RESOURCES

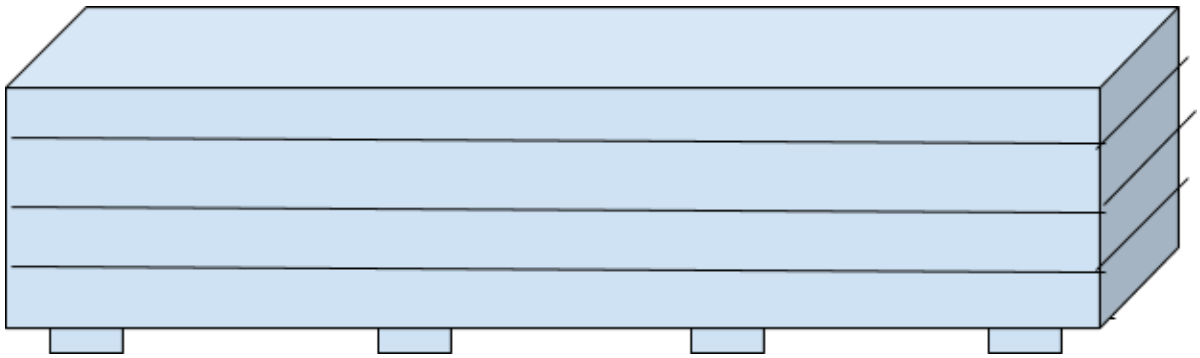
TITLE | BASIC CONSTRUCTION PLANS FOR SCHOOL GARDEN INFRASTRUCTURE

CATEGORY | Gardens & Green Space

OVERVIEW | This document provides the detailed construction plans for commonly built Education Outside Outdoor Classroom infrastructure. It includes a plan for a raised bed, teaching table, and bench. We recommend hosting a training covering construction basics, like the one outlined in *Outdoor Classroom Design* linked in the Table of Contents. The training will provide garden educators with the safety information and knowledge needed to construct the following items. The plans also include materials lists, cut lists, and price estimates.

Raised Bed Plan

This raised bed plan serves as an easy guide to creating a standard raised bed for a school garden. The raised bed can be built and placed on either impermeable (concrete, asphalt etc.) or permeable (soil, grass etc.) surfaces. If you plan to place the bed on a permeable surface, you may omit the feet noted on step 3. This raised bed measures 96” x 32” x 24”. The design can easily be altered to match other preferred measurements. Redwood lumber is suggested. Never use pressure treated wood if you are planning to grow food in the beds.



Materials:

- ☐ Gloves
- ☐ Eye Protection
- ☐ Pencil
- ☐ Ruler
- ☐ Tape Measure
- ☐ Drill bit (make sure it matches screw heads)
- ☐ Drill
- ☐ Lumber

- ☐ 2.5” decking screws
- ☐ Miter saw (if you are planning to cut the wood yourself)
- ☐ Hardware cloth
- ☐ Wire cutter
- ☐ Staples
- ☐ Staple gun
- ☐ Landscape fabric
- ☐ Soil, compost, etc.

Cut List (per bed):

2x6 (frame and walls)	2x4 (feet) *Omit if bed is placed on permeable surface	4x4 (posts)
(8) 96”	(4) 32”	(4) 22”
(8) 32”	(2) 22”	

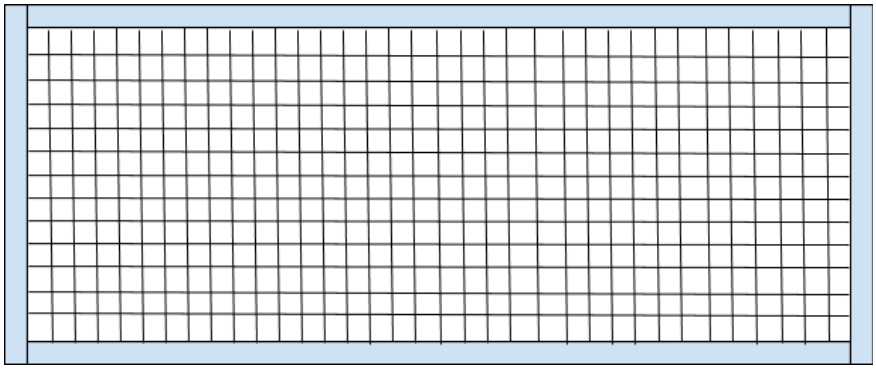
Lumber	Total Boardage (1 raised bed)	Redwood Price (approx. in 2019)
Lumber is purchased in 8 foot boards (96 inches) then cut into pieces ready for assembly. Prices vary by location and quality of wood. Expect to spend approx $40 on screws, $20 on landscape cloth, $10 on staples, and $50 on hardware cloth.	(11) 2x6x96”	$141.68
	(2) 2x4x96” *omit if bed is placed on permeable surface*	$23.14
	(1) 4x4x96”	$18.88
	Total:	$183.7

Assembly Instructions:

1. Assemble frame

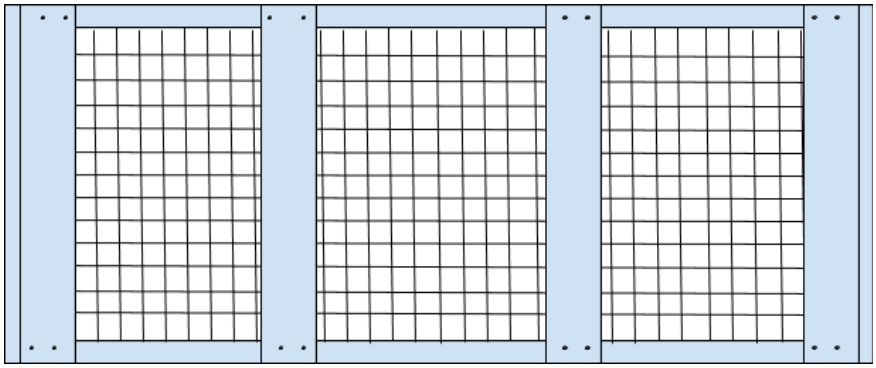
- Place 96” boards on the inside and screw through 32” boards to assemble

2. Add hardware cloth



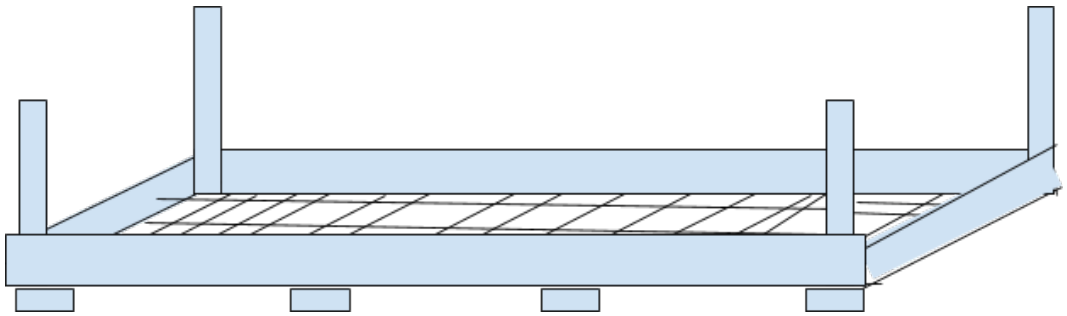
- Staple hardware cloth to frame
- Staple every 3 inches or so

3. Add feet (you can omit this step if you are placing bed on permeable surface)



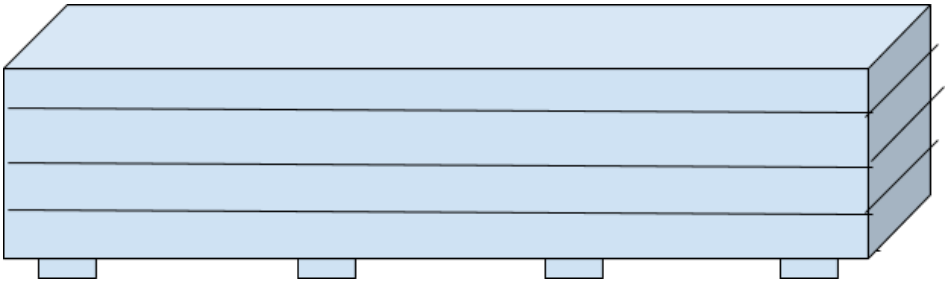
- Evenly space feet across frame on top of landscape cloth. Drill into 96” boards. The feet closest to the end of the frame should align next to the 32” board instead of directly beneath it. The outermost feet will serve as a platform for the 4 x 4 posts to rest on.

4. Add posts



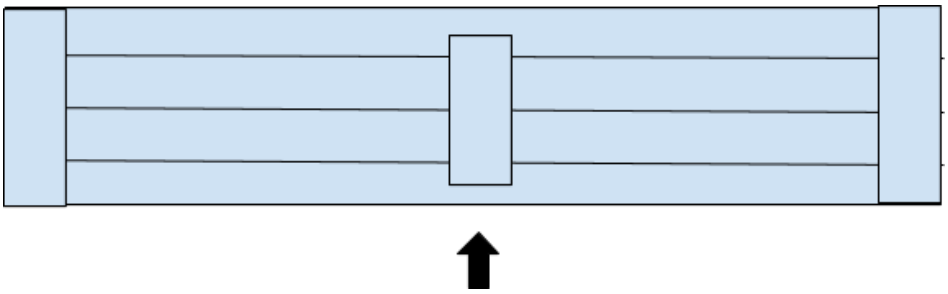
- Flip frame upside down so that feet are on the ground.
- Place 4x4 posts inside the frame interior and drill to both 96” and 32” boards

5. Add additional 2 x 6 boards to finish bed



6. Add the scrap 2 x 4 wood for support. Since the beds are long, it is best to reinforce both 96” walls with additional support. Simply center the 2 x 4 scrap wood in the middle of each 96” wall and screw in from the exterior.

View from interior:



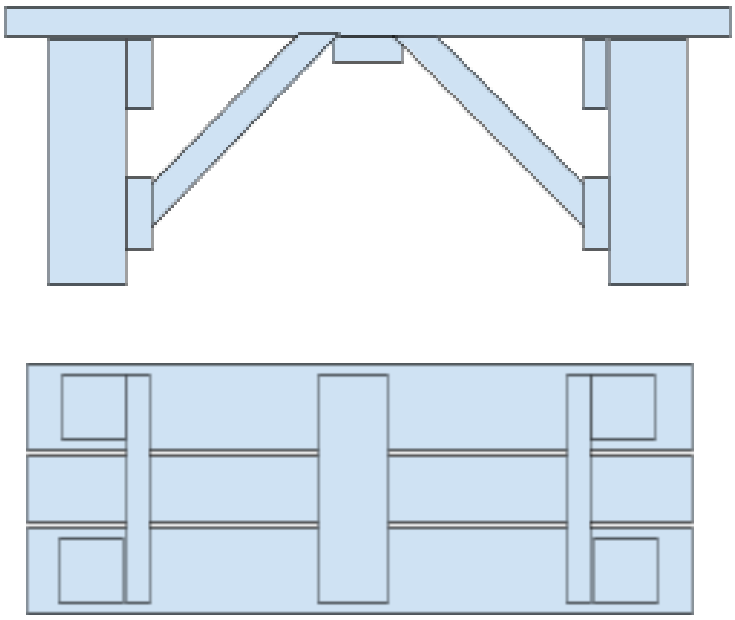
7. Staple landscape fabric to the interior to prevent water and soil from seeping through the seams. This is not 100% necessary for functionality, but will improve aesthetics.

Additional Tips:

- Pre-drilling holes for screws is good practice, but not always necessary for certain assembly steps.

Bench Plan

This bench plan serves as an easy guide to creating seating benches for any outdoor classroom. This bench design is recommended due to its sturdiness, modularity, functionality, and relative ease of assembly. This plan includes a list of materials, cut list, price estimations, and step by step assembly instructions. Each bench is 48” inches long and comfortably fits 3 elementary students.



Materials:

- ☐ Gloves
- ☐ Eye Protection
- ☐ Pencil
- ☐ Ruler
- ☐ Tape Measure
- ☐ Drill bit (make sure it matches screw heads)
- ☐ Drill
- ☐ Lumber
- ☐ 2.5” decking screws
- ☐ Miter saw (if you are planning to cut the wood yourself)
- ☐ ½” spacer (optional, but very helpful)
- ☐ Spar Urethane outdoor stain
- ☐ Foam brush

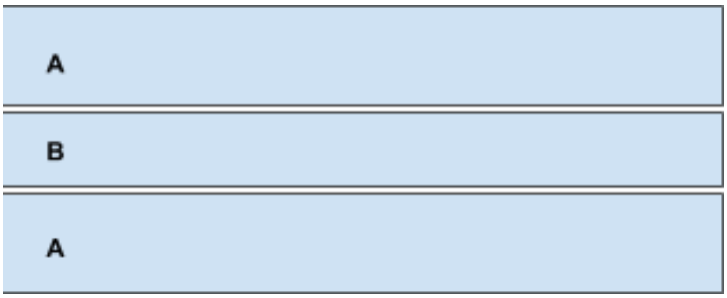
Cut List (per bench):

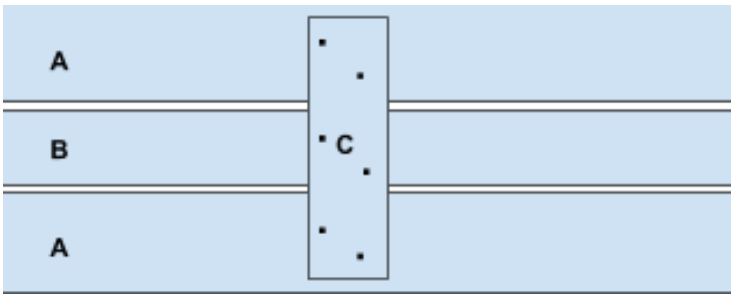
*Cuts have labeled as letters so that you can see how to assemble by cut later

2x6 boards	2x4 boards	4x4 boards
(2) 48” (**A**)	(1) 48” (**B**)	(4) 14” (**E**)
(8) 32”	(2) 22”	
	(5) 13.5” (**C**)	
	(2) 14” (**D**)	

Lumber	**Total Boardage (8 benches)**	**Redwood Price (approx. in 2019)**	**Pine Price (approx. in 2019)**
Lumber is purchased in 8 foot boards (96 inches) then cut into pieces ready for assembly. Prices vary by location and quality of wood. Expect to spend approx $40 on screws.	(12) 2x4x96”	$94.68	$32.64
	(8) 2x6x96”	$97.60	$73.54
	(5) 4x4x96”	$82.10	$39.90
	Total:	**$274.38**	**$146.08**

Assembly Instructions:

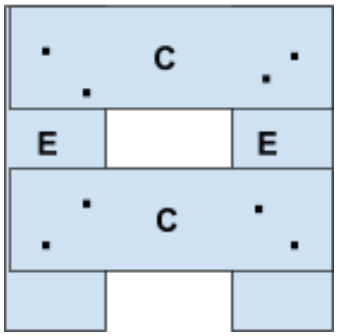




1. Assemble seat
   - Lay out the three seat pieces (ABA) with ½” gap between each piece. It’s useful to have multiple ½“ spacers for this step.
   - Measure 22¼“ from each end of ABA pieces (lengthwise) and ½“ on A pieces (widthwise) to center brace (C).
   - Drive 6 screws through C piece into seat (2 screws in A, 2 screws in B, 2 screws in A) Stagger screws diagonally to avoid splitting wood.

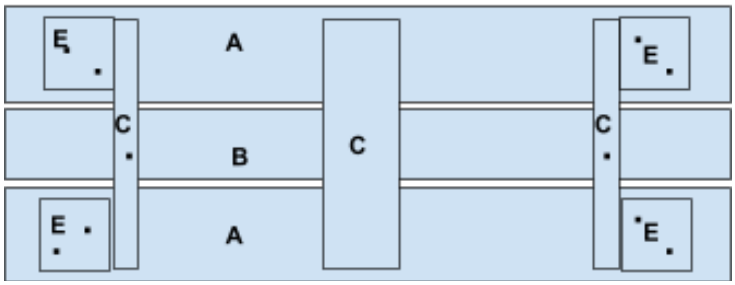
2. Assemble legs

- Lay out 2 (E) pieces parallel to each other and place 2 (C) pieces on top perpendicularly.
- The upper (C) brace should be flush with the tops of the (E) pieces. The lower (C) piece is placed 4" from the bottom of the (E) pieces.
- Hold (C) pieces steady over (E) pieces and screw 1 screw into each corner.
- Square the legs before screwing second screw into each corner. This step is to ensure the bench legs are as even as possible to prevent wobbling. Measure the distance between diagonal corners (top left to bottom right and top right to bottom left). They should be the same length. Adjust the distance by tapping until both measurements are within ¼" of each other.
- Once square, screw in second screw for each corner.

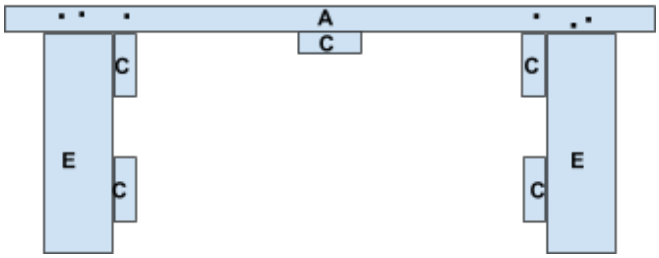


3. Attach seat and legs

- This is the trickiest part! For each bench set up 2 pairs of legs (braces inward).



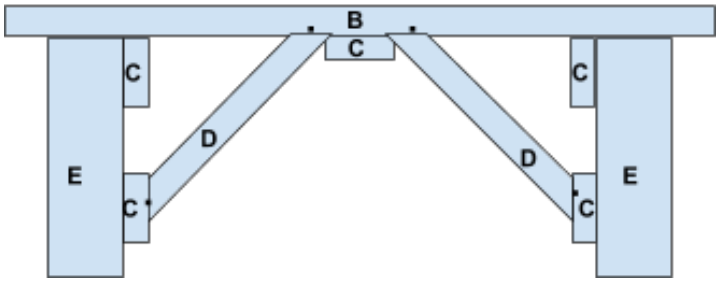
- Lay the assembled seat on top of legs. In order to align seat and legs, measure 6" from ends of (ABA) pieces to where the legs start. (You can also use the angled brace (D) pieces to determine the appropriate leg placement.) There should be a ½" overhang on the sides of (ABA) pieces above the legs. This step requires two people doing a lot of measuring and adjusting until its just right!



- Once aligned, drive 10 screws in total into top of bench. 5 screws per side. 2 into each (E) piece and then 1 on each side of (B) piece into (C) brace on legs.

4. Reinforce with angled braces

- Carefully flip nearly completed bench upside down so legs are in the air. Place angled braces (D) so each one runs diagonally from the center seat (B) piece up to the lower (C) brace.



Additional Tips:

- Do not assemble one bench at a time. Assemble the seats needed for all benches, then assemble all of the legs. This method is more efficient and results in better benches.
- Pre-drilling holes for screws is good practice, but it's not always necessary for certain assembly steps or for more experienced builders. Pre-drilling is definitely recommended for step 4 (angled braces).

Teaching Table Plan

This plan serves as an easy guide to creating a teaching table for any outdoor classroom. This table is recommended because of its sturdiness, functionality, and relative ease of assembly. This plan includes a list of materials, cut list, price estimations and step by step assembly instructions for a 2'x4'x33.5" table. The plan can be adjusted for a table of a different size.

Materials:

- ☐ Gloves
- ☐ Eye Protection
- ☐ Pencil
- ☐ Ruler
- ☐ Tape Measure
- ☐ Drill bit (make sure it matches screw heads)
- ☐ Drill
- ☐ Lumber
- ☐ 3" and 2.5" decking screws
- ☐ Miter saw (if you are planning to cut the wood yourself)
- ☐ Spar Urethane outdoor stain
- ☐ Foam brush

Cut List (per table):

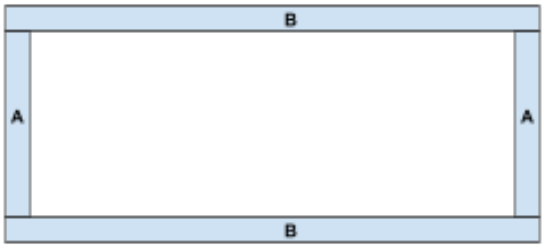
* Cuts have labeled as letters so that you can see how to assemble by cut later

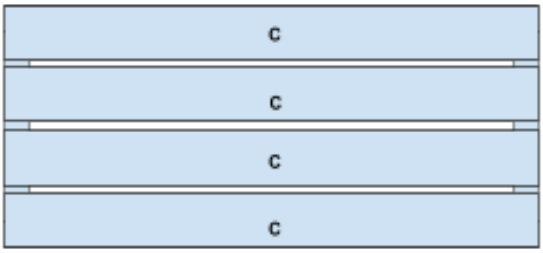
2x6 boards	2x4 boards	4x4 boards
(4) 48" (**C**)	(6) 21" (**A**)	(4) 32" (**D**)
(6) 37" (**E**)	(2) 47" (**B**)	

	Total Boardage (1 table)	Redwood Price (approx. in 2019)
Lumber Lumber is purchased in 8 foot boards (96 inches) then cut into pieces ready for assembly. Prices vary by location and quality of wood. Expect to spend approx $25 on screws.	(3) 2x4x96”	$30
	(2) 2x6x96”	$28
	(2) 2x6x120”	$36
	(2) 4x4x96”	$40
	Total:	**$134**

Assembly Instructions:

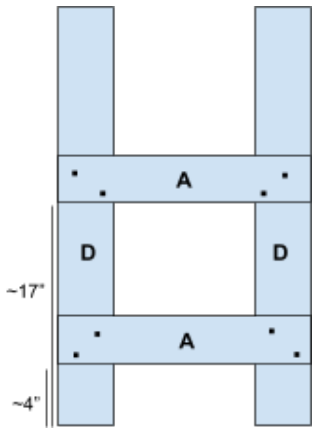
1. Assemble table top
   - Assemble a rectangle with 2 (A) and 2 (B) pieces.
   - Check for square by measuring the diagonals to ensure the lengths are the same.
   - Lay out 4 (C) pieces on top of this rectangle frame, evenly spacing the boards across. Screw into place.



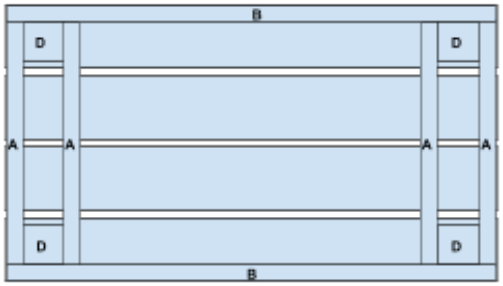


2. Assemble legs

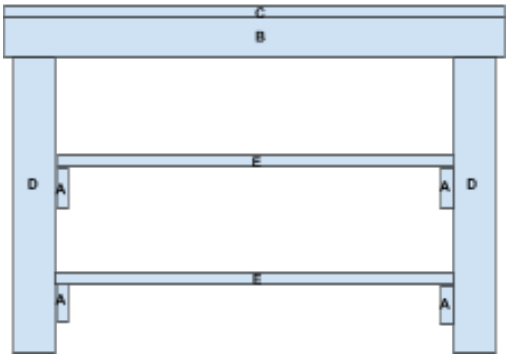
- Lay out 2 (D) pieces parallel to each other and place 2 (A) pieces on top perpendicularly.
- The A pieces will serve as shelf supports, so the height can be adjusted depending on where you’d like them placed. We recommend placing the lower (A) piece ~4” from the bottom of the (D) pieces and the upper (A) piece ~17” from the bottom.
- Hold (A) pieces steady over (D) pieces and screw 1 screw into each corner.
Make sure the (D) pieces are separated only to the length of the (A) pieces (21”).
If the separation is too wide the legs will not fit with the top.
- **Square the legs before screwing second screw into each corner. This step is to ensure the table legs are as even as possible to prevent wobbling. Measure the distance between diagonal corners (top left to bottom right and top right to bottom left). They should be the same length. Adjust the distance by tapping until both measurements are within ¼” of each other.**
- Once square, screw in second screw for each corner.
- Repeat steps a-e for the other set of legs



3. Attach top and legs
   - Turn the table top upside down, and place two pairs of legs in the corners with the shelf supports facing inward (so the legs are in the air). Attach the legs and top with screws.
   - Turn the table right-side-up, and add additional screws through the top into C pieces, if needed.



4. Attach shelves
   - Place three (E) pieces (shelves) on top of each of the (A) pieces (shelf supports). Space evenly. Attach with screws.



Additional Tips:

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