WATER CONSERVATION

Water is essential to life. It is a primary building block in the cycle of life and an absolutely precious natural resource. We use water in our homes in a variety of ways. We use it to clean and wash, to drink and to flush; water is essential for operating appliances; we use it outdoors and in our cars, and for all types of recreational uses. As a matter of fact every American, on average, uses over 80 gallons of water every day. Water is an integral part of the household system and how we use and manage our residential water supply will impact all of the other components of that system.

In this chapter we will focus on conserving water and using it more efficiently. Using less water minimizes the demand on your spring, well, or municipal water supply and (since most of the water you use goes down the drain) reduces demand on your septic system or municipal sewer system. The American Water Works Association estimates that indoor water consumption can be reduced by 32% simply by fixing water leaks and installing efficient water fixtures and appliances. With basic water conservation practices, even more can be saved.

Drought

Drought is an unusually long period of dry weather that creates significant water shortage. Drought is a phenomenon that can devastate water supplies, agriculture and livestock, the economy, and human life over long periods of time. Drought is a natural disaster that affects more people worldwide than any other natural hazard. Rainfall is an obvious solution, but one that is not under our control. Water conservation, which is normally mandated during times of drought, is a necessary action to alleviate the dangers of drought conditions.

Drought is worse because it occurs randomly and unpredictably. During times of good rainfall, population growth and development increase our water needs. As long as water is adequate, we are not enthusiastic about spending money to conserve water or to expand our water supplies. When drought finally hits, it is often too late to take action.

Serious drought conditions in Virginia caused a State of Emergency to be declared in 2002. Under penalty of law Virginia residents were not allowed to water their lawns, wash their vehicles, or fill their swimming pools. State agencies were required to reduce water use by 15% and more serious measures were installed in other states and regions of the country.

The only good thing that comes from a drought is that water conservation becomes an important issue and the value of water as a resource becomes fully appreciated. The challenge is for every citizen to practice water conservation on a daily basis whether a drought exists or not. This kind of personal leadership will benefit everyone: money will be saved, energy will be saved, and our water quality and supply will be preserved and protected.

Water Saving Practices

In a single day, waste and inefficiency may cost you up to 100 gallons of water for each person in your house. Listed below are some simple water saving measures that can be applied in any residence.

- Fix leaky faucets, leaky toilets, and leaky pipes. Fixing water leaks may save from 15 to 100 gallons of water per day.
- Install low-flow showerheads and faucet aerators. This can reduce the water used by over 50%.
- Replace an old toilet with a water-saving model that uses 1.6 gallons of water per flush. Your old toilet (pre-1992) may be using 5 or more gallons per flush.
- If you do not use an efficient toilet then install a toilet displacement bag or kit and save ½ a gallon per flush.
- Flush toilets only when necessary. Do not use toilets for waste-baskets.
- Take short showers. Five minutes should be the maximum.
- If you take frequent baths, only fill the tub by 1/3. A full tub can use over 50 gallons of water.

- Do not run water continuously while shaving or brushing your teeth.
- Wash clothes only when you have a full load of clothes and use cold water whenever possible
- Using an Energy Star certified washing machine will reduce water use by 50%.
- Only operate dishwashers when the load is full.
- Limit the pre-rinse cycle in dishwashers by scraping dishes and dirty pans.
- Avoid using garbage disposals or use recycled water to operate a disposal.
- Do not water your lawn, plants, or trees needlessly. Excessive watering retards root growth, resulting in more need for water and more damage when drought hits and water conservation measures are imposed.
- Add mulch to trees and plants. This will trap and hold water in the ground and roots.
- Avoid fertilizing your lawn in summer because this will increase your lawn's need for water. Fertilize in fall or early spring instead.
- If you use a lawn sprinkler use it efficiently. Lawn sprinklers that are left on all day can waste thousands of gallons of water. Water the lawn in the evening or early morning, when evaporation is less.
- If you have a swimming pool, keep it covered when not in use. This will prevent evaporation and the need to fill the pool unnecessarily.
- When you wash your car use a shut-off nozzle on your hose or choose a car wash that recycles water.
- Conserving water is simply using good common sense. Examine your habits and practice conservation by making better decisions.

Low Flow Water Saving Fixtures and Appliances

The National Energy Policy Act of 1992 set the following standards for all new fixtures manufactured in the United States:

- Toilets use no more than 1.6 gallons per flush.
- Showerheads use no more than 2.5 gallons per minute.
- Kitchen and bathroom faucets not exceed 2.5 gallons per minute.

If your kitchen and bathroom fixtures were purchased after 1992 then you probably have an energy efficient low flow water device. There are showerheads and faucets that exceed the minimum standards set by law and if you are ready to replace your fixtures then be sure to check these out. If you have fixtures that are pre-1992 then you could be experiencing a faucet flow rate of almost 7 gallons per minute and a showerhead that flow rate of over 5 gallons per minute. But remember: your house is a system and the impact of low flow fixtures will be minimized if you leave the water running or take lengthy showers. Be sure to combine conservation with efficiency to maximize the energy and water saving potential in your household.

Low Flow Toilets

The toilet is the greatest consumer of water in a household and typically can account for up to 25 to 30% of indoor water use. If you have a toilet that was manufactured before 1992 then consider replacing it with a low flow toilet that will only use 1.6 gallons per flush compared to older models that will use from 3.5 to over 5 gallons per flush. It is important to research and carefully select a toilet because they will vary in quality. If you buy a low quality toilet that takes two flushes to empty the bowl, you won't be saving much water!

Waterless Urinals

A waterless urinal is a non-flushing urinal that allows the urine to pass through a lighter-weight liquid, which serves as a trap and keeps odors from escaping into the room. There are no moving parts and therefore very little maintenance. These appliances are currently used in commercial applications exclusively but a waterless toilet for residential use may be available in the future.

Composting Toilets

Composting toilets allow human waste to be converted into nutrient rich compost, which can be used for fertilizing non-food crops and plants. There is no water

used in flushing a composting toilet. The composting chamber consists of organic matter like wood shavings, peat moss, and some water that will aid in the decomposition of the waste. These systems are expensive and may not be for everyone but they certainly save energy and water and reduce the costs of treating wastewater.

Low Flow Faucets

Faucets purchased after 1992 will be equipped with an aerator that uses 2.5 gallons per minute. Compared to faucets manufactured before 1992, which use 5-7 gallons per minute, this is a significant saving. An aerator adds air to the water stream, increasing the effectiveness of the flow and reducing water consumption. Aerators on the market range from 0.5 to 2.5 gallons per minute.

Low Flow Showerheads

Showers account for almost 17% of indoor water use and use almost half of all hot water that is consumed within a household. Showerheads manufactured after 1992 are required to operate at 2.5 gallons per minute. Pre-1992 showerheads may use up to 8 gallons per minute. There are low flow showerheads on the market now that use only 1.5 gallons per minute. Some showerheads come with shut off valves that allow the individual to cut off the flow of water when shampooing or soaping up and then turn it on again when needed. There are many different models to choose from so be smart, do some research and ask questions before purchasing a low flow showerhead. A low flow showerhead will save water and energy by reducing hot water use. Remember, though, that combining this efficient device with practicing conservation by taking shorter showers is the way to operate your household at maximum energy performance levels.

High Efficiency Washing Machines

An Energy Star labeled washing machine (Chapter 7), uses 30 to 40% less water than a traditional machine. They do this by not filling the entire tub with water and agitating the clothes covered with water but by rotating the clothes through a partially full tub. They also spin the clothes better, producing clothes ready for the line or the dryer that have less moisture. A typical household does nearly 400 loads of laundry a year, which accounts for over 20% of indoor water use. So consider an energy efficient washing machine for your next appliance purchase and you will significantly reduce your household water consumption.

Dishwashers

Dishwashers (Chapter 7) manufactured after 1994 use 7-10 gallons of water per cycle versus pre-1994 models that use 8-14 gallons of water per cycle. This is due to national efficiency standards. When purchasing a new dishwasher be sure to study the EnergyGuide label and look for those that are Energy Star certified to insure that they exceed the minimum efficiency standards.

Fixing Water Leaks

Household water leaks can account for over 10% of a home's water consumption and can result in an average loss of over 25 gallons per day. Thousands of gallons of water can be lost annually due to leaky faucets, toilets, and water pipes. The Environmental Protection Agency (EPA) concluded in 2002 that 14% of the water that we buy is lost to water leaks. The EPA calculated that the water lost to leaks in homes totals 1.72 billion gallons daily nationwide. That is the equivalent to the amount of water consumed daily by New York City and Chicago combined.

Prevention and consistent maintenance is the key to correcting this wasteful and costly problem. Prevention of leaks is first accomplished by using quality fixtures, plumbing hardware, pipes, fittings and valves. Always select National Sanitation Foundation (NSF) approved plumbing fixtures, piping, and fittings. Quality products will minimize the potential for water leaks.

Most water leaks are fairly obvious while some may require testing or crawling under the house to check a water line. If you have a water meter, check it when no water is being used. If the meter is showing that usage has occurred when all the water in the house is off, then you have a leak somewhere. If you are unsure whether your toilet may be leaking or not, give it the dye test. Lift the lid off the toilet tank and put several drops of dark food coloring into the tank. Wait several minutes and then check to see if there is any dye color in your toilet bowl. Your toilet is leaking if there is color in your bowl.

Table 9-1 – Water Loss from Leaks*

Pipe Leaks *(at 60 pounds of water pressure)*		**Faucet Leaks**	
Size of Hole	Gallons Wasted Monthly	Drops per Minute	Gallons Wasted Monthly
1/32" 1/16" 1/8" 3/16" 1/4"	6,300 25,000 100,000 225,000 400,000	60 90 120	192 310 429

**Source: California Urban Water Conservation Council*

Hiring a plumber to fix a water leak, particularly if it is a leaky pipe that might require replacement or re-soldering, is a good investment and should be considered whenever there is potential loss of water due to leaks. At the same time a homeowner can make faucet and toilet leak repairs simply by making an adjustment or by replacing a washer. This can save time and money. Follow the instructions below and you may be able to fix toilet and faucet leaks without hiring a plumber. The following illustrations and information are courtesy of the New Mexico Office of the State Engineer and is contained in their water conservation booklet "Don't Waste a Drop". Check their website at www.ose.state.nm.us .

Toilet Types

The first step in fixing a toilet leak is determing what type of mechanism your toilet has: float ball / tank ball, float cup/ flapper, or float ball/flapper.

Float Ball/Tank Ball Models

Float ball / tank ball models use a ball float to sense the water level in the toilet tank and a ball valve to control the flow from the tank to the toilet bowl. They have the following components (see Figure 9.1):

a. Tank– The top portion that holds water waiting to be flushed. Also inside are the flush mechanisms and components.

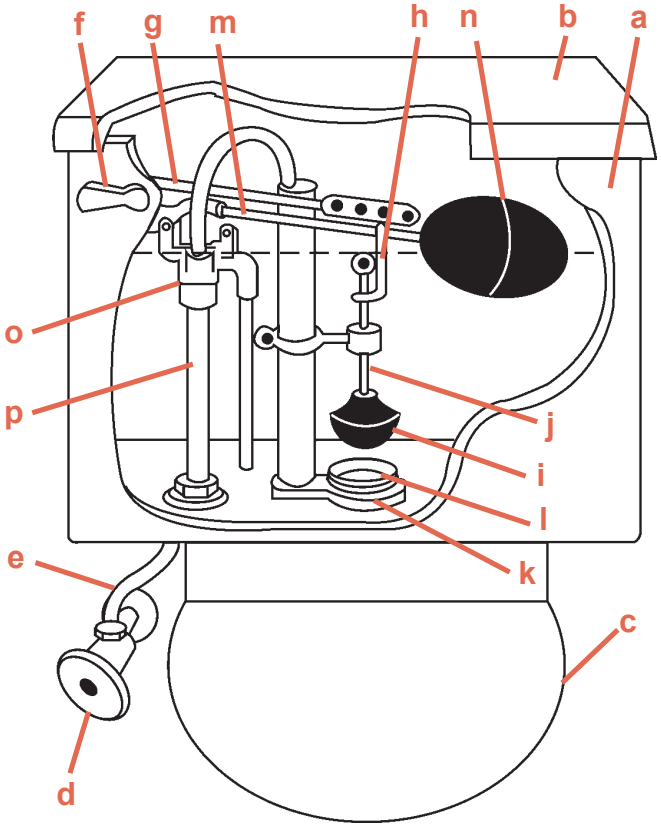


Figure 9-1 - Float ball / tank ball toilet

b. Tank lid– The cover that sits on the tank and conceals the flush mechanisms.

c. Bowl– The lower half of the toilet that holds waste prior to flushing.

d. Water shutoff valve– The valve located on the wall near the base of the toilet (typically with an oval or round handle) that controls the flow of water into the toilet tank.

e. Water supply line– A hose-like line, typically made of flexible material, that connects the water shutoff valve to the bottom of the tank.

f. Flush handle– The mechanism that is pushed to activate the flush.

g. Lift arm– The metal or plastic rod connected to the flush handle.

h. Lift wire– The connecting link between the lift arm and the tank ball.

i. Tank ball– The rubber ball that sits in the flush valve (the hole in the bottom of the tank) to keep water in

the tank until the flush.

j. **Guide arm**– A fixed piece, connected to the overflow pipe, which ensures that the tank ball falls snugly on the flush valve.

k. **Flush valve**– The opening through which water flows from the tank to the bowl.

l. **Valve seat**– The rubber seal at the bottom of the tank into which the tank ball fits.

m. **Float arm**– The metal or plastic rod connected to the ball cock at one end and the float ball at the other. The angle of the float arm is what tells the ball cock to shut off the water supply to the tank.

n. **Float ball**– A hollow rubber ball that rises and falls with the water level in the tank.

o. **Ball cock valve**– The tall mechanism on the left-hand side of the tank that controls the flow of water into the tank.

p. **Overflow pipe**– The vertical pipe that drains excess water from the tank to prevent overflow.

Float Ball/Flapper Models

Float ball / flapper models use a ball float to sense the water level in the toilet tank and a flapper valve to control the flow from the tank to the toilet bowl. Besides the general components of the float ball /tank ball models, they have (see Figure 9.2):

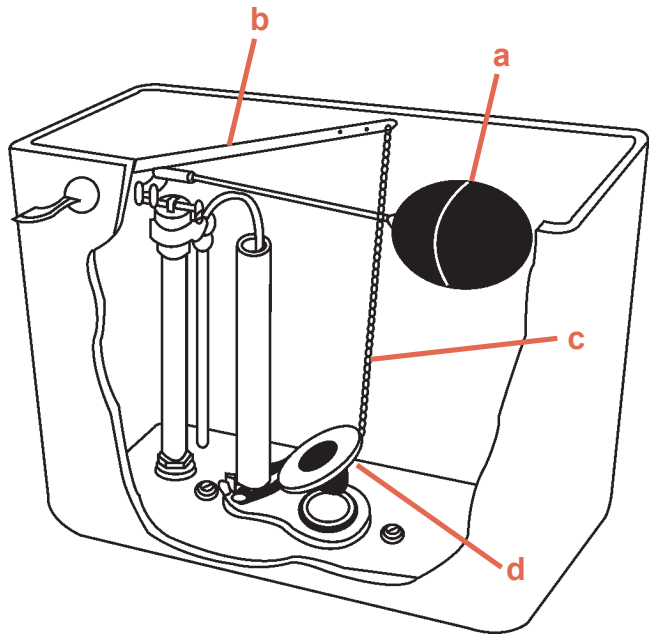


Figure 9-2 - Float ball / flapper toilet

a. **Float ball**– A hollow rubber ball that rises and falls with the water level in the tank.

b. **Lift arm**– The metal or plastic rod connected to the flush handle.

c. **Lift chain**– The connecting link between the lift arm and the flapper.

d. **Flapper**– The flush valve seat that controls the volume of water passing from the tank to the bowl during a flush.

Float Cup/Flapper Models

Float cup/ flapper ball models use a float cup (sometimes called a "vertical ballcock") to sense the water level in the toilet tank and a flapper valve to control the flow from the tank to the toilet bowl. Besides the general components of the float ball /tank ball models, they have (see Figure 9.3):

a. **Float cup**– A variation on the float ball, a float cup performs the same basic function, rising and falling with the water level in the tank. When the float cup rises high enough along the ball cock tube, it triggers the ball cock to stop the flow of water into the tank.

b. **Lift arm**– The metal or plastic rod connected to the flush handle.

c. **Lift chain**– The connecting link between the lift arm and the flapper.

d. **Flapper**– The flush valve seal that controls the volume of water passing from the tank to the bowl

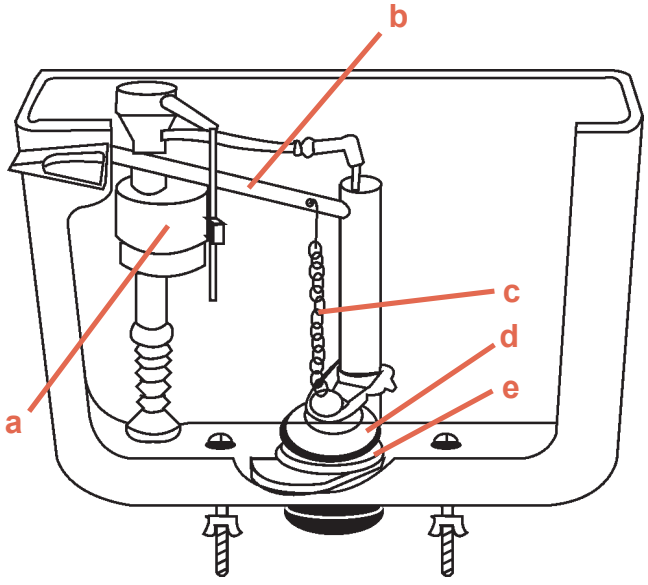


Figure 9-3 - Float cup / flapper toilet

during a flush.

e. **Flush valve**– The opening through which water flows from the tank to the bowl.

Another type of toilet is the pressure-assisted toilet, which uses air pressure within a cylindrical tank inside the toilet tank to propel the water during a flush. Tuning up a pressure-assisted toilet is best left to a professional plumber.

Fixing Toilet Problems

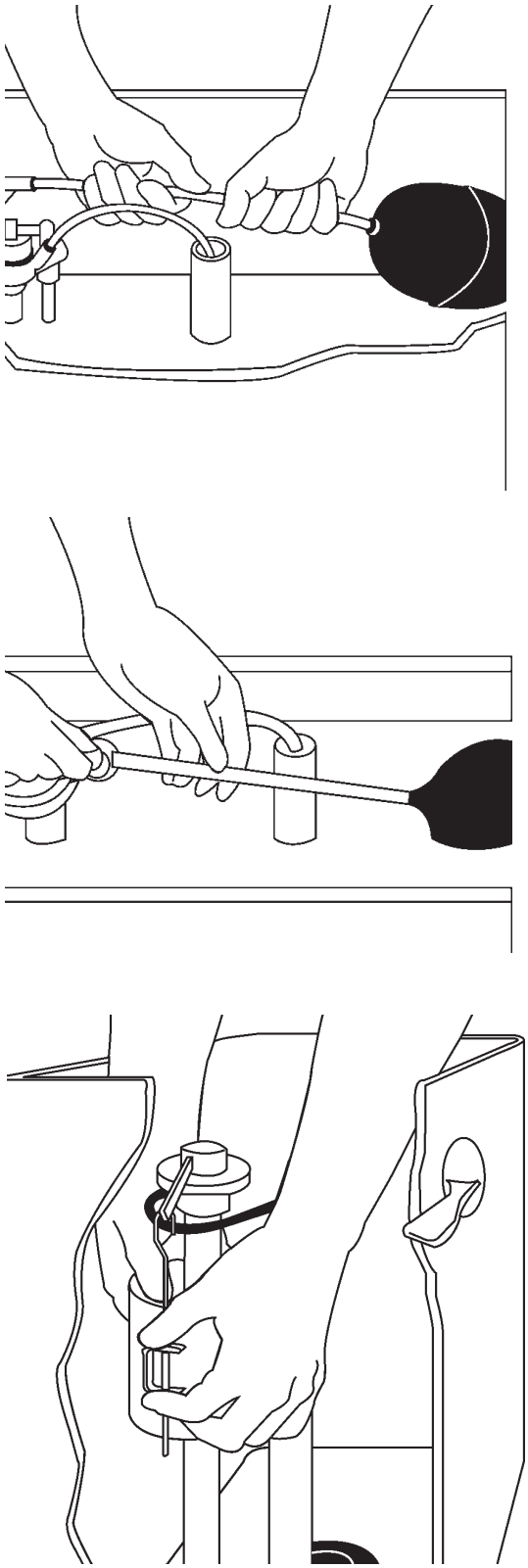
Leaks and noises are the most common problems with tank toilets, and the two types of problems are often interrelated. (However, some leaky toilets are silent.) The good news: many common toilet leaks can be fixed by making minor adjustments. Let's go through some of the most common reasons toilets leak and the steps you'll need to follow to fix them.

Toilet "runs" all the time, or periodically between flushings. (You hear the sound of running water.)

A running toilet can be caused by an improperly adjusted float ball that results in a water level in the tank that's so high that water is escaping into the top of the overflow pipe. A running toilet can also be caused by a cracked float ball, an improperly seated flapper or tank ball, a kinked lift chain or a bent lift wire.

If the water level in the tank is too high: Adjust the float arm.

- In older toilets with a metal float arm, you'll need to grab the float arm with both hands and gently bend the side with the float ball downward. (Figure 9-4a)
- If your toilet has a plastic float arm, there's probably an adjusting knob located where the arm meets the ball cock. Loosen the knob and move the float arm and float ball downward. (Figure 9-4b)
- If your toilet has a float cup instead of a float ball, pinch the spring clip on the side of the float cup and slide the float cup a bit lower. (Figure 9-4c)
  Some toilets have a "floatless ball cock" that controls



9-4a

9-4b

9-4c

Figure 9-4 - Adjusting tank level

the water level with a pressure sensing device. To adjust the water level on a floatless ball cock, turn the adjustment screw on top of the ball cock. Turn the screw clockwise to raise the water level and counterclockwise to lower it.

Flush the toilet and check the new water level. It should be about 1/2 inch below the top of the overflow tube (or at the line etched on the inside back of the tank).

Replace the float ball

If a simple water-level adjustment doesn't fix the problem, you might need to replace the float ball. If the float ball is cracked, it will fill up with water and never rise high enough to tell the ball cock valve to shut off the water. The float ball will be fully or partially submerged and the water level in the tank will be so high that water flows into the overflow pipe.

- Remove the float ball by unscrewing it counterclockwise.
- Coat the threads of the float arm with petroleum jelly.
- Screw a new float ball onto the float arm.

(See Figure 9-5.)

If jiggling the handle stops the toilet from running: Check the guide wire or lift chain.

- For flappers with lift chains: Make sure the chain isn't kinked or hung up on the float arm or float ball. Try adjusting the chain by hooking it into a different hole on the lift arm (which is attached to the flush handle). (See Figure 9-6.)
- For tank balls with guide wires: Check to see that the tank ball is fitting properly on the valve seat. To readjust a tank ball mechanism, loosen the thumbscrew that fastens the guide arm to the overflow pipe. Reposition the arm and the lift wire so that the tank ball is right above the flush valve.

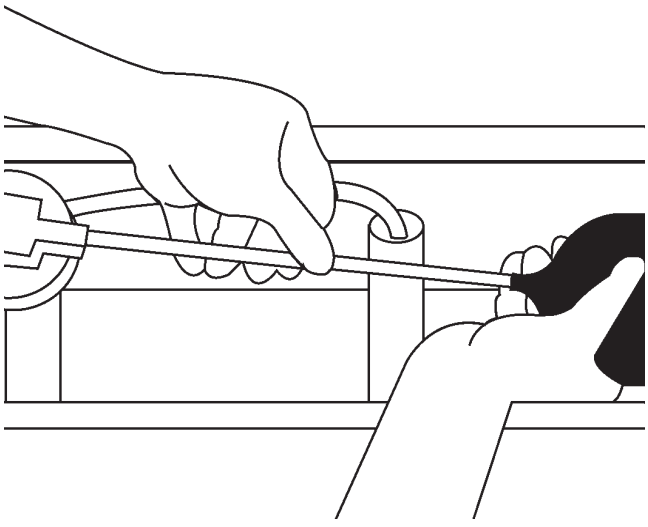


Figure 9-5 Replacing float ball

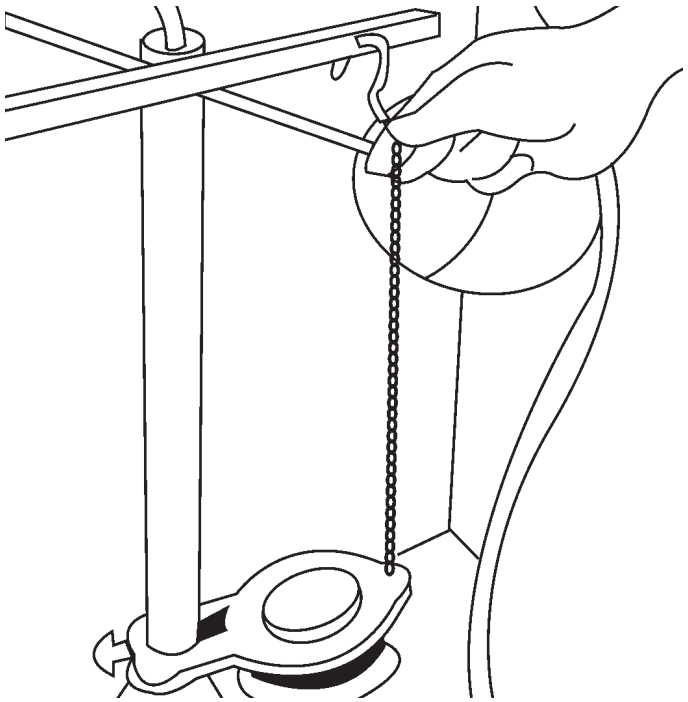


Figure 9-6 - Check the lift chain

If the toilet STILL leaks, replace the ballcock

If none of the above procedures has fixed the leak, or the toilet is making a high whine or whistle when the tank is filling up, consider replacing the ball cock, the mechanism that controls the flow of water into the toilet tank. Replacement ball cocks are sold at plumbing, hardware and home improvement stores.

Although it is possible to replace an older ball cock with a new one, consider replacing it with a new float cup valve, which many plumbers prefer because it is less prone to leaking.

- Turn off the water shutoff valve and flush the toilet to drain the tank.
- Disconnect the water supply tube from the bottom of the tank.

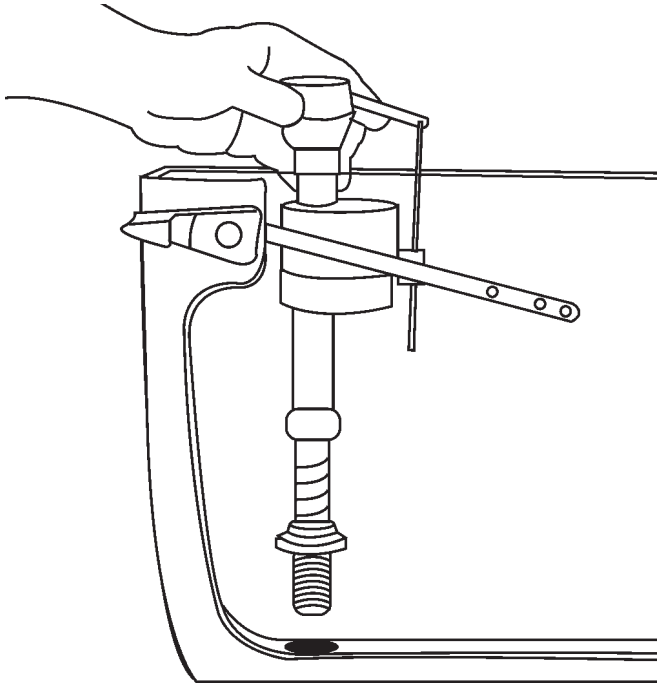


Figure 9-7 - Replacing the ballcock

- Remove the float arm from the ball cock.
- Remove the refill tube from the top of the ball cock.
- Loosen the nut under the tank that holds the ball cock into place. If the ball cock turns when you try to loosen the nut, hold the ball cock with one hand while loosening the nut under the tank with your other hand. Once the nut is removed, lift the ball cock out of the tank.
- Install a new float cup valve into the tank and tighten the nut on the underside of the tank.
- Attach the refill tube to the float cup and to the overflow tube.
- Reconnect the water supply tube and turn on the water supply.
- Adjust the float cup until the water level is about 1/2 inch below the top of the overflow tube. To adjust the water level, simply pinch the spring clip on the side of the cup and move the cup higher (to raise the water level) or lower (to lower the water level.)

(See Figure 9-7.)

Faucet Types

The first step in fixing a leaking faucet is determing whether it is a compression faucet or a washerless faucet.

Compression faucets

Compression faucets, sometimes called stem faucets, have one handle for cold water and one for hot water. When the handle is turned on, the stem rotates. The threads cause the stem to rise, moving a rubber washer away from the faucet seat and allowing water to flow. When turning the faucet off, you can sometimes feel the rubber washer being squeezed against the faucet seat to stop the flow of water.

A typical compression faucet is shown in Figure 9-8.

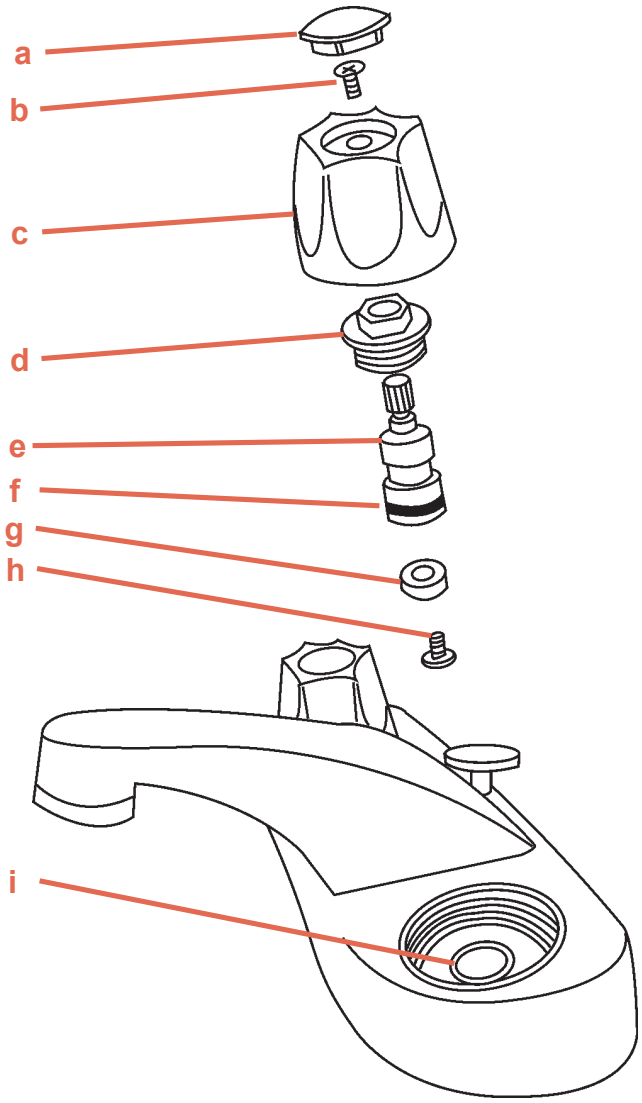
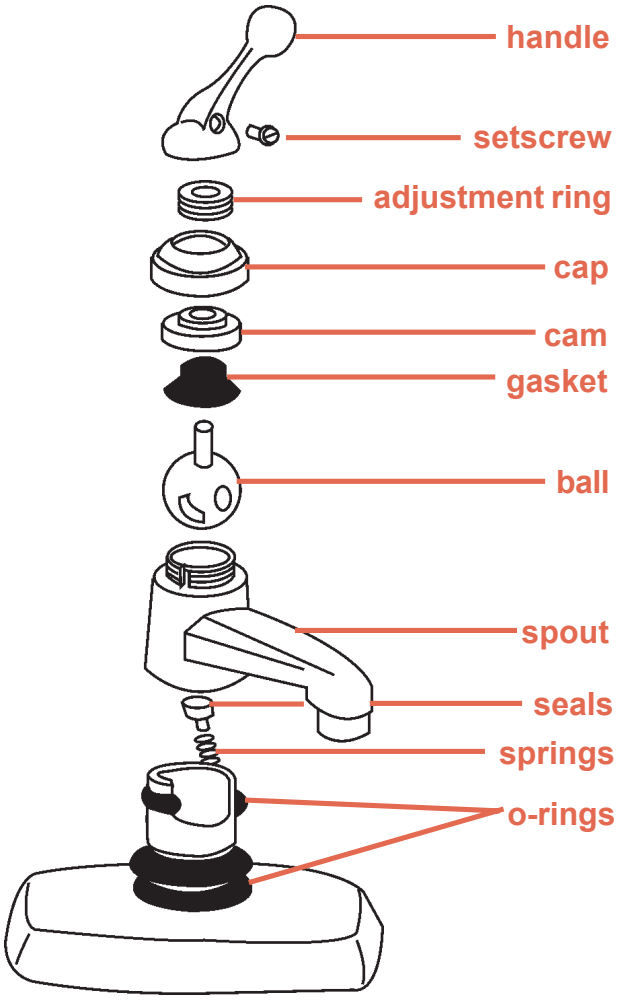
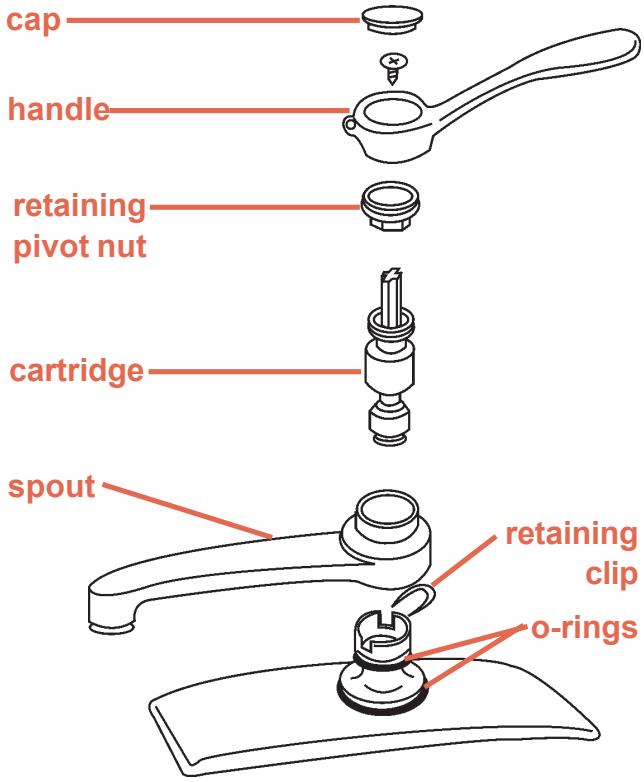


Figure 9-8 - Compression faucet:

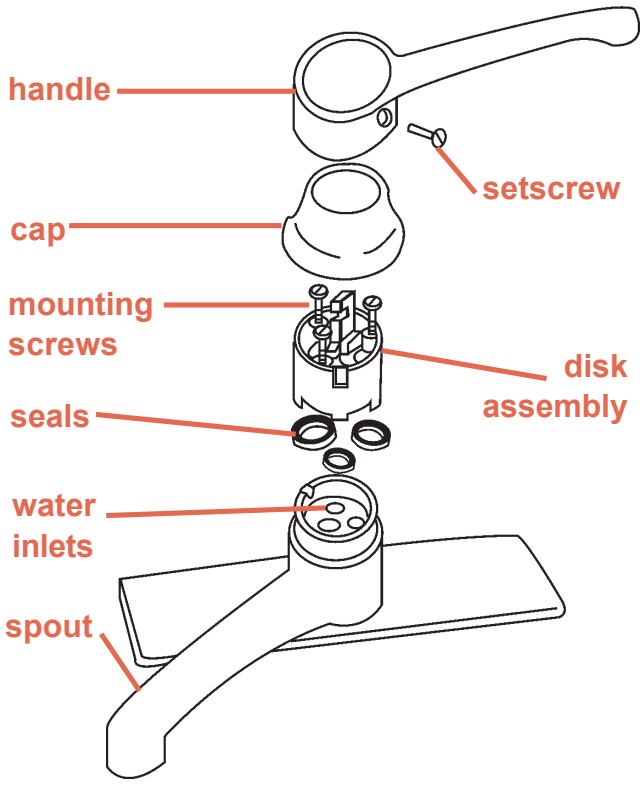
a. decorative cap	*b. handle screw*
c. handle	*d. retaining (packing) nut*
e. stem	*f. packing washer or o-ring*
g. seat washer	*h. seat screw*
i. valve seat	



9-9a - Ball faucet



9-9b - Cartridge faucet



9-9c - Disk faucet

Figure 9-9 - Washerless Faucets

Washerless faucets

Washerless faucets typically have just one handle that controls both the hot and the cold water. Washerless faucets are known for providing years of trouble-free service because their design minimizes friction and wear. There are three primary types of washerless faucets:

- A **ball faucet** has a single handle over a dome-shaped cap.
- A **cartridge faucet** has a narrow plastic or metal cartridge inside the faucet body. Most cartridge faucets are single-handle models, but some two-handled faucets use cartridge designs.
- A **disk faucet** has a single handle and a wide cylinder inside the faucet body.

Washerless faucets are shown in Figure 9-9.

Fixing Faucet Leaks

Most leaky faucets can be repaired by installing a few inexpensive parts.

Helpful Tips

- Turn off the water before you start any faucet repair. The shutoff valves for indoor faucets are underneath the sink. Turn the left knob clockwise to shut off the hot water; turn the right knob clockwise to shut off the cold water.
- Before disassembling a faucet, cover the sink with a towel to protect it from dropped tools and to prevent small parts from going down the drain.
- When dismantling parts, line them up in the order and orientation in which they were removed to make it easier to properly reassemble the pieces.
- When using metal tools on a polished surface, protect the polished surface with a rag or several layers of masking tape.
- Take the old parts with you when you go to a plumbing or hardware store to buy replacement parts. This will help ensure that you get the right parts for the job.
- Most faucet repair kits come with good instructions. Follow them!

Fixing a compression faucet

To fix a leaking compression faucet, first determine whether it's a hot water leak or a cold water leak. If you can't tell from the temperature of the dripping water, turn off the hot water supply valve under the sink. If the drip stops, it's the hot water stem that's leaking. If the drip continues, the culprit is the cold water faucet.

- Remove the handle screw. (It may be hidden under a decorative cap or behind the handle.) Remove the handle.
- Unscrew the retaining (packing) nut.
- Remove the stem by either jiggling it from the valve seat or unscrewing it counterclockwise with a wrench.
- To replace the washer on a standard stem, remove the seat screw at the bottom of the stem and pry out the old washer with a screwdriver. Install a new washer.
- For some compression faucets, you'll also need to replace the packing washer or packing string, which prevents water from leaking at the faucet handle.
- Check the valve seat (the metal that the washer seals on) for damage by running your finger along the rim of the seat. If it's pitted and not completely smooth, remove the valveseat using a seat wrench. Install a new valve seat.
- Reassemble the parts.

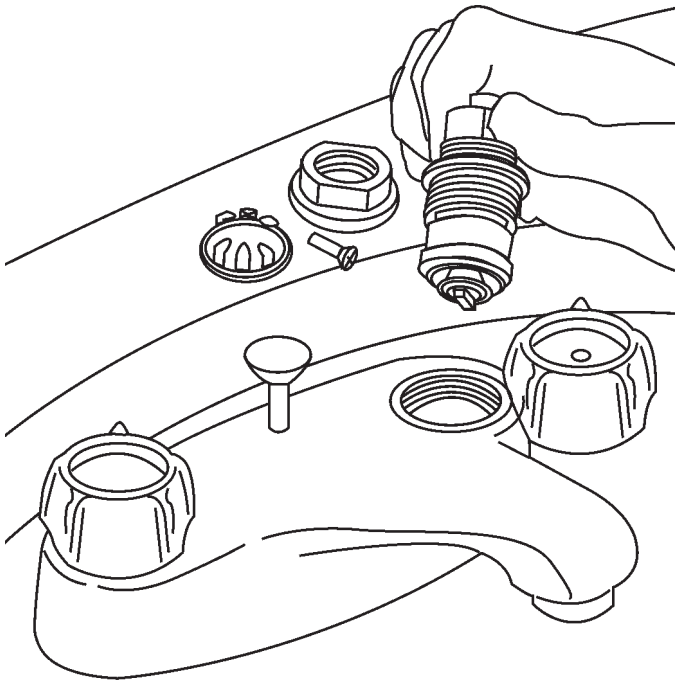


Figure 9-10 - Compression faucet repair.

Compression faucet repair is shown in Figure 9-10

Fixing a ball faucet

- With an allen wrench (hex key), loosen the setscrew at the base of the handle. Remove the handle.
- Underneath the handle you'll find a protective cap with an adjusting ring. Sometimes a dripping ball faucet can be fixed by tightening this ring. Turn it clockwise gently.
- If tightening the ring doesn't stop the leak, close both shutoff valves beneath the sink.

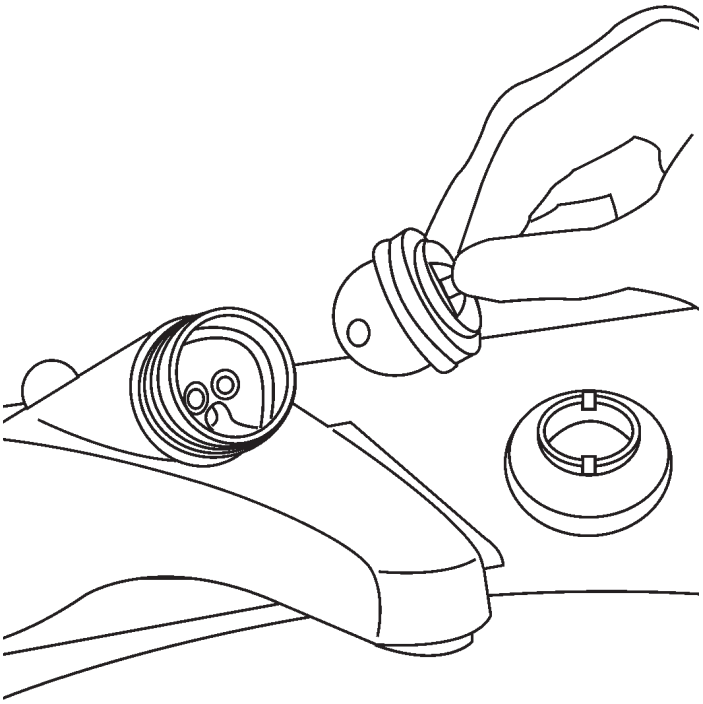


Figure 9-11- Ball faucet repair.

- Unscrew and lift off the cap, plastic cam, cam gasket and rotating ball.
- Rubber faucet seats are held against the bottom of the ball by small springs. Using the point of a screwdriver or a pair of needle-nose pliers, gently remove the two seats and springs. Remove any loose debris.
- Install new seats and springs from a repair kit.(Follow the instructions provided in the repair kit.) Also, lift the spout and replace the two O-rings. (Apply a light coating of petroleum jelly or valve grease to the new O-rings before installing them.)
- Reassemble the faucet and tighten the adjusting ring enough to prevent leaks without making the handle difficult to operate.

Ball faucet repair is shown in Figure 9-11.

Fixing a cartridge faucet

- Shut off both water supply valves underneath the sink.
- Remove the decorative cap (if any) and remove the handle screw. Remove the handle.
- Unscrew the retainer nut.
- Some models have a U-shaped clip that holds in the cartridge. Use needle-nose pliers or the tip of a screwdriver to remove the clip.
- The cartridge fits tightly in the faucet body. Remove the cartridge by pulling up on it firmly with a pair of pliers.
- Replace damaged O-rings and lubricate the new ones with petroleum jelly or valve grease. If the cartridge is worn or damaged, replace it with an identical part. (Cartridge repair kits typically contain a new cartridge, new O-rings and grease.)
- Install the new cartridge, making sure that the notch in the stem faces the sink.
- Reattach the U-clip, retainer nut, handle, handle screw and decorative cap.

Cartridge faucet repair is shown in Figure 9-12.

Fixing a disk faucet

- Shut off both water supply valves underneath the sink.
- Remove the setscrew from the handle. Lift off the handle and remove the body cover (escutcheon cap).

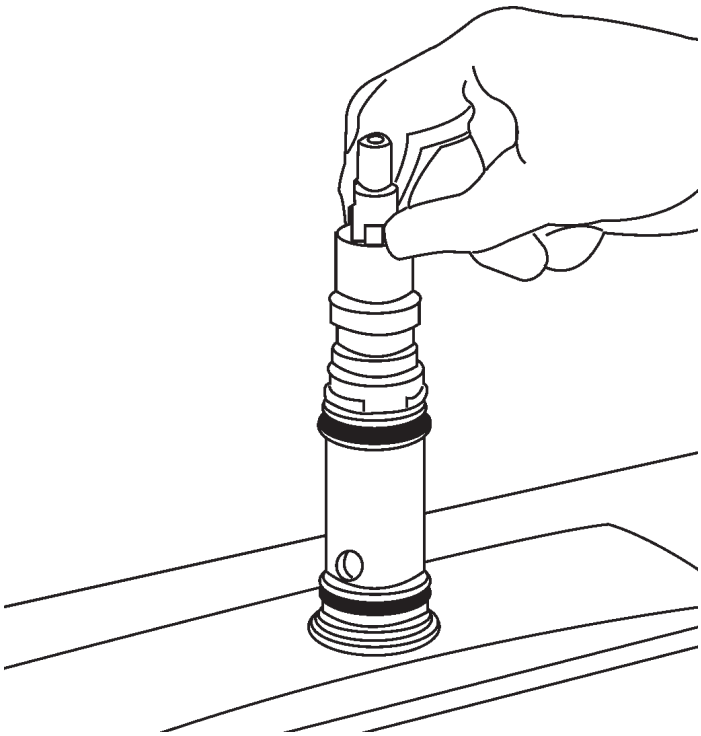


Figure 9-12- Cartridge faucet repair.

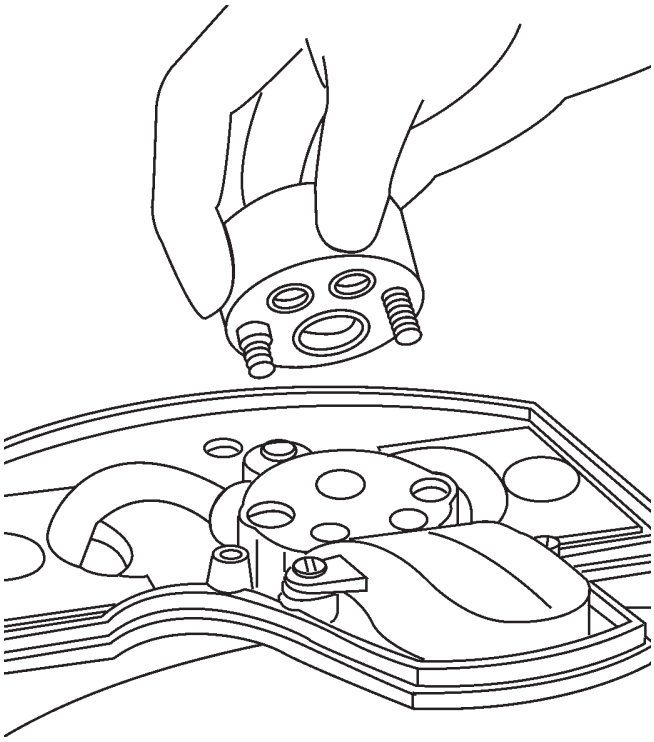


Figure 9-13 - Disk faucet repair.

- Remove the disk assembly as a unit by unscrewing the mounting screws. Pull the disk out.
- Turn the disk over and remove any dirt lodged between the ceramic disks.
- Remove the rubber seals from the cylinder openings. Clean the cylinder openings and flush out any debris.
- Install new rubber seals and reassemble the faucet.
- If the faucet still leaks, replace the entire disk assembly with a new one.

Disk faucet repair is shown in Figure 9-13.

Stormwater Management

Stormwater is rainfall that does not soak into the ground or evaporate. Instead it flows along the surface of the ground and becomes runoff. Stormwater runoff can cause major problems in cities and towns because of flooding and the pollutants that are picked up and then dumped into our waterways. This is a very serious and significant issue in developed areas because of all the roadways, paved parking lots, sidewalks, and stormwater management systems that channel and direct the water rather than allowing it to permeate the ground and become part of the groundwater system. The pollutants that are collected into this runoff come from road salt, animal waste, and vehicle fluids that are commonly found on the impervious materials that make up much of our developed environment. Water conservation includes properly managing rainfall to maximize its ability to enter the ground rather than obstructing that reentry with improperly placed impervious materials. The earth is a sponge and when we cover that sponge with obstructions that cause runoff, we are not allowing mother nature to replenish the ground with water. This does not represent good water conservation practice.

Residential stormwater management is an excellent way to conserve water and can be accomplished by following some simple recommendations:

- Separate impervious surfaces such as driveways, walkways, and patios with vegetation to reduce run-off.
- Use porous or pervious materials for driveways and patios.
- Avoid installing curbs or obstructions that allow water to be channeled into runoff.
- Preserve the natural topography on your property as much as possible.
- Reduce or eliminate any pollutants – like fertilizers and pesticides - that you may use on your lawn and garden that may become part of any runoff that occurs.
- Do not allow pollutants like gas or oil to collect on any impervious material such as a driveway and then become part of any stormwater runoff.
- Set up your roof downspouts so that the water is distributed in a manner that will maximize ground absorption.
- Set up a simple rainwater collection system that catches and stores rainfall so that it can be used for selective irrigation and even household potable water needs.

Rainwater Harvesting

People all over the world have been using some type of rainwater collection system for centuries. This was

before drilled wells, pumping systems, and municipal water plants. It was a combination of good common sense and survival to collect water as it fell from the sky, store it in some type of cistern or tank, and then use it for household, agricultural, and landscaping purposes. In many parts of the world rainwater collection or harvesting still provides the majority of water that is used. Survival and common sense still make rainwater collection a practical measure even in modern society. Rainwater harvesting can save a homeowner money, energy, and is a great way to practice water conservation on a daily basis.

Most rainwater collection systems are designed to collect water from roofs of buildings. The water is then carried through gutter or other piping into a storage tank. A normal rainwater collection system consists of the following components:

- A collection area
- A system or method of transferring the water
- A filtering device or system
- A storage tank or cistern
- A distribution system

If the harvested water is to be used for non-drinking use then any material can be used in the collection system. If the rainwater will be used for household potable water needs then it is very important that the collection and distribution systems be free of any harmful materials or impurities. There are many types of tanks, filters, and distribution systems available for rainwater collection and the prices will vary accordingly.

It is estimated for every inch of rainfall, an average of 1,200 gallons of rainwater can be harvested from the roof of a 2,000 square foot home. Utilizing this time-honored method is a natural way to practice conservation and save money at the same time.

Water Saving Tips and Recommendations

1. Conserving water and using it more efficiently will help to save and preserve this valuable natural resource. Water conservation will also help to reduce home energy consumption and lower water and energy bills.
2. Mandating water conservation measures during time of drought is necessary but the practice of conserving water should be a daily activity whether drought conditions exist or not.
3. The following basic water saving tips can be applied to just about any residence:
    - Fix water leaks. Water leaks in faucets, toilets, and piping can account for 100 gallons of water being lost daily.
    - Install low-flow showerheads and faucets. This can cut water use by 50%.
    - If your toilet was manufactured before 1992, consider replacing it with a low flush toilet that will use over 50% less water per flush.
    - Combine conservation with efficiency – take short showers using a low flow showerhead and don't leave your low flow faucet running unnecessarily.
    - Consider purchasing an Energy Star washing machine. You will use 50% less water per load.
    - Use cold water when washing clothes and wash clothes only when you have a full load.
    - Operate dishwashers only when the load is full.
    - Use lawn sprinklers and outdoor hoses efficiently.
    - Avoid overwatering your lawn, plants, and shrubs. Use mulch to trap moisture and reduce the need to water plants and trees.
4. Before you call a plumber, try to fix simple water leaks in your faucets and toilets yourself. Sometimes this can be accomplished by making an adjustment or replacing a washer.
5. Apply good stormwater management practices at your home and save water and minimize pollution by reducing strormwater run-off.
6. Consider harvesting rainwater by installing a simple rainwater collection system at your home. You will save water and save money at the same time.