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# Solid Waste MANAGEMENT

MT 9204 (HR)

## Building Bins and Boxes for Yard Waste Compost

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Yard wastes make up about 20 percent of the solid waste that ends up in our landfills. It includes leaves, brush, grass clippings and other organic materials. Composting is one way to reduce waste accumulation. It is low in cost, easy to manage and produces a useful product.

The process of home yard waste composting is outlined in the MSU Extension Service Solid Waste Management factsheet "Home Composting," MT 9203 (HR). This factsheet deals with systems for making compost.

### Compost systems

There are many ways to make compost. Home compost methods range from "mulched paths" which are replenished every other year, to "turning units" which are maintained weekly. Compost systems can be built with scavenged materials or are available commercially at a substantially higher cost.

Composting systems are often organized by the type of wastes they process. Yard wastes are usually composted in holding and turning units or by using them as mulches while vegetative kitchen food wastes may be composted through soil incorporation or in worm bins. Turning units may also be used to compost yard and kitchen waste together in a hot pile, if someone is willing to turn the pile on a regular basis. Yard wastes may be composted in a variety of open systems. The style depends on what materials are to be recycled, how much space is available, when compost is desired and what it will be used for.

### Composting yard wastes

Yard wastes can be composted in simple holding units where they will sit undisturbed for slow decomposition, in **turning bins** which produce finished com-

post in a month, or as mulches on paths or around plantings until they decompose in a year or two.

**Compost mound.** Yard wastes can be composted without a bin if you don't mind the appearance of a **compost mound** in your yard. To build a compost mound or pile find a good location and loosen the soil under the heap. A pile should be large enough to hold heat and small enough to admit air to the center. As a rule, the minimum dimensions of a pile should be three feet by three feet by three feet to hold heat. The maximum dimensions that will allow air to the center of the pile is five feet by five feet by any length.

There are ways around this rule. By insulating the sides of the mound, higher temperatures can be maintained in a much smaller volume. By turning a pile or using "ventilation stacks" in the center of the pile, dimensions larger than five feet wide are possible (Figure 1). However, a large pile is unnecessary in most backyard situations.

Many people find that simply mounding compostable materials into a heap is unsatisfactory. Containers such as bins and boxes can protect the com-

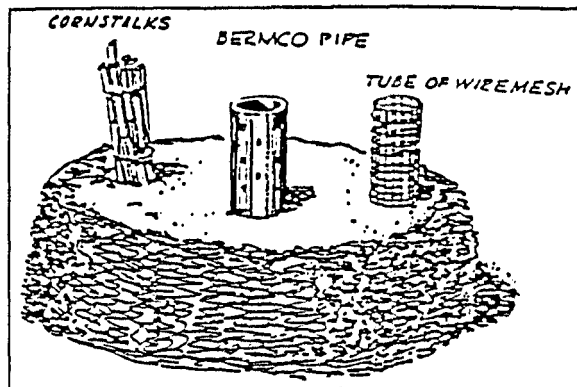


Figure 1. "Ventilation stacks"

post from wind, heavy rains and hot, baking sun. Bins and boxes can make composting easier and improve its appearance and quality. Here are some ideas for building your home composter:

**Wire mesh compost bins** (Figure 2) are versatile, inexpensive and easy to construct. A circular wire mesh bin may be made from poultry wire, hardware cloth, or heavy wire mesh. Poultry wire and light weight hardware cloth are the least expensive but they quickly lose their shape with use, require support with posts and need frequent replacement. Heavier, self-supporting wire mesh (16 gauge galvanized or plastic coated woven wire fencing) is recommended as it is easier to work with and more durable. This wire is available in three, four and five foot widths. To determine the length of wire needed, multiply the diameter you want for your compost heap by 3.14. That's the length of wire you should buy. Once you've purchased the fencing and picked a location for the compost heap, bring both ends of the wire mesh together to form a circle. To support the compost when the mesh is removed later, a wooden stake should be driven in the ground in the center of the wire mesh circle. The ends of the mesh can be held together with several small chain snaps available at any hardware store.

When you're ready to start a second heap or want to turn the compost, remove the snaps holding the ends of the wire mesh together. Pull the mesh away from the completed heap and erect it again at the new heap site. If the heap is not going to be turned, the compost pile will keep its shape even after the wire mesh is removed. The stake through the center prevents it from caving in or falling apart. Don't forget to water the heap—dig a depression in the top of the pile and water moderately.

**Snow Fence Bins.** Bins made with prefabricated snow fencing (Figure 3) are simple to make and easy to move and store. To build this bin, the appropriate length of prefabricated fencing must be supported with 2"x4"s to make it stand and maintain its shape. With wire attach the 2"x4"s to the bottom and ends of the fencing to form

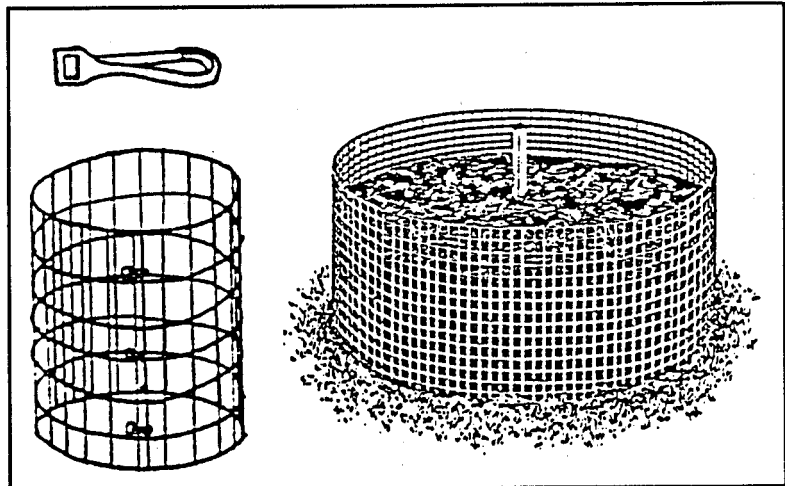


Figure 2. Wire mesh compost bins

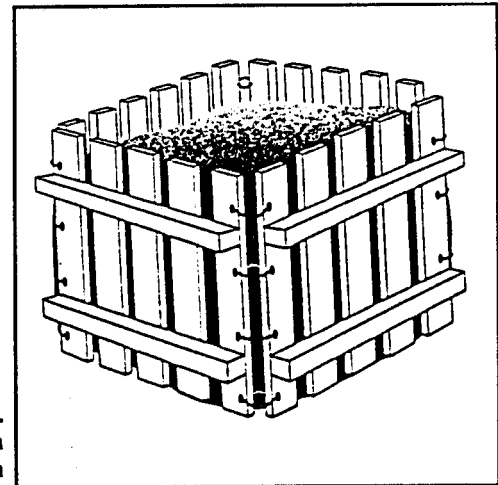


Figure 4. Wooden pallet bin

a square. A circular snow-fence bin can be supported by two large dowels or 2"x2" boards.

**Wooden Pallet Bins.** Four used wooden pallets (Figure 4) can be hinged or wired together for constructing a compost bin. The bin should be constructed with at least one removable side so that materials can be easily turned.

**The Lehigh-Keston compost bin** (Figure 5), designed by J.I. Rodale has proven effective and popular. The bin is adjustable in size, portable and provides for proper ventilation and protection. It is constructed by

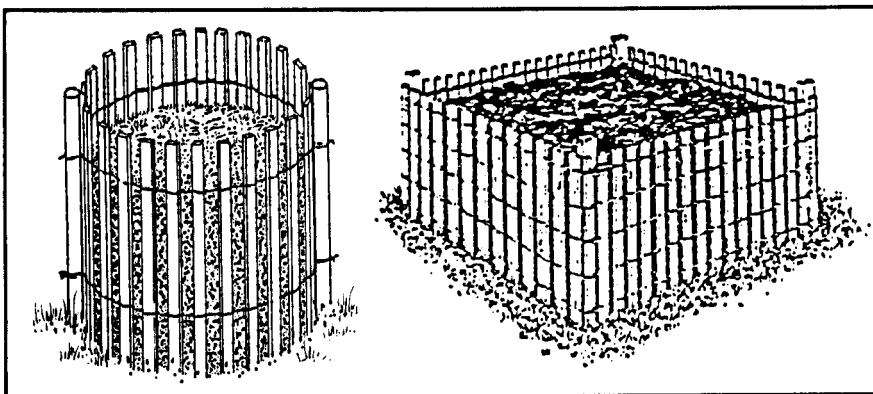


Figure 3. Snow fence bins

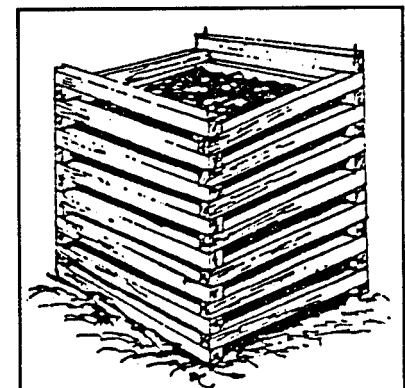


Figure 5. Lehigh-Keston bin.

alternating 2"x2" lumber or poles with holes drilled in the corners of each piece. Each corner is fastened together by inserting a long metal rod through the holes to form a square.

**New Zealand Box.** The New Zealand box is another simple, efficient design developed by the Auckland Humic Club of New Zealand. There are many variations of the design. The simplest is a wooden structure four feet square by four to five feet high without top or bottom. The wooden sides consist of six-inch wide by 3/4-inch thick boards. Allow at least one half inch of air space between each board so that air may penetrate the heap from all sides. The box is movable. A divider in front

slides down between two posts so that when you want to empty the box, you can pull the dividers upward and take them out one by one. Two by fours provide the structural framework for this box. Figure 6 illustrates the construction of a variation developed by John Bartok of the University of Connecticut Extension Service.

**Portable Wood and Wire Composting Bin.** This wood and wire compost bin (Figure 7) is very flexible. It fits well in small spaces, and may be used either as a yard waste holding bin or as a portable turning unit. The bin can be easily moved to turn piles or to harvest finished compost and build a new pile. Simply undo the latches, pull the sides apart and move it. Compost may then be turned into the bin at its new location, and finished compost can be removed from the bottom.

**Turning Bins.** Turning bins (Figure 8) are typically a series of three or more bins that allow you to make compost in a short time by turning the hot material on a regular schedule. Turning bins are most appropriate for gardeners with a large volume of yard waste and the desire to make a high-quality compost. Figure 10 illustrates the construction of a concrete block turning unit. Figure 11 details the construction of a wood and wire three-bin turning unit.

**Block or Brick Bins.** Compost bins can also be made of brick, cement blocks or rocks. Just lay the blocks without mortar. Leave space between each block to permit aeration. Pile them up to form three sides of a square container. This bin is sturdy, durable, and easily accessible. Figure 9 illustrates a concrete block bin and details its construction.

**Rotating Turning Barrel.** An alternative to stationary ground turning bins is a horizontally mounted rotating barrel (Figure 12). A variety of rotating barrel composters are available commercially. However, a rotating barrel composter can be made from a 55-gallon drum with a loading door cut and hinged. Aeration holes must be cut at the ends or around the barrel. Be careful not to place too many holes in the barrel, as they leave materials dry or clumped together. Ideally, barrel units should have flat sides, or "fins" inside to lift and drop materials as the barrel is turned.

Rotating barrel units do not need layering; materials can be thrown in and mixed up. If a rotating barrel composter is turned every two to four days, compost will be ready to use in two to three weeks.

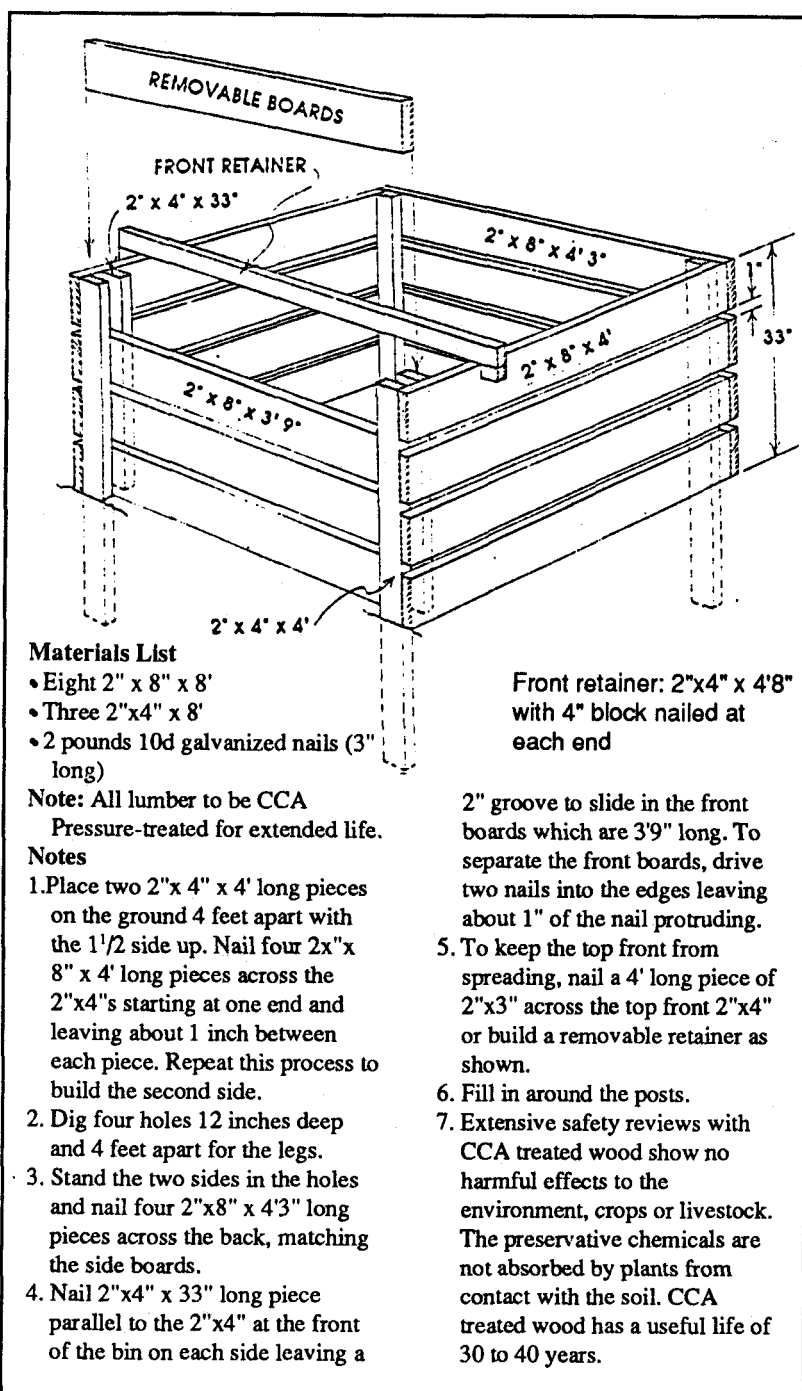
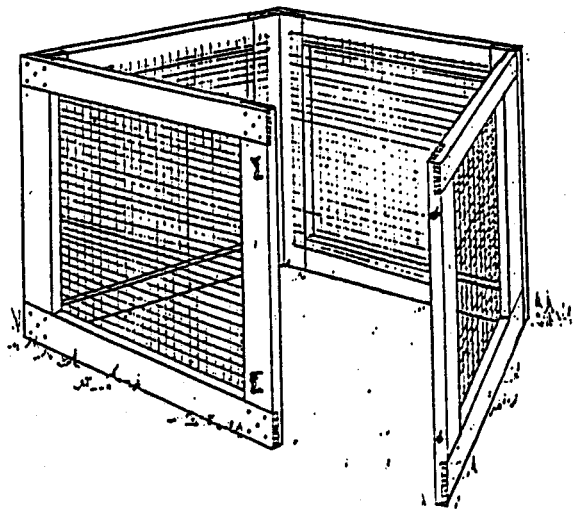


Figure 6. New Zealand box

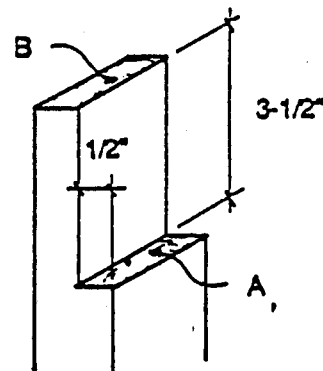


#### Materials

- 1 12 foot pressure treated 2"
- 3 12 foot fir 2"x4"
- 12 feet of 36" wide 1/2" hardware cloth
- 100 1 1/2" galvanized No. 8 wood screws
- 4 3" galvanized butt door hinges
- 150 poultry wire staples or power stapler
- 1 10 oz. tube exterior wood adhesive
- 6 large hook and eye gate latches

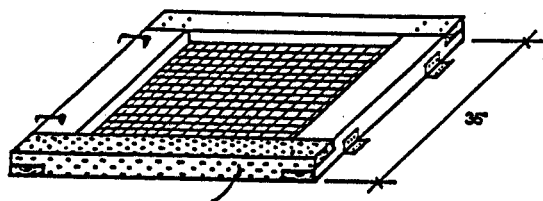
#### Tools

- Hand saw and chisel, or radial arm saw with dado blade, or circular saw or table saw
- Hammer, screwdriver, tin snip, caulking gun, pencil and small carpenter's square.
- Use eye and ear protection.



#### Construction Details:

1. Cut each 12 foot 2"x4" into four 3 foot long pieces. Cut a 3/4" deep and 3 1/2" wide section out of each end, for a total of 32 lap cuts. If using handsaw and chisel, cut 3/4" down at the 3 1/2 inch line, at A in diagram to right. Then cut a 1/2" deep groove into the end of the board, at B in the diagram. Place a thick wood chisel in the end groove and split the wood with a hammer to the 3 1/2" cut. If using a radial arm saw, circular saw or table saw, set blade depth to 3/4" and make multiple passes until the whole section is removed.



Pressure treated lumber on bottom

2. Make four 3 foot square frames from the lap jointed 2"x4"s. Use one pressure treated 2"x4" on each frame. Put enough construction adhesive to fill the gaps when the lap joints are screwed together. Fasten each joint with four screws.
3. Cut the hardware cloth with tin snips into four 3 foot square sections. Bend the edges of the cloth back over 1" for strength. Lay one onto each of the four frames. Center and tack each corner with a poultry wire staple. Hammer in place a staple every 4" along all four edges of the hardware cloth. Try to tension the cloth so it will not sag when filled with compost.
4. Connect each pair of frames together with two hinges. Then put the hook and eye gate latches on the other ends so that the sections latch together. Note: instead of using hinges, all four corners may be connected using hooks and eyes.

Figure 7. Portable wood and wire composting bin

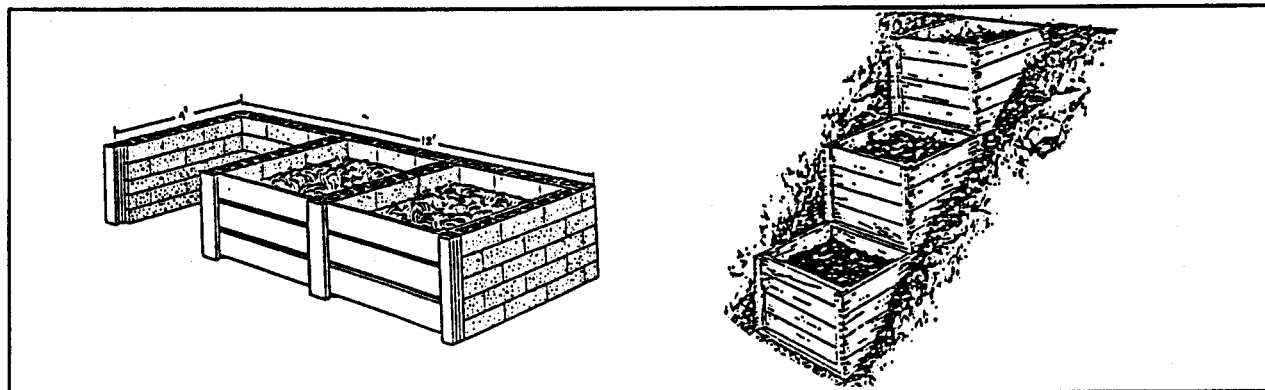
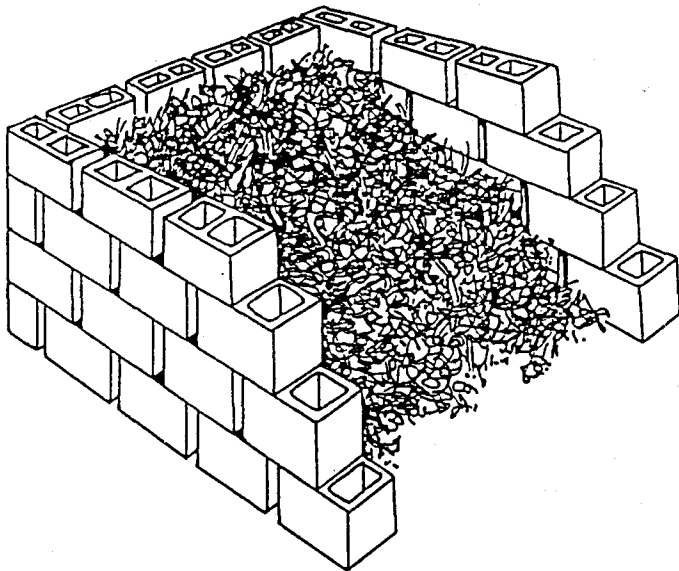


Figure 8. Turning bins.



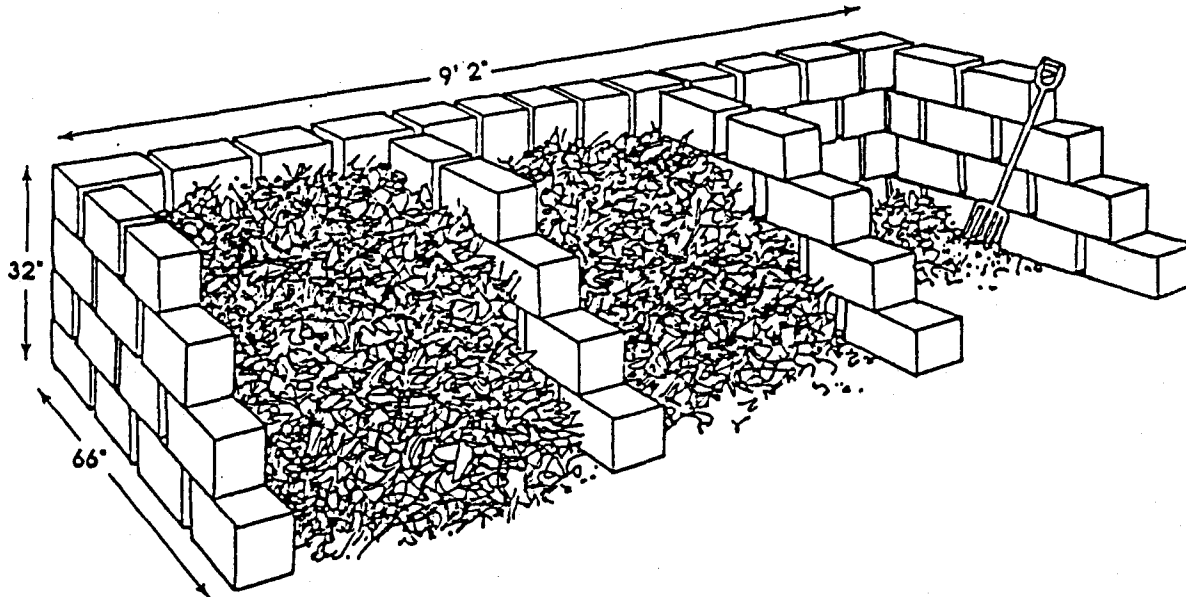
#### Materials List

- About 46 concrete blocks for the first bin
- Optional: about 32 blocks for a second bin
- Work gloves

#### Notes

1. Place 5 concrete blocks in a row along the ground at your composting site, leaving about  $\frac{1}{2}$  inch between each block to let in air.
2. Place 4 concrete blocks in another row along the ground perpendicular to and at one end of the first row, forming a square corner; leave about  $\frac{1}{2}$  inch between each block.
3. In the same way, place 4 concrete blocks at the opposite end of the first row to form a three-sided enclosure.
4. Add a second layer of blocks, staggering them to increase stability and leaving about  $\frac{1}{2}$  inch between each block. There should be a layer of 4 concrete blocks on each of the three walls of the enclosure.
5. Add a third layer of blocks, again staggering them to increase stability, with 5 blocks across the back of the enclosure and 3 on each side.
6. The last and top layer should have 4 blocks across the back and 3 on each side.
7. To make the bin more stable, drive wood or metal posts through the holes in the blocks.
8. Optional: If you wish to decrease your composting time, build a second bin next to the first so the wastes in one can mature while you add wastes to the other. Use one

Figure 9. Block or brick bins.



A concrete block turning unit looks like three holding units in a row. It is sturdy, and if you can find used blocks, it is inexpensive to build.

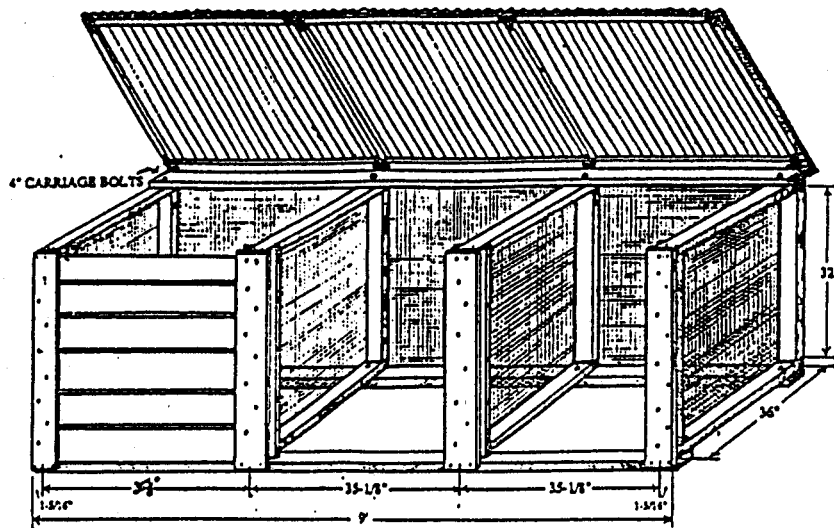
#### Materials List

- About 98 concrete blocks
- Work gloves

#### Notes

1. Place 12 concrete blocks in a row along the ground at your composting site, leaving about  $\frac{1}{2}$  inch between each block to let in air.
2. Place 4 concrete blocks in another row along the ground perpendicular to and at one end of the first row, forming a square corner; leave about  $\frac{1}{2}$  inch between each block.
3. In the same way, place 4 concrete blocks at the opposite end of the first row to form a three-sided enclosure.
4. Place two more rows—4 concrete blocks each—along the ground, parallel to the ends and evenly spaced within the enclosure. This divides the enclosure into three separate bins.
5. Add a second layer of blocks, staggering them to increase stability and leaving about  $\frac{1}{2}$  inch between each block. There should be a layer of 13 blocks across the back and 3 blocks on the sides of each bin.
6. Add a third layer of blocks, again staggering them to increase stability, with 12 blocks across the back of the enclosure and 3 on each side.
7. The last and top layer should have 13 blocks across the back and 2 on each side.
8. To make the bin more stable, drive wood or metal stakes through the holes in the blocks.

Figure 10. Concrete block turning unit.



#### Materials:

- 2 1 8-foot treated 2"x4"s
- 4 12-foot, or 8 6-foot treated 2"x4"s
- 1 9-foot and 2 6-foot 2"x2"s
- 1 16-foot cedar 2"x6"
- 9 6-foot cedar 1"x6"s 22-feet of 36' wide 1/2" hardware cloth
- 12 1/2" carriage bolts 4" long
- 12 washers and 12 nuts for bolts
- 3 lbs. of 16d galvanized nails
- 1/2 lb 8d galvanized casement nails
- 250 poultry wire staples or power stapler with 1" staples
- 1 12-foot and 1 8-foot sheet 4 oz. clear corrugated fiberglass
- 3 8-foot lengths of wiggle molding
- 40 gasketed aluminum nails for corrugated fiberglass roofing
- 2 3" zinc plated hinges for lid
- 8 flat 4" corner braces with screws
- 4 flat 3" T-braces with screws

#### Tools:

Hand saw or circular power saw, drill with 1/2" and 1/8" bits, screwdriver, hammer, tin snips, tape measure, pencil, 3/4" socket or open ended wrench, carpenter's square, (optional—power stapler with 1" long galvanized staples), safety glasses and ear protection.

#### Construction Details:

1. **Build Dividers**—Cut two 31 1/2" and two 36" pieces from each 12 foot 2"x4". Butt end nail the four pieces into a 35' x 36' square. Repeat for other three sections. Cut four 37" long sections of hardware cloth, bend back edges 1". Stretch hardware cloth across each frame, check for squareness of the frame and staple screen tightly into place every 4" around edge.
2. **Set Up Dividers**—Set up dividers parallel to one another 3 feet apart. Measure and mark centers for the two inside dividers. Cut four 9 foot pieces out of the two 18 foot 2"x4" boards. Place two 9 foot base boards on top of dividers and

measure the positions for the two inside dividers. Mark a center line for each divider on the 9 foot 2"x4". With each divider, line up the center lines and make the base board flush against the outer edge of the divider. Drill a 1/2" hole through each junction centered 1" in from the inside edge. Secure base boards with carriage bolts, but do not tighten yet. Turn the unit right side up and repeat the process for the top 9 foot board. Using the carpenter's square or measuring between opposing corners, make sure the bin is square, and tighten all bolts securely. Fasten a 9 foot long piece of hardware cloth securely to the back side of the bin with staples every 4" around the frame.

3. **Front Slats and Runners**—Cut four 36' long 2"x6"s for front slat runners. Rip cut two of these boards to 4 3/4" wide and nail them securely to the front of the outside dividers and baseboard, making them flush on top and outside edges. Save remainder of rip cut boards for use as back runners. Center the remaining full width boards on the front of the inside dividers flush with the top edge, and nail securely. To create back runners, cut the remaining 2"x6" into a 34' long piece and then rip cut into 4 equal pieces, 1 1/4" x 2". Nail back runner parallel to front runners on side of divider leaving a 1" gap for slats. Cut all the 1"x6" cedar boards into slats 31 1/4" long.
4. **Fiberglass Lid**—Use the last 9 foot 2"x4" for the back of the lid. Cut four 32 1/2 inch 2"x2"s and one 9 foot 2"x2". Lay out into position on ground and check for squareness. Screw in corner braces and T-braces on bottom side of the frame. Center lid frame, brace side down on bin structure and attach with hinges. Cut wiggle board to fit the front and back 9 foot sections of the lid frame. Pre-drill flush with front and back edges. Overlay pieces at least one channel wide. Pre-drill fiberglass and wiggle board for each nail hole. Nail on

Figure 11: Wood and wire three-bin turning unit

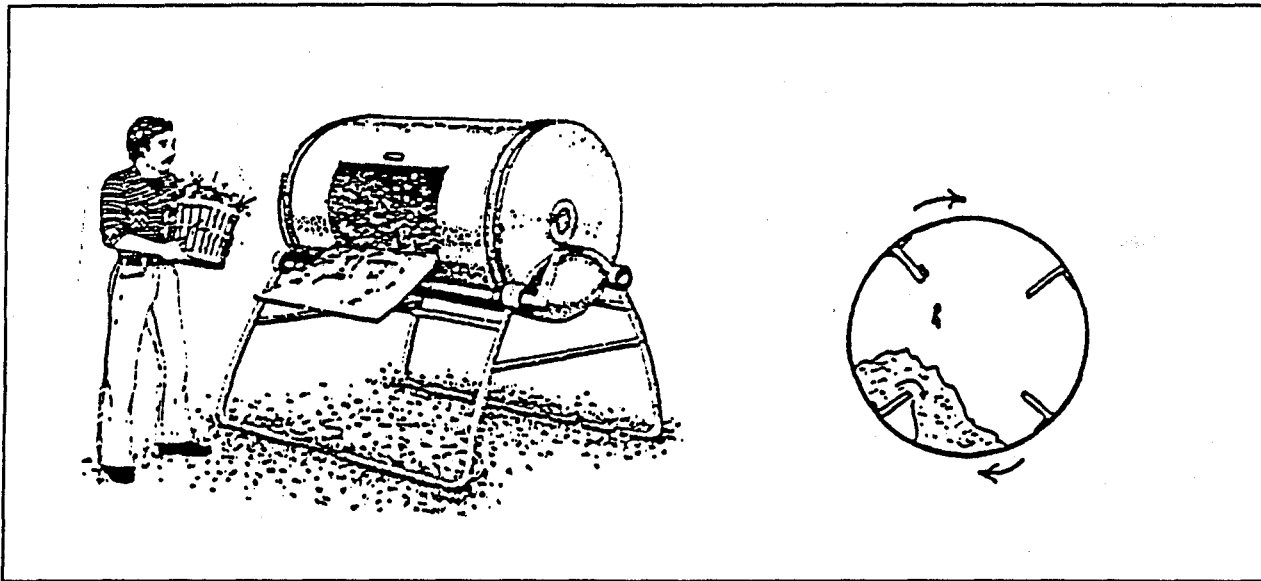


Figure 12. Rotating turning barrel

### Acknowledgements

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