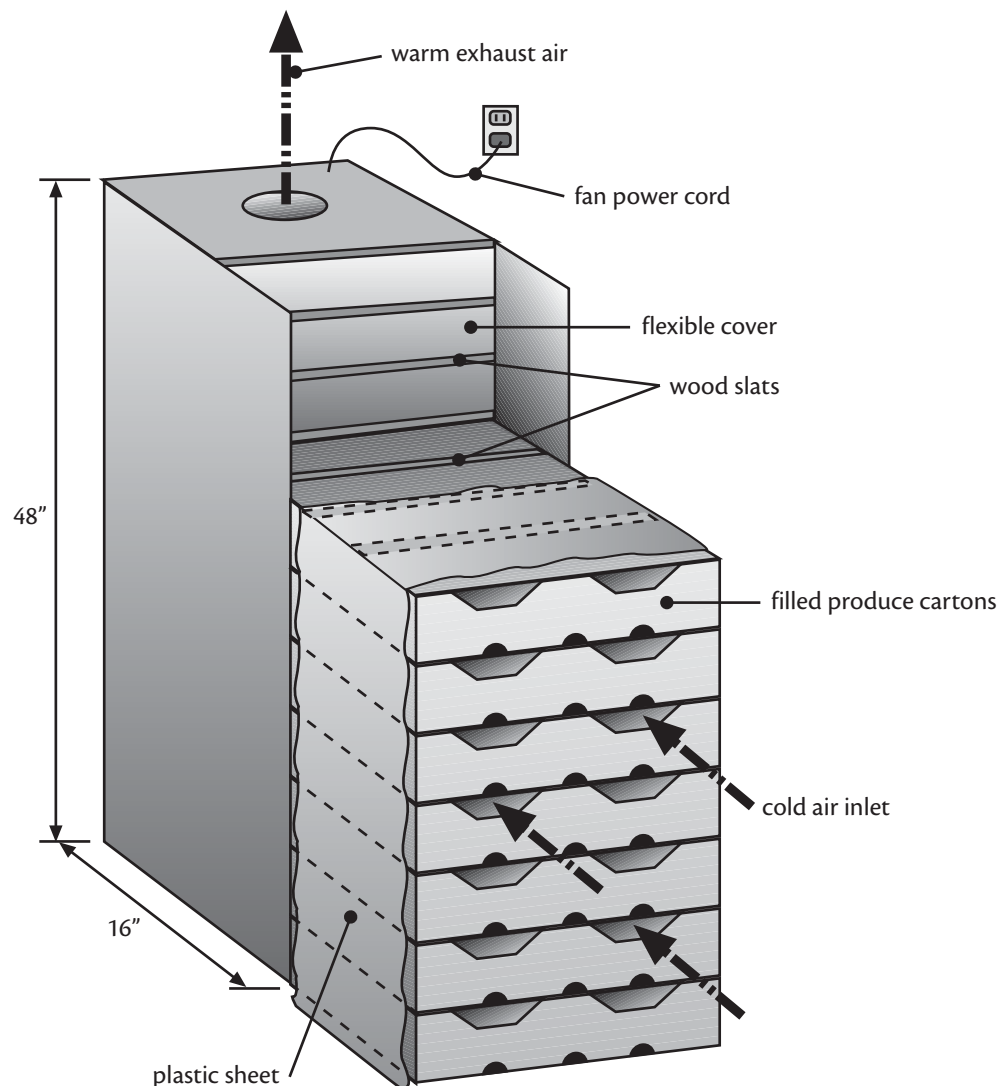


Forced-Air Produce Cooler

William Wilcke, Extension Agricultural Engineer, Virginia Tech

Herbert Stiles, Extension Horticulturist, Virginia Tech

This is a plan for a simple device you can build yourself to speed cooling of non-wrapped produce packed in vented cartons. The cooler is designed for small fruits, but can easily be adapted for other products. Some dimensions of the cooler depend on the size of produce cartons used, so select and measure your cartons before starting construction. The cooler is designed to cool one to three columns of cartons (about 15 cartons per column, depending on carton depth) at a time.



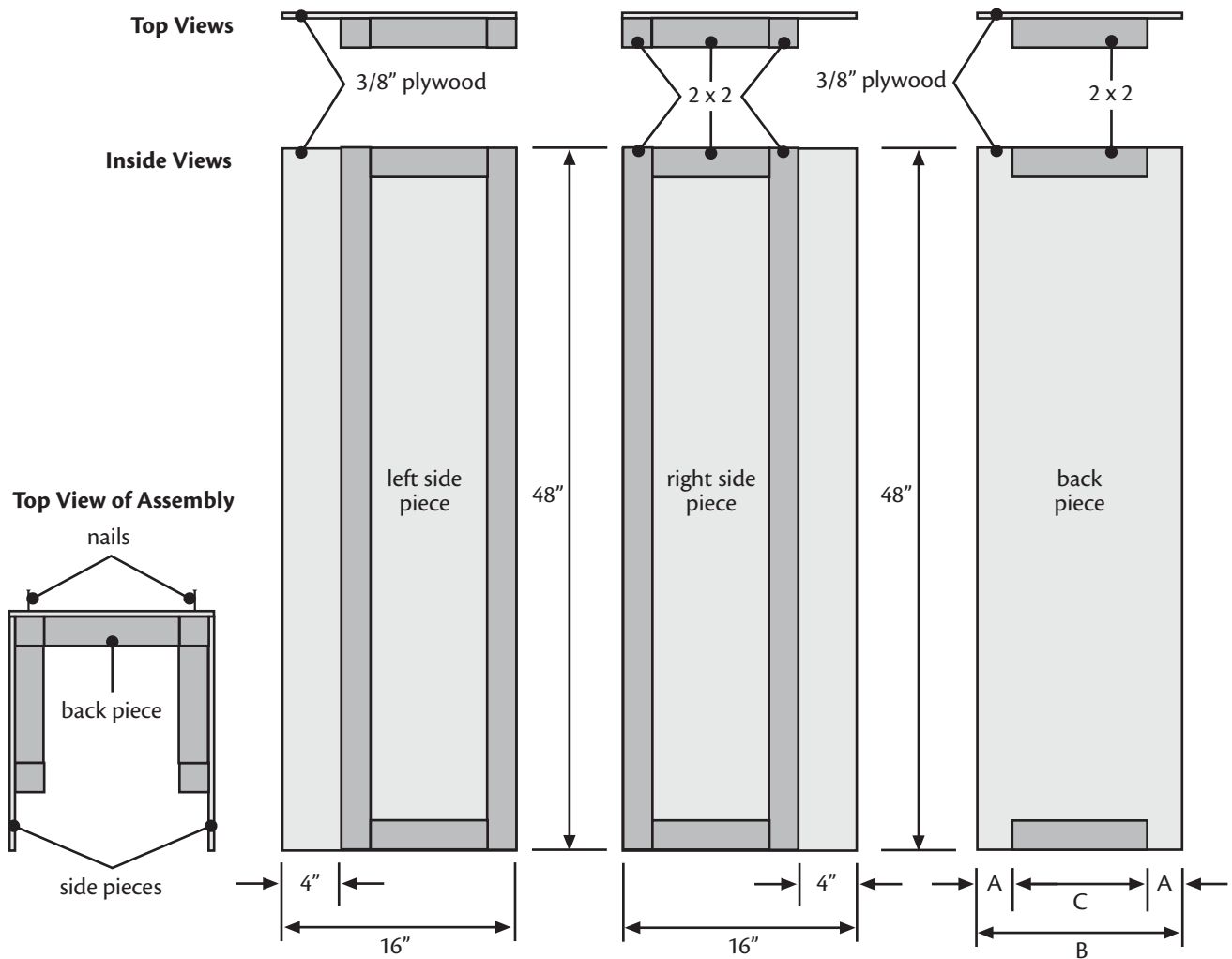
www.ext.vt.edu

Tools needed:

Hammer	Saw	Square	Tape measure	Several small wrenches
Drill	Screwdriver	Stapler	Caulking gun	Wire stripper (or knife)

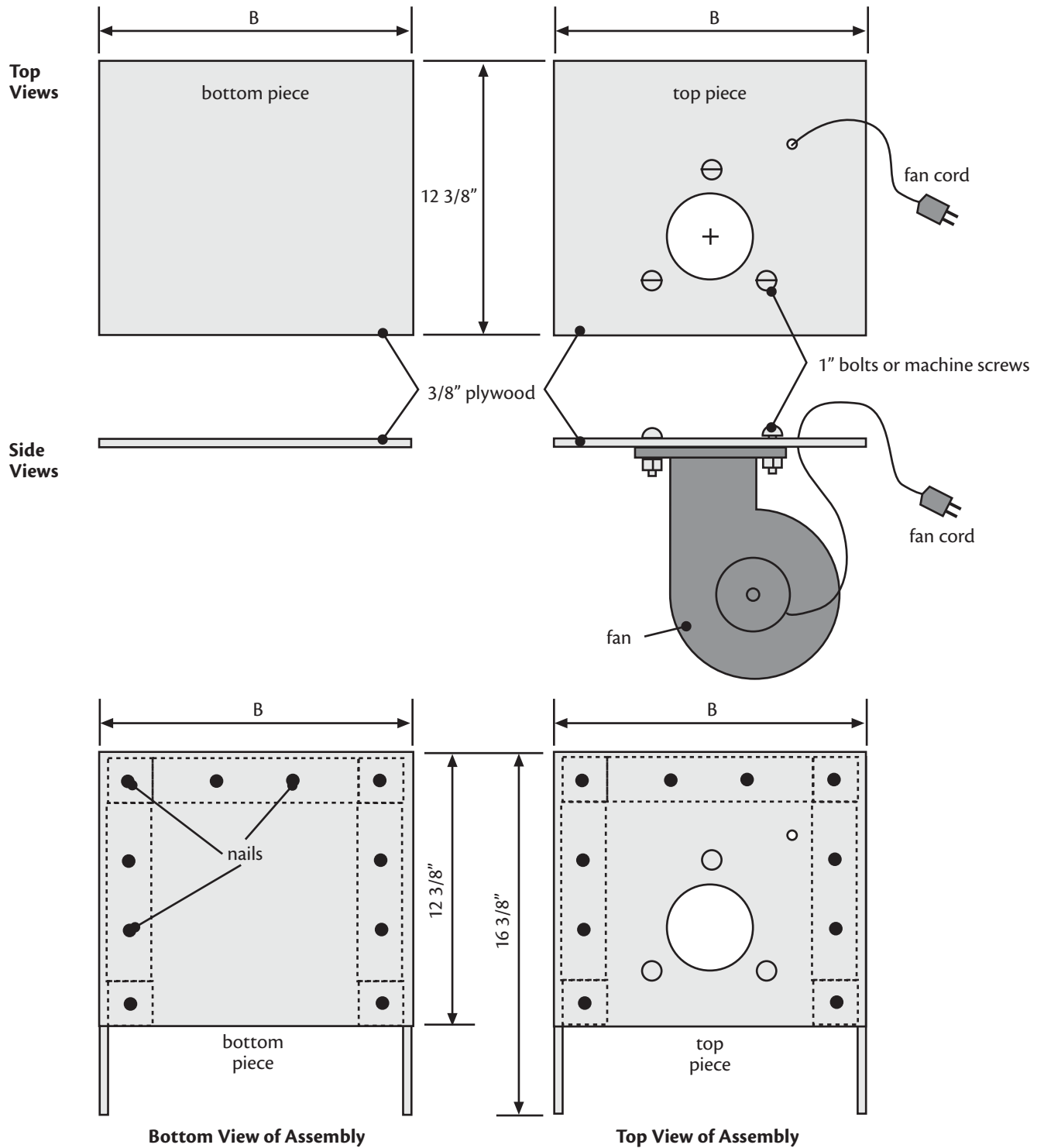
List of Materials

- One 4' x 8' sheet 3/8" exterior-glye plywood
- About 24 running ft of 2 x 2
- About 18" x 60" of vinyl or canvas fabric (width depends on length of produce cartons)
- About twelve 18"-long wood strips (lath or 1 x 1s)
- 1 lb. underlayment or other small nails
- Eight 1 1/4" #6 flat-head wood screws
- 1/4" x 1" bolts or machine screws (number required depends on number of bolt holes in fan housing)
- 8' electrical cord (rubber, two #14 conductors with ground)
- One grounded electric plug
- One tube caulk
- One small fan. Select a fan that delivers 1 cfm/lb. produce against 0.10" water pressure. Use the maximum pounds of produce that will be cooled at one time to determine total cfm required.



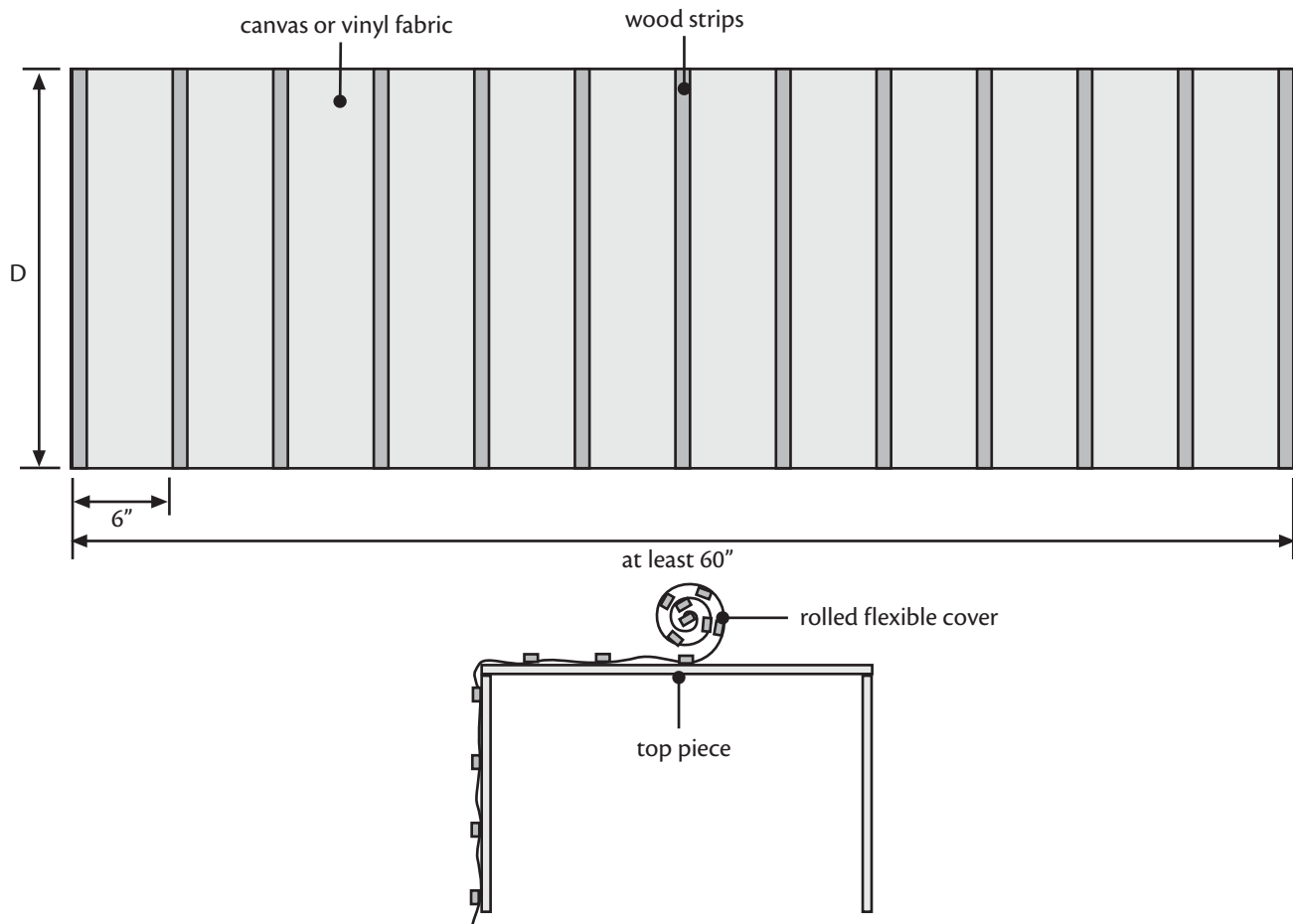
Notes

- $A = \text{thickness of } 2 \times 2$; $B = \text{length of produce cartons} + 1''$; $C = B - (A + A)$.
- Nail plywood pieces to 2x2s with underlayment or other small nails. Then, nail back piece to side pieces, as shown.



Notes

- B = length of produce cartons + 1".
- Cut hole to match fan outlet — will be rectangular for some fans.
- Nail bottom piece to page 2 assembly with underlayment nails.
- Attach top piece to page 2 assembly with 1 1/4" #6 flat-head wood screws.
- Drill hole slightly larger than fan cord diameter in top piece. Connect cord to motor (or plug) after running cord through hole. Caulk around cord after installation.
- Caulk any leaks at joints of cooler.



Notes

- D = length of produce cartons.
- Staple or tack fabric to wood strips.
- Nail one end of flexible cover across front of top piece.

Operation

1. Place the forced-air cooler in a room maintained at proper temperature and relative humidity for the type of produce being cooled (about 32°F and 90% relative humidity is recommended for small fruits).
2. Stack one to three columns of cartons against the open side of the cooler. Arrange the cartons so that air must pass through produce.
3. Unroll the flexible cover over the top cartons to prevent air from bypassing the produce.
4. Drape a sheet of light-weight plastic over the flexible cover and down the sides of the cartons. Negative pressure from the fan will draw the plastic against the cartons and reduce air leaks.
5. Plug in the fan.
6. Straighten the plastic and make sure it is not blocking air inlets on the ends of the cartons.
7. Operate until produce is within a few degrees of cold-room temperature. This will take 2 to 6 hours, depending on fan size and initial temperature differences. Do not operate more than about 6 hours or produce will dry out.
8. Move cooled produce to another part of the cold room and set another batch of warm produce against the cooler. If you want to start cooling more produce before the first batch is finished, you need to slide the partially-cooled columns back and set the warmest produce closest to the forced-air cooler to avoid reheating partially-cooled produce.