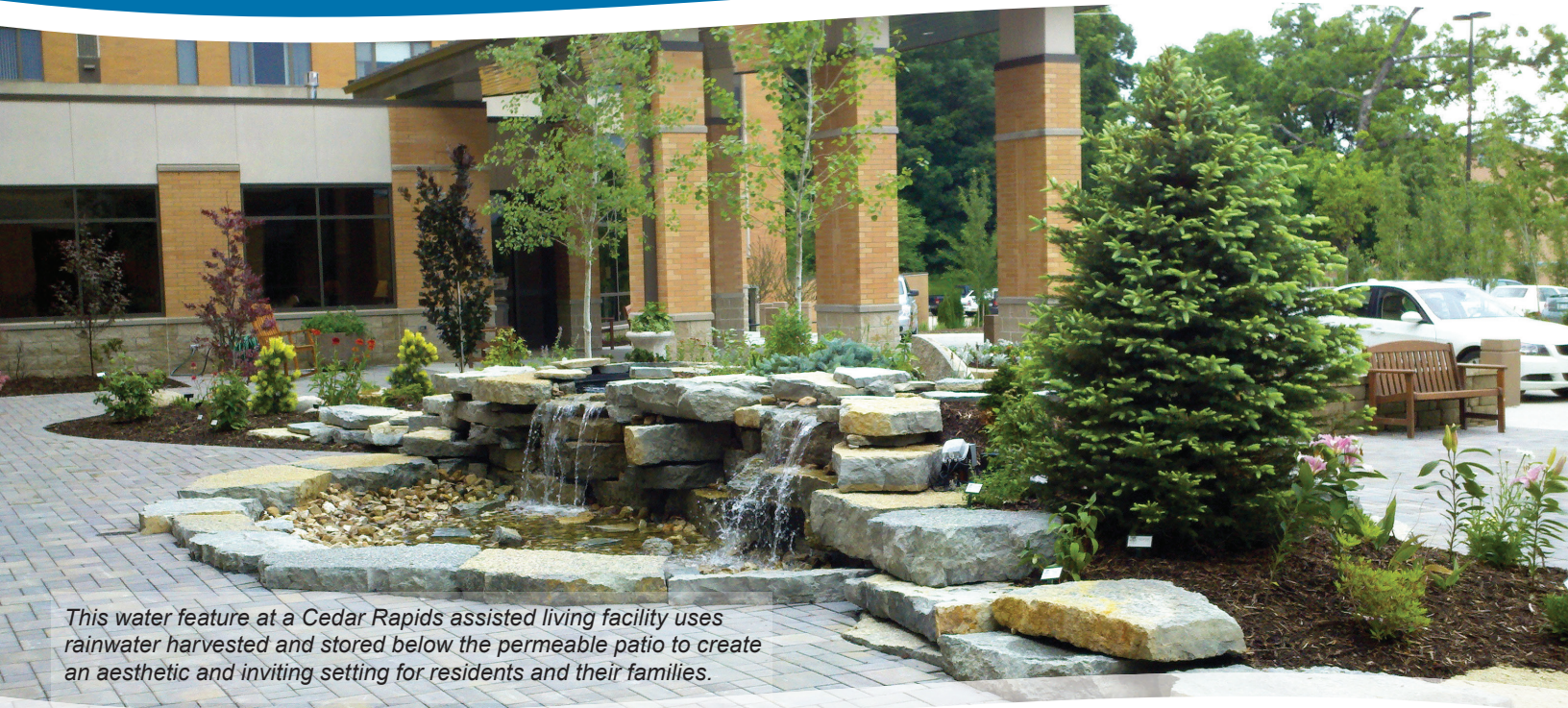


Rainwater Harvesting

Simple Solutions for Stormwater Management



This water feature at a Cedar Rapids assisted living facility uses rainwater harvested and stored below the permeable patio to create an aesthetic and inviting setting for residents and their families.

WHAT IS RAINWATER HARVESTING?

Rainwater harvesting is the process of collecting rainwater and storing it for later use. Storage methods can range from small barrels to large underground storage tanks.

The simplest way to start rainwater harvesting is to install a rain barrel next to a building that has downspouts collecting roof water. More elaborate rainwater storage systems can be installed underground in the interior of a structure connecting to a building's water system. It is even possible for these larger systems to meet all non-potable and separate water uses, such as toilet flushing and laundry.

Rainwater is a valuable resource that is underutilized in our communities. In the past, many homes were designed to have cisterns to capture and utilize rainfall for household purposes. Today, our rooftops and yards are designed to shed rainwater runoff into the street, down the storm drain, and into streams, rather than absorbing or infiltrating it. This stormwater runoff picks up pollutants and impacts water quality of our surface waters.

We commonly use drinking water for our lawns and gardens during the growing season when we could be using rainwater. Rainwater can be harvested for these uses which helps to conserve drinking water while also preventing runoff, and protecting water quality.



Rain Barrels

Rain barrels are placed in locations that can easily catch water such as at the end of a downspout. Using downspout adaptors or flexible elbows, rain barrels are placed at the end of downspouts that are directed to the top of the barrel. Rain barrels will fill quickly and will require an overflow drain for excess water. The overflow drain can be a garden hose or outlet pipe pointed away from the house or connected to another barrel to increase storage capacity.



Left: Connected rain barrels capture more water for reuse. **Right:** A downspout is redirected into a rain barrel.

Rainwater Harvesting Tips

- » Make sure the top of the rain barrel has a screen where the downspout releases water to ensure mosquitos can't access the water to minimize breeding.
- » At >8 pounds per gallon of water, a full 50 gallon rain barrel weighs over 400 pounds. Install rain barrels on a level and sturdy foundation.
- » Drain, leave valve open, or redirect downspouts away from the system during the winter to prevent freeze damage.
- » Rainwater harvesting systems can be installed adjacent to rain gardens to provide maximum water filtering capabilities by overflowing into the rain garden once the usable storage is full.
- » It only takes 60 square feet of rooftop to fill a 50 gallon rain barrel during an inch of rain.
- » Divert overflow water away from foundations.



Rain barrel capturing rainfall from homeowner's roof to be used for watering plants.



This natural looking water feature harvests rainfall from the home's rooftop, and reuses the water in the stream for other outdoor watering.



These structural blocks and plastic liner are used to store water below ground. They are used as the reservoir below natural or landscaped water features, like shown above and on the front page.



Above ground rainwater harvesting cisterns in Cedar Rapids capture water to be used for gardening and irrigation.

Cisterns

As stormwater reuse and water conservation become more widespread, the use of cisterns for non-potable water for commercial and industrial application is growing. Cisterns have great potential to be used as a secondary source of water for irrigation and gardening on corporate campuses and residential areas while larger cisterns can be adapted to supplement non-potable water systems.

Cisterns can be placed above or below ground, or stored inside a heated area. Small cisterns can be as easy to install as a rain barrel, whereas larger systems will require design assistance and contractors. Before installing a cistern, it is important to observe local city and county regulations pertaining to the indoor use of captured rainwater to prevent cross contamination of drinking water.

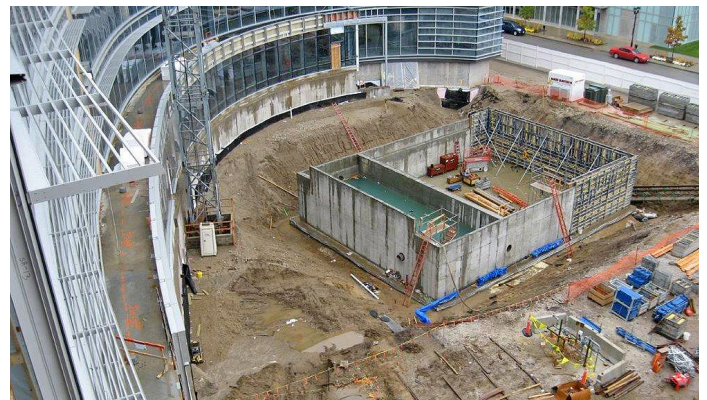
Water Collection Potential

To determine the size of containment unit needed for harvesting rainwater, first assess the plans and monthly needs for the harvested water. The months with the most rainfall aren't typically when extra water is needed for irrigation. The intended use determines the necessary size of the cistern. The storage size, estimated monthly availability and usage must be balanced.

Therefore, the first element of planning a harvesting system is identifying the amount of intended use for the water. The next step is identifying the storage size that has the ability to hold enough water throughout the year to accomplish the goals.

Use the following equation to determine the potential yield in gallons of rainwater that can be harvested from an area generating runoff.

$$\begin{aligned}
 \text{Harvested Water (gallons)} = & \\
 & \text{Rooftop Surface (sq. ft.)} \\
 & \times \\
 & \text{Average Rainfall Event (in.)} \\
 & \times \\
 & 0.623
 \end{aligned}$$



The Wellmark Building in Des Moines constructed this large cistern. The water is collected for irrigation, and supplies 8,000 gallons a day for flushing urinals and toilets. It reduced Wellmark's treated drinking water use by nearly 58%.



Rainwater Harvesting Iowa



- 1 A homeowner in North Liberty harvests rainwater under their permeable paver patio and uses it to irrigate the greenhouse, water an extensive vegetable garden, and for the water feature.
- 2 The Cedar Rapids library uses harvested rainwater to irrigate vegetation on the green roof during times of drought.
- 3 The World Food Prize Building in Des Moines has this rainwater cistern located under the steps and plumbed in for non-potable water uses in the building.
- 4 Harvesting rainwater in a steel silo structure in new upscale downtown Des Moines building will be used for residents to water their outdoor raised bed gardens and irrigate the landscaping.



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