Rainwater harvesting systems:
Protecting our water resources for the long run

Rainwater harvesting systems have been used throughout the world to provide precious water resources to areas where water is scarce. In more recent times, they have been used to conserve water in parts of the world where the increasing population has increased water demand beyond the local water resource levels. The United States, with its abundant natural resources, has not escaped this dilemma. Over the past decade, rainwater harvesting systems have become more common across North America.

Historically, the construction of these systems was based on common sense and the judgment of those installing the systems. Only recently have local agencies started to adopt codes and guidelines to govern the construction of these systems. In the U.S., code officials responsible for inspecting these systems have voiced their need for more detailed design parameters to ensure the safe implementation of these systems. For this reason, the Canadian Standards Association and the International Code Council formed a joint committee to create a rainwater harvesting standard for use in North America.

The intent of the standard is to:

- Provide detailed design parameters to ensure rainwater harvesting systems are designed and installed in a way that protects the health and safety of others.
- Make it easier for local jurisdictions to accept and approve rainwater harvesting systems.
- Provide a framework for designers and code officials to implement systems meeting the intent of existing codes.

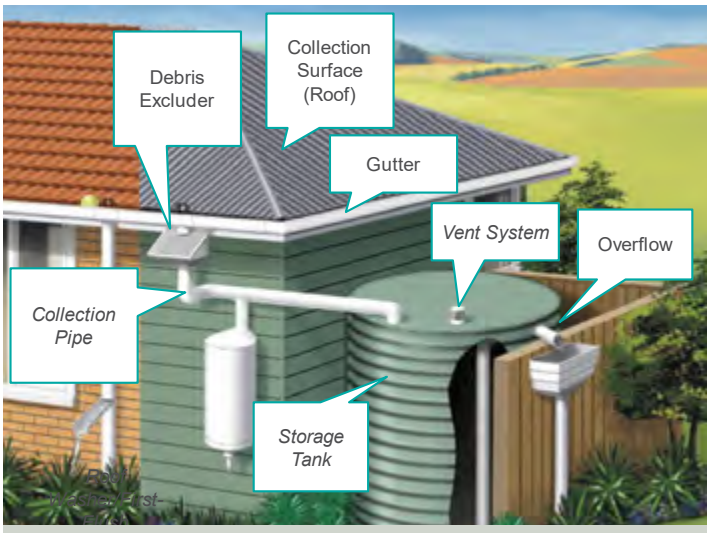

Figure 1: Typical roof surface rainwater collection system.

The CSA B805-18/ICC 805-2018 — Rainwater Harvesting Systems standard applies to the design, materials, installation and operation of rainwater harvesting systems for potable and non-potable applications. Some of the key provisions:

- This standard addresses roof surface rainwater and stormwater being used as source water.
- It addresses rainwater intended for use in non-potable applications (e.g., irrigation, fire protection, toilet and urinal flushing, clothes washing, hose bibbs, decorative fountains, and vehicle washing) as well as potable applications (e. g., human consumption, oral care, food preparation, dishwashing and bathing).
- This standard provides different methods for protecting water based on the influent water quality, the system and the application. Stormwater runoff is expected to have a higher likelihood of contamination as a result of its flowing overland. Therefore, this standard specifies additional treatment process requirements for stormwater runoff and does not cover its use for potable water applications.
- This standard requires that a water safety plan be developed for all rainwater harvesting systems. The water safety plan considers the specific challenges and risks presented by the site and associated impact on source water quality, operation of system components and the risk associated with the end-use.

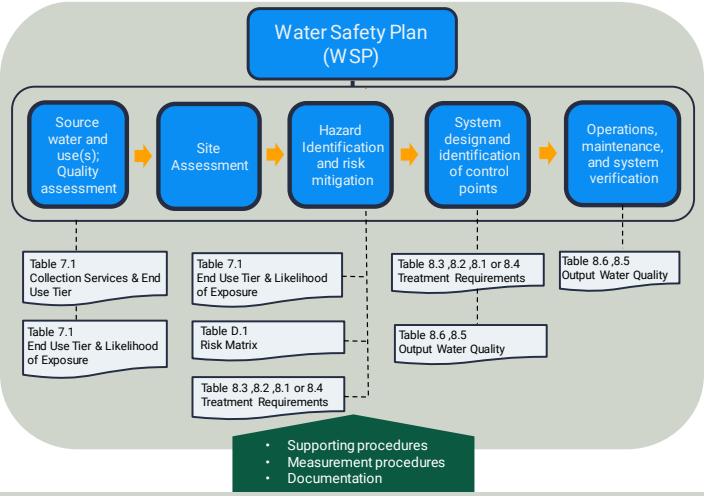

Figure 2: Water Safety Plan (WSP) overview including CSA B805/ICC 805 resource tables and their relationship to elements of the WSP

- Applications for harvested rainwater are separated into four end-use tiers that consider the exposure potential through ingestion, inhalation and skin contact. It further separates these tiers into two groups, one for single-family residential and one for multi-family, commercial and public facilities.
- This standard specifies minimum performance criteria for each end-use tier in consideration of the health risk and identifies possible treatment process options to meet the specified performance criteria.
- Based on the expected source water quality, this standard establishes suitable water quality parameters that are used to substantiate that the treatment process is operating as intended to produce safe water for the specified end-use.

Figure 3: Rainwater treatment and control station.

Currently, Chapter 13 of the International Plumbing Code does not address the use of rainwater for potable applications, nor does it contain provisions for the use of stormwater for non-potable applications. Adoption of the CSA B805/ICC 805 standard provides code officials with the following benefits:

- The guidance needed for reviewing and inspecting rainwater harvesting systems of all types.
- An alternate compliance path for rainwater to be used in both potable and non-potable applications.
- An alternate compliance path for stormwater to be used in non-potable applications.

The adoption of the CSA B805/ICC 805 standard will not increase or decrease the cost of construction. The standard is a voluntary standard that provides an alternate compliance path to existing codes. It is an option provided to the user, not a requirement. Therefore, no added cost is mandated to the user of the standard. What the standard does provide are ways for property owners, builders, architects and engineers to construct new buildings, or renovate existing buildings, in ways that will protect our water resources well into the future.

ABOUT THE AUTHOR

Jim Cika is a director, PMG technical resources for the International Code Council, where he serves as a subject matter expert to the plumbing, mechanical, fuel gas, and swimming pool & spa codes. He represents ICC in federal and state coalitions, task forces, committees, and councils where expertise in PMG technical matters is required. Cika has a degree in Mechanical Engineering from the Georgia Institute of Technology, and started his career as an HVAC design consultant. In addition, he has over 20 years of experience as a chief engineer responsible for regulatory, product standards, building code and product engineering matters for manufacturers of water heating and space heating appliances.