



280 S. Maple St. P.O. Box 435 Grant, MI 49327

How your sewer system works

Do you ever wonder what happens to the things that get flushed down the toilet or go down the sink drains? Municipalities spend a great deal of time, money and energy to be sure that when you flush, it is collected, treated and disposed of properly. Not only is this the right thing to do from an environmental standpoint, it is also mandatory to avoid illness to the general public.

The City of Grant is equipped with a sewer system that includes gravity sewers, lift stations, force mains and a waste treatment plant. This is split into two sections; the collection system and the treatment plant. Each of these is exactly what it sounds like. The collection system is the entire underground piping network that collects the waste water from your homes. The collection system pumps all of this waste water to the treatment plant, which treats the waste water before returning it back to the groundwater, lakes and streams of the state.

Hopefully, this will explain how your typical sewer system works and what happens when you flush your toilet.

The collection system:

Each home in the city has a toilet, sinks, a shower, bathtubs, washing machines, dishwashers, etc. All of these devices are hooked to the plumbing system that runs through your home, and collect in one common pipe. This pipe, which is usually a 4-inch plastic, clay tile or ductile iron pipe, is typically known as your service lateral. This pipe leaves your home at the lowest point, like a basement or crawlspace. If you go into your crawlspace or basement, you will see this 4-inch pipe exiting your home, usually toward the street, which is where the collection system is.

This 4-inch pipe from your house runs under your front yard to a gravity sewer main under the street. This pipe is bigger than your 4-inch service lateral. It is usually 6 to 8 inches in diameter, because there are many homes with service laterals hooked up to it, so it has to accommodate much more flow. The gravity sewer main runs parallel under your street. The pipe is pitched at a very slight angle to allow the waste water to flow down-hill. One gravity sewer main will run into another, larger gravity sewer main, which will run into another gravity sewer main, then to another, then another, always running toward the treatment plant.

When the piping underground can no longer be pitched on this slight downhill angle, you have to pump it up to an elevation which will allow gravity to take over again. This is done by having the gravity sewer mains dump into a catch basin that is equipped with pumps. This catch basin with pumps is called a lift station, and it does exactly what it says; it lifts the waste water! When the gravity sewer mains fill this basin, the pumps are activated by level switches. A switch is activated and the pumps pump the wastewater through a pipe called a force main. The force main pumps the waste water uphill until gravity can take over again. This process is repeated over and over again, until the waste water reaches the treatment plant.



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The treatment plant:

The City of Grant has a treatment plant that is designed to treat 150,000 gallons of waste water each day. It is known as an Aqua Aerobics Sequencing Batch Reactor. The treatment plant consists of three reaction tanks, two sludge digesters, two sludge storage tanks and a retention pond.

How it works:

Waste water from the entire city is sent to the plant. The waste water that enters the treatment plant is called influent. The influent is sent to one of the three reaction tanks. Each one of these tanks is loaded with micro-organisms that are bred with the specific purpose of treating waste water. This mixture of micro-organisms is known as mixed liquor. A mixer is activated, and oxygen is pumped into the mixed liquor to stimulate the micro-organisms to attack and eat the “bad” things that are in the waste water. A chemical called Ferric Chloride is added to the treatment process to aid in the treatment of things in the influent that the micro-organisms do not eat. The reaction process is done for two to three hours, giving the micro-organisms a chance to eat all of the “food” available to them. Once this is accomplished, the oxygen and the mixer are shut off to allow the reaction tank to settle. This lets all of the micro-organisms fall to the bottom of the tank, which separates them from the clear, treated water. The treated water is then sent through a pipe where it is sterilized with chlorine gas. This kills any bacteria that may have been left in the clear water. The water leaving the treatment plant is called effluent. The effluent is sent to the retention pond, and then down a set of stairs known as a step-aerator. This is done to shake up the clean water, and to be sure that there is plenty of oxygen in the water as it is leaving the treatment plant and into the receiving stream.

During each reaction cycle, the oxygen that is added to the treatment process makes the micro-organisms eat, but it also makes them breed. To maintain the correct amount of micro-organisms, each reactor must “waste” a little bit of these excess organisms. This is called waste sludge. The waste sludge is sent to one of two digesters, where it is aerated again to make the micro-organisms eat. Since you do not give them any influent, or “food”, they eat each other. Since the micro-organisms are eating each other, this reduces the amount of sludge during the year.

From the digester, the waste sludge is sent to one of two sludge storage tanks for safe keeping until fall. This sludge is then pumped out of the storage tanks and, just like cow manure, it is used on farm fields for fertilizer.

Summary:

In everyday life, you hope that everything goes as it should; your car starts when you want it to, the furnace in your house runs and keeps you warm, and the water comes out of the faucet when you turn the handle. If all goes well, you hardly think twice about these things, and simply go on with your day. If, however, one of these things does not work as it should, it can literally ruin your day! Your sewer system is one of those things that, when working properly, you don't think twice about it. But if you flush the toilet and it does not go down, it will definitely ruin your day!