SHADE STRUCTURE

DIFFICULTY: ***COMPLEX***

6 VOLUNTEERS

8 HOURS

MATERIALS

PREP

(1) 4x4x12ft board

(4) 4x4x10ft boards

(7) 2x6x8ft boards

(4) 2x6x12ft boards

(36) 2x2x8ft boards

(3) 4'x8' lattice pieces

BUILD

(9) 80lb bags of concrete

(4) 4x4x10ft boards

(4) 4x4x36" trapezoids

(4) 2x6x12ft boards

(7) 2x6x8ft boards

(24) 2x2x8ft boards

(24) 2x2x48" boards

(3) 4'x8' lattice pieces

(8) .5"x8" galvanized carriage bolts

(8) .5" galvanized nuts

(8) .5" galvanized washers

(4) LS30-R skewable angle braces

5lbs 2 .5" deck screws

(14) H2.5A rafter ties

2lbs 1 .5" N8 nails

2lbs 8d galvanized nails

Tools listed on page 2

PREP LIST

1. Sort materials into piles by like items to ensure you have materials needed to complete project. ☐
2. Take the 4x4x12. Cut into (4) 4x4x36" pieces. ☐
3. Take (12) 2x2x8ft boards. Cut each into (2)48" pieces, for a total of (24) 2x2x48" pieces. ☐
4. Do NOT cut the following: (4) 4x4x10ft boards, (7) 2x6x8ft boards, (4) 2x6x12ft boards, (24) 2x2x8ft boards, (3) 4'x8' lattice pieces. ☐
5. Angled Cuts: Take the (4) 4x4x36" pieces cut in step 2. Using the miter saw, cut 45° off both-sides, creating a 36" trapezoid. ☐

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TOOLS

PREP

Miter saw

Tape measure

Pencil

Carpenter's square

Safety glasses

BUILD

Marking paint

Levels

Measuring tape

String line

Pencil

Hammer

Ladder

.5" long drill bit

Screw driver bit

Drill

.75" socket with ratchet or .75" open-ended wrench

Safety glasses

BUILD LIST

1. Sort materials into piles by like items to ensure you have materials needed to complete project. ☐
2. First, the 4x4x10s must be set in the ground as posts. Each post will be buried 2 feet in the ground with concrete. The footprint of the shade structure is 9ft long by 6ft wide. Holes need to be 24" deep with about an 8" diameter. ☐
3. Your posts need to be level both side to side and front to back. They also need to be in a straight line with proper alinement. A string-line can be helpful for this. ☐
4. Let the concrete set for several hours before completing the shade structure. ☐
5. Take the (4) 2x6x12ft boards and lay them on ground. The 2x6x12ft boards will run parallel with long side of the structure stretching roughly 16.25" past the outside of the posts. The 2x6x12 boards will run on BOTH sides of the 4x4 posts. ☐
6. Grab two ladders, raise the headers to the tops of the 4x4 posts and level them (keep in mind the tops of the posts might not be exactly the same height, it is not necessary). Attach headers to the posts temporarily with 2.5" screws. ☐
7. Using the long, .5" drill bit, drill 1 hole through both 2x6x12 headers and the 4x4 post in order to fit the 8" carriage through this hole. ☐
8. Now you'll place a carriage bolt through each hole you've drilled (there should be a total of 4 holes; 1 through each post). Put the carriage both through the hole so that the head of the bolt is facing outward and the washer and nut are on the inside of the structure. ☐
9. Next you'll attach the 4x4x36" trapezoid braces. Make sure the 45 degree angle sits flush with the 4x4 post but also passes through the 2x6x8 headers. You'll attach the lower end of the 4x4 trapezoid brace to the 4x4 post using the angled brackets and the 1.5" nails. ☐

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Drill

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Safety glasses

BUILD LIST

10. On the higher end of the trapezoid brace, you'll again use .5" long drill bit to drill a hole through both 2x6x12 headers and the 4x4x36" trapezoid brace. Place a 8" carriage bolt through this hole and attach using a washer and nut, again making sure the head is on the outside of the structure and the washer and nut are on the inside. Repeat this step for all 4 trapezoid braces. ☐

11. Next you'll layout the seven 2x6x8 rafters above the headers. The rafters should overhang the outside headers by about 8.5" on each side. The rafters should be roughly 22.25" apart. The end rafters should be approximately flush with the end of the headers. There are 2 rafters, side by side, (to cover the seams where the 8ft long 2x2s will meet the 4ft long 2x2s). These 2 side by side rafters should be place 8' from the end of the headers. ☐

12. Use the rafter ties to attach the rafters to the headers. Make sure that 2 rafter ties are used per rafter (one on each end). You'll use the 1.5 nails to fasten the rafters to the headers. ☐

13. Next attach the 2x2x8s on top of the rafters using the 8d nails. They should be evenly spaced about 2 5/8" apart. The 2x2s will meet on one of the two rafters that are side by side and overhang the outside rafter. ☐

14. Next attach the 2x2x4s on top of the rafters, again, using the 8d nails. The 2x2x4s should line up with the 2x2x8s and therefore should also be evenly spaced about 2 5/8" apart. Similarly, the 2x2s will meet on the other rafter that is placed side by side and overhang the outside rafte. ☐

15. Finally, use the 8d nails to attach the three sheets of 4'x8' lattice onto the 2x2x8s. Orient the sheets of lattice as shown in the picture below. ☐