

11.0 Post Construction BMP Standards and Specifications

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11.5 Rainwater Harvesting

11.5.1 Rainwater harvesting is defined as systems that intercept, divert, store and release rainfall for future use. Rainwater that falls onto impervious surfaces is collected and conveyed into an above- or below-ground cistern, where it can be used for non-potable water uses and on-site stormwater disposal or infiltration. Runoff collected and temporarily stored in more traditional stormwater management practices constructed in accordance with the Post Construction Stormwater BMP Standards and Specifications, such as wet ponds, can also be used for irrigation purposes to achieve these same goals. Design variants include:

11.5.1.1 Seasonal Rainwater Harvesting Systems

11.5.1.2 Continuous Rainwater Harvesting Systems

11.5.2 Rainwater Harvesting Stormwater Credit Calculations

11.5.2.1 If not protected from freezing, Rainwater Harvesting systems must be taken offline for the winter and credited as seasonal systems.

11.5.2.2 Seasonal Rainwater Harvesting Performance Credits

11.5.2.2.1 The R<sub>Pv</sub> runoff reduction performance credit for Seasonal Rainwater Harvesting systems is 50% of the retention storage.

11.5.2.2.2 The C<sub>v</sub> and F<sub>v</sub> runoff reduction performance credit for Seasonal Rainwater Harvesting systems is 0%.

11.5.2.2.3 The total nitrogen, total phosphorus, and total suspended solids pollutant reduction performance credits for Seasonal Rainwater Harvesting is 100% of the load reduction.

11.5.2.3 Continuous Rainwater Harvesting Performance

Credits

11.5.2.3.1 The R<sub>Pv</sub> runoff reduction performance credit for Continuous Rainwater Harvesting systems is 75% of the retention storage.

11.5.2.3.2 The C<sub>v</sub> and F<sub>v</sub> runoff reduction performance credit for Continuous Rainwater Harvesting systems is 0%.

11.5.2.3.3 The total nitrogen, total phosphorus, and total suspended solids pollutant reduction performance credits for Continuous Rainwater Harvesting is 100% of the load reduction.

11.5.3 Rainwater Harvesting Feasibility Criteria

11.5.3.1 Designers and plan reviewers shall consult all applicable local, State and Federal regulations to determine the allowable indoor uses and required treatment for harvested rainwater.

11.5.3.2 Pipes and spigots using rainwater must be clearly labeled as non-potable.

11.5.3.3 The final invert of the outlet pipe from the cistern must be at an elevation that will not allow water from the discharge point to backflow into the cistern.

11.5.3.4 In areas where a below-ground cistern will be buried partially below the water table, buoyancy calculations must be conducted for the empty cistern and special design features must be employed, as applicable, to secure the cistern.

11.5.3.5 Cisterns must be installed according to the manufacturer's specifications.

11.5.3.6 The bearing capacity of the soil upon which the full cistern will be placed must be considered.

11.5.3.7 Cisterns shall be designed to be watertight.

#### 11.5.4 Rainwater Harvesting Conveyance Criteria

11.5.4.1 All conveyance pipes to the cistern, including gutters and downspouts, must be kept clean and free of sediment, debris and rust.

##### 11.5.4.2 Overflow

11.5.4.2.1 An overflow mechanism must be included in the Rainwater Harvesting system design to handle flows that exceed the capacity of the cistern.

11.5.4.2.2 Overflow pipes must have a capacity equal to or greater than the total capacity of the inflow pipes and have a diameter and slope sufficient to drain the cistern before it reaches full capacity.

11.5.4.2.3 The overflow pipe must be screened to prevent access to the cistern by rodents and birds.

#### 11.5.5 Rainwater Harvesting Pretreatment Criteria

11.5.5.1 Pre-treatment is required to keep sediment, leaves, and other debris from the system.

11.5.5.2 Small cistern systems of 2,500 gallons or less shall have leaf screens or gutter guards for pretreatment as a minimum.

11.5.5.3 Large cistern systems of greater than 2,500 gallons shall include a pretreatment system capable of treating and conveying the flow rate generated by the RPv from the contributing impervious surface drainage area without creating a backup or bypass condition.

#### 11.5.6 Rainwater Harvesting Design Criteria

11.5.6.1 The following factors that must be considered when designing a Rainwater Harvesting system and selecting a cistern:

11.5.6.1.1 Rainwater Harvesting Systems shall comply with all applicable local, State, and Federal regulations.

11.5.6.1.2 Above-ground cisterns must be impact resistant or protected from impact using bollards or other physical barriers.

11.5.6.1.3 Below-ground cisterns must be designed to support the overlying soil and any other anticipated loads.

11.5.6.1.4 Below-ground cisterns must have a standard size manhole or equivalent opening to allow access for cleaning, inspection, maintenance, and repair purposes.

11.5.6.1.5 Cisterns must be screened to discourage mosquito breeding and reproduction.

11.5.6.1.6 A suitable foundation must be provided to support the cistern when it is filled to capacity.

11.5.6.1.7 Dead storage below the outlet to the distribution system and an air gap at the top of the cistern must be added to the total volume.

11.5.6.1.8 Any hookup to a municipal backup water supply must have a backflow prevention device to keep municipal water separate from stored rainwater.

#### 11.5.6.2 Distribution Systems

11.5.6.2.1 The Rainwater Harvesting system must be equipped with an appropriately-sized pump, if necessary, that produces sufficient pressure for all intended end-uses.

11.5.6.2.2 A backflow preventer is required to separate harvested rainwater from the main potable water distribution lines.

11.5.6.2.3 Distribution lines for Continuous Rainwater Harvesting Systems must be buried beneath the frost line.

11.5.6.2.4 A drain plug or cleanout sump, also draining to a pervious area, must be installed to allow the system to be completely emptied, if needed.

11.5.6.2.5 Above-ground outdoor pipes must be insulated or heat-wrapped to prevent freezing and ensure uninterrupted operation during winter.

11.5.6.2.6 Distribution lines and above ground outdoor pipes for Seasonal Rainwater Harvesting Systems shall be drained or otherwise winter-proofed during the non-operational period.

#### 11.5.6.3 Rainwater Harvesting Material Specifications

11.5.6.3.1 Cisterns must be structurally sound, watertight, and sealed using a water-safe, non-toxic material. Re-purposed tanks used to store rainwater for reuse must be acceptable for potable water or food-grade products.

11.5.6.3.2 Above-ground cisterns must be UV resistant and opaque to prevent the growth of algae in the tank.

11.5.6.3.3 Below-ground cisterns shall be located below the frost line.

#### 11.5.6.4 Sizing of Rainwater Harvesting Systems

11.5.6.4.1 For seasonal rainwater harvesting systems, weekly irrigation demand shall be at least 50% of the stored volume.

11.5.6.4.2 For Continuous Rainwater Harvesting Systems, a minimum of 50% of the demand shall be met through non-irrigation needs, such as plumbing, process water, car washing, or other uses that are present throughout the year.

11.5.7 If the harvested rainwater is to be used for irrigation, the design plan must include the delineation of the proposed planting areas to be irrigated and quantification of the expected water demand based upon the area to be irrigated.

#### 11.5.8 Rainwater Harvesting Construction Criteria

11.5.8.1 Rainwater Harvesting system components connecting to the internal plumbing system shall be installed by a licensed plumber.

11.5.8.2 Construction reviews are required during the following stages of construction, and shall be noted on the plan in the sequence of construction:

11.5.8.2.1 Pre-construction meeting.

11.5.8.2.2 Initial site preparation including installation of erosion and sediment controls

11.5.8.2.3 Excavation and grading including interim and final elevations for cistern foundations

11.5.8.2.4 Installation of cistern, pretreatment system and conveyance system

11.5.8.2.5 Implementation of required stabilization

11.5.8.2.6 Final construction review including development of a punch list for facility acceptance

11.5.8.3 Upon project completion, the owner shall submit Post Construction verification documents to demonstrate that the rainwater harvesting practice has been constructed in accordance with the approved Sediment and Stormwater Management Plan and accepted by the approving agency. Items to be checked and verified are as follows:

11.5.8.3.1 Presence of a pretreatment device.

11.5.8.3.2 Capacity of any cisterns matches the design plan.

11.5.8.3.3 For ponds, volume of storage provided is within ninety percent of the design volume.

11.5.8.3.4 For continuous systems, all pumps, controls, and other appurtenances installed in accordance with the plan.

11.5.8.3.5 For irrigation systems, area of coverage is within ninety percent of that shown on the plan.

11.5.9 Operation and Maintenance Plans shall clearly outline how Rainwater Harvesting Systems will be managed taking into account seasonal variations and cistern location.