

## How to Build Soak-in/Runoff Models



### Materials (for building one model)

- Sturdy plastic container with flat sides
- Two  $\frac{3}{4}$ " 45° elbows
- One  $\frac{3}{4}$ " coupler (cut in half with a ratcheting PVC cutter to make two)
- Two pieces of  $\frac{3}{4}$ " PVC tubing (cut  $1\frac{1}{2}$ " in length using a ratcheting PVC cutter)
- Four # 18 O-Rings
- 1" spade bit and drill
- Ratcheting PVC cutter
- Clamps
- Sandpaper (or a craft knife if needed)
- Safety glasses/goggles
- Leather gloves

### Additional materials for experiments (per model)

- Small watering can
- Two clear containers (large enough to hold 250–500 mL of water) to catch the runoff and recharge (i.e. graduated cylinders, measuring cups, or plastic cups)
- Potential Groundcovers: concrete (can be made with a bag of concrete mix and water); soil (can be obtained from your yard); turf grass; native/well-adapted plants for rain garden; a can with a hole drilled in the bottom can be used to model a cistern with passive irrigation in a rain garden (optional)

### Procedures

1. Wear leather gloves that fit properly and safety glasses/goggles when using tools/equipment. **Please make sure you are trained on all the tools and equipment used for this project; serious injuries can occur.**
2. Use clamps to stabilize the container to your worktable while you drill a hole near the top left of the box using a 1" spade bit (for the surface-runoff spout). Next, drill a hole near the bottom right of the container (for the groundwater-recharge/infiltration spout).

3. Slide a 1½" long tube cut from ¾" PVC through each hole so half of the PVC tube is sticking out of the hole. Note: this is a very tight fit in order to prevent water leakage. If needed, you can widen the hole using sandpaper (or a craft knife).
4. Place # 18 O-Rings around each side of both PVC tubes.
5. Attach a surface-runoff spout made of ¾" 45° elbow onto the tube on the outside of the box. On the inside of the box, slide a ¾" coupler (that has been cut in half) onto the tube, and push together for a tight fit. Tip: hold an object with a hard, flat surface against the coupler while you push the elbow toward the coupler. Attach the groundwater-recharge/infiltration spout using the same procedures.

### Pictures to help identify parts and how they fit together



Wear leather gloves and use a clamp to hold the PVC or PVC coupler while using the ratcheting PVC cutter



¾" PVC tubing with #18 O-Ring (black) and coupler cut in half (on left).



Same picture as above with another #18 O-Ring and the ¾" 45° elbow added. Note: the coupler and one O-Ring should be on the inside of the container and the other O-Ring and ¾" 45° elbow should be on the outside of the container. All parts should be pressed together tightly to make a watertight seal.

**Instructions for creating different groundcovers:** concrete, compact soil, turf grass, and a rain garden with native/well-adapted plants. Fill one of the boxes with soil to the surface-runoff spout (slightly above the bottom of the spout, but below the top of the spout).



Use the same soil to plant turf grass so the grass is slightly above the bottom of the surface runoff spout. Create a rain garden with native/well-adapted plants planted in a depression (a can with a hole drilled in the bottom can be used to model a cistern with passive irrigation). For the container with concrete, fill in soil to 2" below the bottom of the surface-runoff spout. The concrete mix should be prepared outdoors (or in a well-ventilated area) as the instructions on the bag indicate. Add a 2" layer of concrete on top of the soil up to the surface-runoff spout (slightly above the bottom of the spout). Make sure not to clog the spout with concrete

**Additional tips:** Place the boxes on a table (or box or crate) with the back ends slightly elevated (small blocks of wood can be used to create the desired slope). Next, place containers (graduated cylinders, measuring cups, or plastic cups) under the spouts to catch the surface runoff and groundwater recharge/infiltration. If soil clogs the runoff spout, then use a pencil or poking stick to unclog the spout. Have a towel/sponge handy.

**For more information and links to lesson plans, see:**

[www.austintexas.gov/Watershed/YouthEd](http://www.austintexas.gov/Watershed/YouthEd)