

# CONCEPTS FOR RESIDENTIAL STORMWATER MANAGEMENT:

Average annual rainfall in Philadelphia is 42" per year. Within each rain event, the first inch (1") of rain generates .62 gallons of water per square foot. On a modest Philadelphia row home with a 500 sf roof surface, this translates to over 300 gallons of water generated in 1" of rain. For this reason, Philadelphia Water Department's Green City Clean Waters program for reducing combined sewer overflows has the goal of managing the first 1" of stormwater runoff from roughly one-third of the impervious surfaces through green stormwater practices. In support of this program, the Philadelphia Horticultural Society convened a group of 37 interdisciplinary professionals, including designers, engineers, and builders, to develop a range of innovative concepts for managing residential stormwater in ways that are affordable and effective, beautiful and buildable. A representative sample of these strategies are illustrated here.

**1 Alley Runnel:**  
This city block scale solution takes roof water and routes it along a specially designed runnel with integrated infiltration drains towards an empty lot that is transformed into a rain garden.

**Design Details:**

1. Water comes down from roofs through downspouts to alley.
2. Water flows through alley runnel perforated with wick drains.
3. Water travels to a vacant lot/rain garden for infiltration.

**Benefits and Cautions:**

- Benefits: It's a solution that is at the city block scale; Opportunity for cool design
- Cautions: Who pays for this?; Is the water flow too much on the surface?; Is there a danger of flooding?; Requires a vacant lot or more surface for infiltration.

**2 Water Column:**  
This easily implementable solution allows large quantities of roof water to be stored in such a way that the rainwater builds up its own useful pressure.

**Design Details:**

- Design based on readily available low cost pipes.
- 24" pipe can store over 410 gallons of water in a length of 20 feet.
- Constructible by home owner.
- Cylindrical columns are much stronger; rectangular can be more aesthetic.

**Benefits and Cautions:**

- Benefits: Ease of implementation; Doesn't use a lot of space; Captures the 1st inch of rain; Replicates easily; Can be mass produced; Provides water at pressure.
- Cautions: Bracing and footing issues due to weight; May not be aesthetically pleasing; Freeze/Thaw issues might occur.

**3 Modular Deck Cistern:**  
Using easily attachable plastic cistern modules that have an integrated deck surface, a cistern can be built on any flat surface around a house. This creates a beautiful deck that works as a large capacity storage tank for rainwater.

**Design Details:**

- Modular plastic cistern system with integrated deck structure on top.
- Can sit on top of existing yard or be excavated into a yard.
- Can be used for passive watering (slow release) or tied into larger system (laundry/flushing/etc.).
- Can be made from recycled materials.

**Benefits and Cautions:**

- Benefits: Can be an incentive for a nice deck; No jackhammers are required, just fits on top of existing patio; The volume of water has a tempering effect on the temperature; It is widely applicable (all neighborhoods); Can be turned on its side and made into a wall; Can be cleaned modularly.
- Cautions: Sediment will get into the cistern elements over time; Freeze/Thaw issues might occur.

