from a camp that is not returning. The [Camp Support Team](#) at Burning Man is a good resource for new camp organizers.

The specialized parts described in this document are not always available at every hardware store. You should definitely not plan to find this stuff in Reno on your way to the burn; it's too specialized.

- EMT or Fence Post Top Rail poles are available in limited supply from big box hardware stores if you only need a small quantity.
- For larger quantities of EMT, try electrical supply shops. They can easily deliver a big stack of EMT right to you.
- Similarly for Fence Post Top Rail you may have a fence supplier in your area.

- Canopy Fittings (5-ways, couplers, and footers) and tarps are available from online dealers that specialize in that stuff.
- 14" Lag Screws are surprisingly hard to find at reasonable prices. While I am hesitant to recommend a particular vendor, Burners have been buying these in bulk from Fastener Superstore for many years.

An arts collective called Form & Reform does an annual sale of "Blackrock Hardware Shade Kits" to raise money for the Empire of Dirt art project. Rather than using plain EMT, Form & Reform provides specialized, swaged pipe segments that fit together, so they are easier to transport. Their pipes also feature special attachments that eliminate the need for vertical ratchet straps to hold the structure to the ground.



## About the Author

This guide was written by Jetpack, a camp organizer who has built large shade structures every year since 2018. Every piece of advice in this guide reflects an actual mistake made and a lesson learned at his camp, the Future Turtles.

