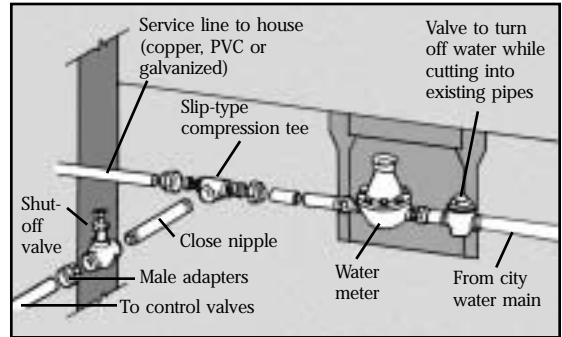


Step 1: Use Flags to Indicate Sprinkler and Valve Locations

Use Toro flags to indicate sprinkler locations according to your design. Use line-marking spray paint to locate the lines along the area where you'll trench and install pipe. Check your worksheet to make sure you mark the lines accurately. You will be digging your trenches along these lines (step 3).

Step 2: Tap Into Your Service Line

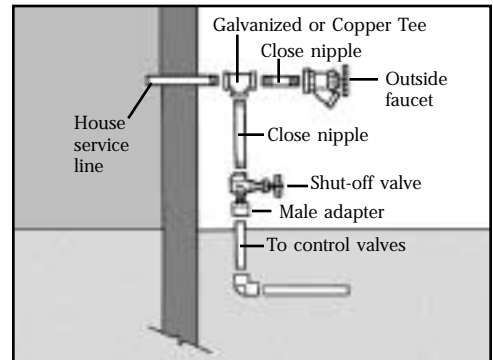
By cutting into your service line and slipping on a compression tee (see illustration to the right), you can connect your sprinkler system to the water supply without soldering. You can avoid cutting the main line by attaching your system to the outside faucet connection (see lower right). In addition, PVC may be substituted for copper in non-freezing areas (check local codes for backflow requirements).



Typical installation using compression tee; PVC pipe and fittings

If the Meter Is in Your Yard:

1. Shut off your water supply at the meter (check with your water department first).
2. Dig to expose the service line.
3. Tie into the service line, between the water meter and the house.
4. Remove a section of pipe, leaving a gap large enough to slide on a compression tee.
5. Slip the tee over each end of the pipe.
6. Tighten the compression nuts. The rubber gasket will compress against the pipe, creating a seal to prevent leakage.
7. Install a close nipple with tape on all threaded connections into the tee.
8. Attach a shut-off valve to this section of pipe. The shut-off valve allows you to turn off the system by hand, if necessary.
9. Keep this connection as clean as possible. This is your tap-water supply.



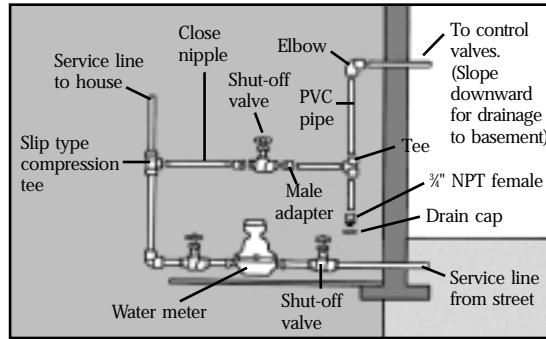
Typical outside faucet connection using galvanized/copper pipe and fittings



When sprinklers are running, the layout using an outside faucet connection may result in noise in your house as the water runs through the pipes.

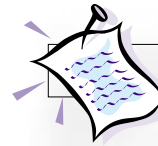
If the Meter Is in Your Basement:

1. Shut off your water supply at the meter (check with your water department first).
2. Tap into the service line with a compression tee.
3. Drill a hole through the sill above the foundation, or drill or chisel a hole in the basement wall. Make a hole no bigger than needed to run a 1" pipe through it.



Typical installation using PVC pipe and fittings

4. Install the piping, as shown above. Add a shut-off valve and drain cap. The drain cap should be in a low position to allow system drainage.
5. Run your connecting pipe out of the basement through the hole to the outside. Then run it to where the backflow preventer and first set of valves are on your planning worksheet (see page 26 for more on backflow prevention).
6. To drain water from the system, close the shut-off valve, place a bucket under the drain cap and remove the cap.
7. After the connecting pipe is installed, seal the hole in the wall with caulking compound.

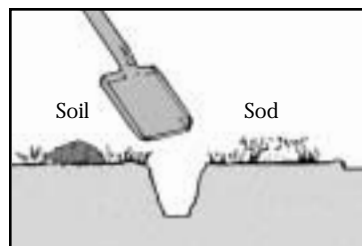


Notes

Step 3: Main and Lateral Line Trenching

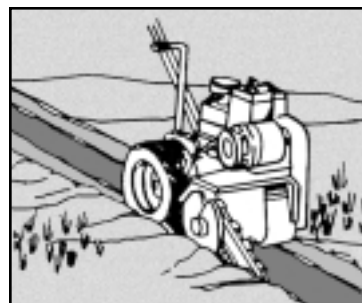
Trenching by Hand

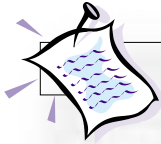
To soften the soil, water the ground approximately two days before you dig. Dig trenches 8" to 12" deep or below the frost line in freezing climates. Put sod on one side of the trench and soil on the other.



Trenching With a Trencher

Trenching machines are an easier, faster alternative to digging with a shovel. They can be rented by the hour, day or week, usually from a lawn supply store or rental equipment dealer. The person you rent from can show you how to operate the machine properly and safely. Trenchers should not be used to dig through ground cover, flower beds, on steep slopes or near buildings. Be sure to verify all underground utilities before trenching.



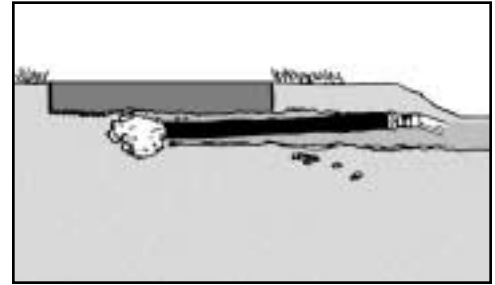


Notes

Step 3: Main and Lateral Line Trenching (cont.)

Going Under Obstacles

To tunnel under brick and concrete walks, attach a piece of Schedule 40 PVC pipe to a hose with a hose-to-pipe adapter. Cap the end with a PVC cap and drill a 1/8" hole in the end of the cap. Point the end of the pipe to where you want to tunnel. Turn on the water and push the pipe under the concrete. The force of water will blast away the soil in front of it to form a tunnel. Tunneling requires care to avoid damage to walks and driveways.



Step 4: Install the Sprinkler System Main Line

Attach your sprinkler system main line to the service line. Run it along the bottom of the trench from the house to the first set of valves and if required, to the second set. Place your valve wire next to the pipe whenever possible.

Tips on Working With Different Pipes

PVC Pipe

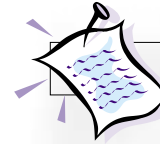
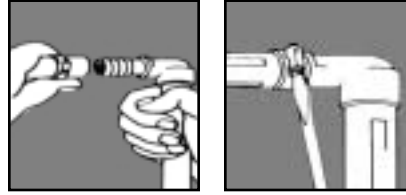
1. Cut pipe with a PVC pipe cutter.
2. Brush on a primer to clean the pipe surface and the inside of the fitting.
3. Brush solvent (cement) on the outside end of the pipe and lightly inside the fitting.
4. Slip the pipe into the fitting and give it a quarter turn.
5. Hold in place for about 20 seconds so the solvent can set.
6. Wipe off excess solvent with a rag.



Wait one hour before running water through the system.

Poly Pipe

1. Cut pipe with a PVC pipe cutter or sharp knife.
2. Slip a stainless-steel clamp over the end of the pipe.
3. Insert the fitting into the end of the pipe, past the barbs.
4. Slide the clamp over the barbs of the fitting.
5. Tighten the clamp.



Notes



To relax poly pipe, expose it to sunlight. Never expose poly pipe to open flame.



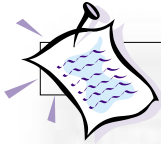
Do not use poly pipe as the connecting pipe between the service line and the control valves. Surge pressure may rupture the poly pipe.

Step 5: Connect Zone Valves to the Main Line

A group of valves is called a manifold. Use flags to mark the location of the valves, as indicated on your worksheet.

Atmospheric vacuum breakers (AVBs) are always installed above ground. With an AVB, dig out an area large enough to accommodate your inlet and outlet pipes.

In-line valves are installed below ground. Protect valves below ground by sheltering them in boxes (see diagram on next page). Dig out the area where below-ground valves are to be installed. Install valve boxes at or near grade level. When you buy boxes, be sure to find out how many valves fit in each box so you can buy the sufficient amount.



Notes

Select the Right Valves

Flo-Pro Electric Atmospheric Vacuum Breaker (AVB) Valve



Above-ground installation with built-in backflow prevention.

250/260 Series Plastic Valve

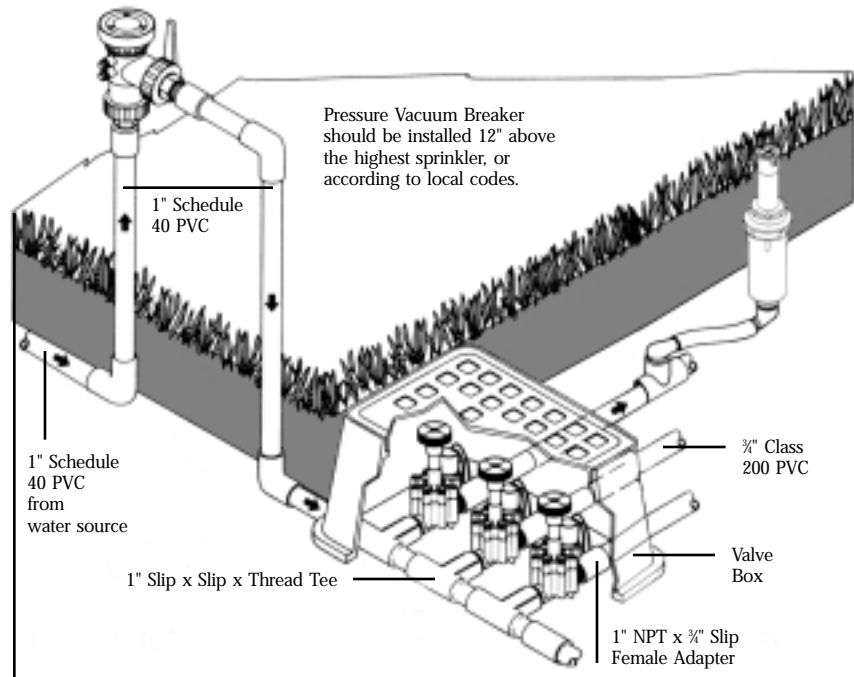


Below-ground installation requires separate backflow prevention.

Backflow Prevention

Call your water company or the proper municipal authority to find out about any building codes or permits required for the installation of underground sprinkler systems. They can tell you about local codes for backflow prevention to protect your household water supply from contamination. They can also advise you on where in the system it should be located (see illustration below for general placement). In addition, check with your local utility companies before digging to identify any buried cables or natural gas lines.

Electric In-Line Valve Assembly (1" Valves Shown)

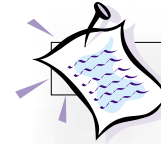


Shut-off Valves

In systems with pressure vacuum breakers (PVBs), the PVB may be used as a shut-off valve.

In systems where PVBs are not used, we recommend installing a shut-off valve between the zone valves and the service line. Check local codes for the type of shut-off valve recommended.

PVBs should be installed 12" above the highest sprinkler, or according to local codes.



Notes

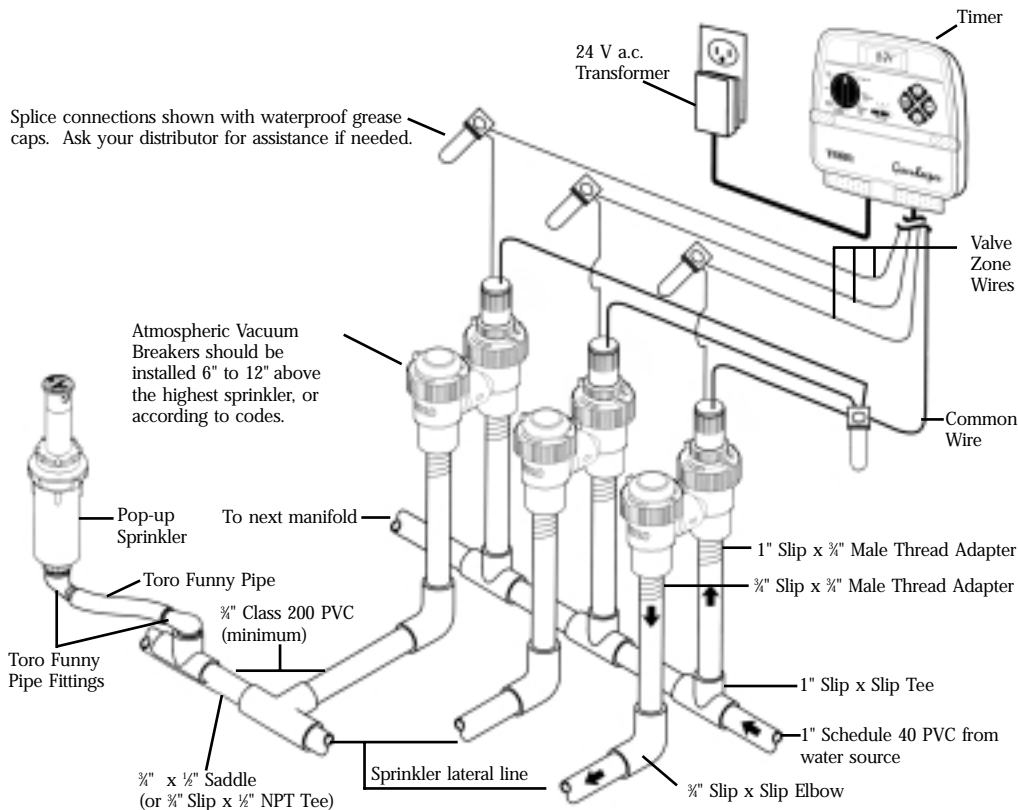


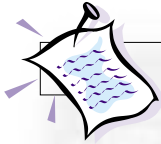
When you install your sprinkler system in the front yard with plans to install the backyard later, run your sprinkler main line and wire to an accessible location in the backyard and cap it off. Leave extra wire (more strands) to handle more valves as you expand in the future.



PVC pipe is shown in these illustrations. However, in areas where freezing occurs, poly pipe may be used downstream of valves instead of PVC. Always check local codes for proper pipe recommendations and before installing backflow prevention devices.

Electric Atmospheric Vacuum Breaker Valve Assembly





Notes

Step 6: Install the Automatic Timer

1. Install the timer in your garage or another convenient place. If an outdoor location is desired, plan to use an outdoor cabinet to protect the timer against the effects of weather. Make sure an adequate power supply is available. Toro timers require only a standard AC outlet (see instructions included with the timer for details).
2. Run wires along the trench, underneath the pipe and from the valves to the system timer.
3. Take one wire from each valve and connect them to a common wire (for ease of identification, use the white wire as the common). Connect the common wires of valves that are located together. Connect the common wire to the common terminal on the timer (see illustration, page 27).
4. Take the other wire from each valve and connect to the timer terminals in sequence.
5. Plug in the timer.



All outdoor connections and splices must be waterproofed.

Select the Right Size Timer

GreenKeeper® Timer



4, 6 or 8 Stations

This is an easy-to-use timer that expands as your landscaping needs grow.

GreenKeeper® Timer Outdoor Cabinet



Optional rainproof, lockable outdoor cabinet is available to be used with the Toro GreenKeeper timer.

Vision® Timer



6, 9 or 12 Stations

Programming is simple with these advanced hybrid, residential controllers designed with solid-state precision.

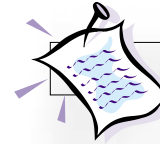
Rain Switch®



Attaches easily to roof eaves or 3/4" PVC pipe. Conserves water by interrupting watering during rainfall.

Step 7: Install Downstream Pipe

Start from the valves and move outward, laying the connecting pipe along the bottom of the trench. At each flag, install an appropriate fitting for sprinkler attachment (see pages 24-25 for tips on working with different pipes).



Notes

Step 8: Flush the System to Clear Debris

After the pipe has been connected and the glue has dried (PVC pipe only), turn on the water, open valves one zone at a time and flush until the water runs clear.



Don't backfill your trenches until your final system operation check is complete (see page 30).

Step 9: Install Your Sprinklers, Zone by Zone

Install one sprinkler zone at a time, using Toro Funny Pipe®. Remember to refer to your planning worksheet.

1. Placing a sprinkler in a trench as a guide, measure from the connecting pipe fitting to the bottom of the sprinkler and cut a length of Funny Pipe to fit. Place sprinklers at least 3" from sidewalks, curbs and buildings.
2. Install the appropriate Funny Pipe elbow into the sprinkler and into the PVC or poly pipe fitting.
3. Connect one end of Funny Pipe to the sprinkler and the other end to the connecting pipe fitting.
4. Position the sprinkler in the trench so that the top of the sprinkler is flush with ground level. Stabilize the sprinkler with soil without filling the entire trench.
5. Verify that the sprinkler is straight for optimum performance.

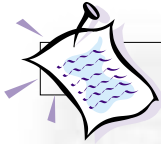
Toro Funny Pipe

One of the most useful and time-saving sprinkler installation aids is Toro Funny Pipe. Whether you are installing a new system or replacing an old sprinkler, Funny Pipe can make your job faster and easier.



What is Funny Pipe?

Funny Pipe is a high-strength poly tubing that solves tough sprinkler installation and replacement problems. Simply put, Funny Pipe acts as a flexible extension cord between the sprinkler line and the sprinkler, allowing you to position sprinklers easily where you need them, even in hard-to-reach areas!

**Notes****Step 10: Check System Operation, Zone by Zone**

1. Slowly turn on the water and manually open the control valve.
2. Adjust the sprinkler to ensure proper coverage (see sprinkler installation instructions for details).
3. If your coverage is incomplete, follow the steps below:
 - a. Make sure the control valve and shut-off valve are fully open.
 - b. Turn off any water being used in the house (washers, showers, faucets, etc.).
 - c. Fine-tune sprinkler spray patterns to match your coverage area.
 - d. If coverage is still not complete, go back and check your system layout against the plans.
 - e. When you see that the coverage is satisfactory, fill in the trench with dirt and cover with sod.

Congratulations!

When properly installed, your Toro automatic sprinkler system will help keep your landscape green and healthy for years of recreation and enjoyment.

Water Conservation

Your new Toro underground sprinkler system is now installed and ready to water your lawn automatically. Following are some tips to conserve water:

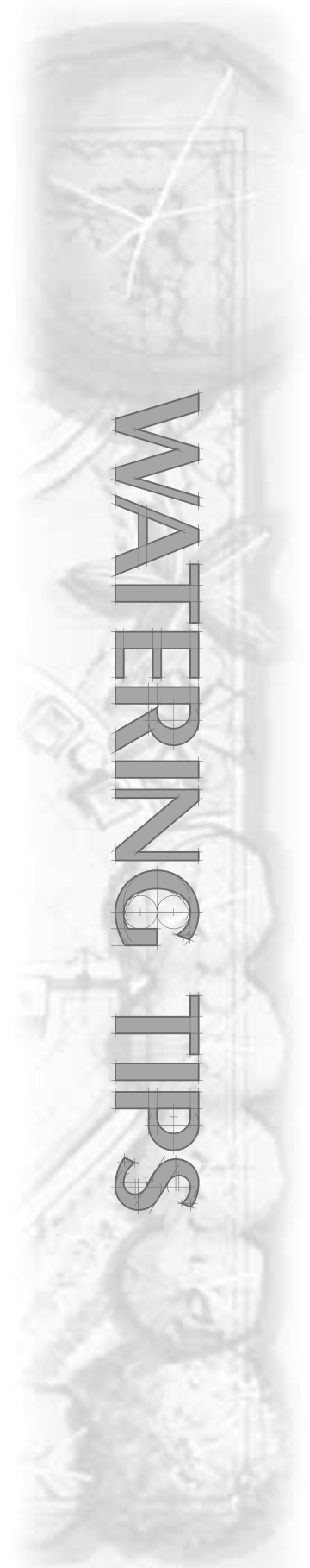
- ✓ Water in the early morning (before sunrise) when water pressure is greatest, evaporation is minimal and the lawn drinks in the most water.
- ✓ Do not water at night because water will sit on the lawn and may cause disease.
- ✓ Do not water in the heat of the day because the sun will evaporate water before it can soak in.
- ✓ Give lawns more water than plants, placing plants on a separate watering schedule. Some timers provide multiple watering programs, which allow you to schedule lawns, shrubs and flower beds separately.
- ✓ Reduce run times for zones in the shade.

Water Scheduling

Using the formula and chart below, determine your weekly watering requirements per zone. Then divide the number of minutes per week into days. For example, if you need to water 65 minutes a week, you could water 9-10 minutes daily or 16-17 minutes every other day. If you have sandy soil, you can apply your daily requirement all at once. With clay soils, you will need to apply water more slowly and may have to use more daily start times.

$$\text{Minutes Per Week} \div \text{Starts Per Week} = \text{Minutes Per Start}$$

Average Daily Temperature	Minutes Per Week		
	Fixed-Spray Sprinklers	Multi-Stream Sprinklers	Medium-Range Rotary Sprinklers
60° and 79°	45	100	120
80° and 99°	65	150	180
100° and 110°	85	200	240



Recommended Winterization Procedures for Freezing Climates

Manual Drain Valves

1. Close the main water supply valve.
2. Open all manual drain valves upstream of the automatic valves to allow drainage of the main line and valve manifold.
3. Open all manual drain valves downstream of the automatic valves to allow drainage of the lines.
4. Follow recommended winterizing instructions included with your specific sprinkler timer.

Automatic Drain Valves

If the system is installed with automatic drain valves, the lines downstream of the valves will drain automatically when the valve closes.

1. Close the main water supply valve.
2. Open all the manual drain valves upstream of the automatic valves to allow drainage of the main line and valve manifold.
3. Follow recommended winterizing instructions included with your specific sprinkler timer.

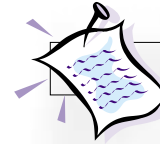
Automatic Control Valves

This procedure should be followed if adequate control valve drainage cannot be achieved through the use of manual or automatic drain valves.

1. Close water supply valve.
2. Complete manual drain valve, automatic drain valve and sprinkler timer winterization procedures.
3. Disassemble the automatic control valve and drain all water.
4. Reassemble the automatic control valve.

Winterization with Compressed Air

1. Connect the air compressor (25 CFM or larger with the pressure regulator adjusted to 30-50 PSI) to the fitting downstream of the water supply drive.
2. Activate each automatic valve from the timer, allowing each valve to remain open until all water has been expelled from the zone.
3. After all valves have been activated and all water has been expelled, disconnect the air compressor.
4. Turn off the timer.
5. Open all the manual drain valves upstream of the automatic valves to allow drainage of the main line and valve manifold.



Notes



WARNING

TO PREVENT PERSONAL INJURY, DO NOT ATTEMPT TO DISASSEMBLE THE SYSTEM WHILE UNDER PRESSURE.



Do not exceed 50 PSI of air pressure in any system. Exceeding 50 PSI can result in equipment damage.



Refer to the Toro Irrigation System Start-Up and Winterization Procedures Guide (form no. 367-0072) for more information.





The Toro Company ▶ Irrigation Division ▶ An ISO 9001-Certified Facility
▶ PO Box 489 ▶ Riverside, CA ▶ 92502 ▶ (800) 664-4740 ▶ www.toro.com

