

DESIGN GUIDE FOR DRY WELLS

Please note that drywells are for the storage and infiltration of roof runoff only. They should not be used for overland runoff.

A drywells is typically a stone filled underground pit into which roof runoff is directed (Design Options 1 and 2 below). However, prefabricated chambers are also available (Design Option 3 below)

Calculate "Stormwater Runoff Volume" created by new impervious cover

- a. Calculate the square footage of the drainage area (the new impervious cover)

Length _____ (feet) x width _____(feet) = drainage area (square feet, ft²)

- b. If multiple drainage areas (D.A.) are being created (more than one area of new impervious cover), calculate the square footage of each drainage area then add them together.

D.A. No. 1 _____ (ft²) + D.A. No. 2 _____ (ft²) = Total D.A. _____ (ft²)

- c. Calculate the volume of stormwater from the drainage area created by 2-inches of rainfall

Total D.A. _____ (sf) x 2 inches x 1ft/12 inches = "stormwater runoff volume" _____(cubic feet, ft³)

Design Option 1 – assume a 3-foot depth for the stone pit of the drywell (this option is for properties where the surface area for the drywell is not restricted by existing features on the property)

- a. Calculate the length and width of the drywell:

"Stormwater runoff volume" (section 'c' above)/3 ft /void ratio of the stone in the drywell (0.40*) = surface area of drywell _____ (ft²)

Length____(ft) x width __ (ft) must be equal to or greater than surface area of drywell _____(ft²)

Design Option 2 –required depth of the stone pit must be calculated (this option is for properties where the surface area for the drywell is restricted by existing features on the property)

- a. Calculate surface area of the drywell (based on limited area due to existing features)

Length ____ (ft) x width ____ (ft) = surface area of drywell _____(ft²)

- b. Calculate depth of drywell

"Stormwater runoff volume" (section 'c' above) / surface area of drywell ____ (ft²) / void ratio of the stone in the drywell (0.40*) = depth ____ (ft)

Design Option 3 – this option is for prefabricated underground storage chambers

- a. Check with the manufacturer to determine the capacity of each chamber chosen

1 chamber = _____ (gallons)

- b. Convert the "stormwater runoff volume" (section 'c' above) from cubic feet to gallons.

1 cubic feet (ft³) = 7.48 gallons

"Stormwater runoff volume" _____ (ft³) x 7.48 = stormwater runoff volume _____ (gallons)

- c. Calculate the number of chambers you need to install underground based on the “stormwater runoff volume”

“Stormwater runoff volume” _____ (gal) / capacity of 1 chamber _____ (gal) = _____ chambers

Other drywell requirements

- Soils at the bottom of the drywell must be capable of infiltrating water. Drywells that take longer than 72 hours to infiltrate water may develop anaerobic conditions and odor.
- Drywells are for the storage and infiltration of roof runoff only.
- Drywells constructed of stone pits (Design Options 1 and 2 above) shall be filled with AASHTO No. 3 stone or a similar clean stone with a void ratio of 40%
- Drywells must be at least 10 feet from buildings.
- Depth of stone pit should not exceed 4 feet.
- The outfall pipe shall not adversely affect neighboring properties.
- See attached drywell detail (for Design Options 1 and 2)

* The stone installed within the drywell must have a void ratio of 40% (or 0.40)

Example

A 20 foot by 30 foot detached garage is proposed.

Calculate “Stormwater Runoff Volume” created by new impervious cover.

- a. Calculate the square footage of the drainage area (the new impervious cover)

Length 20 (feet) x width 30 (feet) = drainage area = 600 square feet, (ft²)

- b. If multiple drainage areas (D.A.) are being created (more than one area of new impervious cover), calculate the square footage of each drainage area then add them together.

D.A. No. 1 600 (ft²) + D.A. No. 2 0 (ft²) = Total D.A. 600 (ft²)

- c. Calculate the volume of stormwater from the drainage area created by 2-inches of rainfall

Total D.A. 600 (ft²) x 2 inches x 1ft/12 inches = “stormwater runoff volume” 100 cubic feet (ft³)

Design Option 1 – assume a 3-foot depth for the stone pit of the drywell (this option is for properties where the surface area for the drywell is not restricted by existing features on the property)

- a. Calculate the length and width of the drywell:

“Stormwater runoff volume” (section ‘c’ above)/3 ft /void ratio of the stone in the drywell (0.40*) = surface area of drywell _____ (ft²)
100 ft³ /3 ft /0.40 = 83.33 ft²

Length ___(ft) x width ___(ft) must be equal to or greater than surface area of drywell _____(ft²)
12 ft x 7 ft = 84 ft² 84 ft² > 83.33 ft²

Option 1 Final Drywell Dimensions for stone pit 12 ft length x 7 ft width x 3 ft depth

Design Option 2 –required depth of the stone pit must be calculated (this option is for properties where the surface area for the drywell is restricted by existing features on the property)

- a. Calculate surface area of the drywell (based on limited area due to existing features)
For this example, assume the property owner only has a 10 ft x 5 ft space to install the drywell

$$\text{Length } 13 \text{ (ft)} \times \text{width } 5 \text{ (ft)} = \text{surface area of drywell } 65 \text{ (ft}^2\text{)}$$

- b. Calculate depth of drywell

“Stormwater runoff volume” (section ‘c’ above) / surface area of drywell ___(ft²)/ void ratio of the stone in the drywell (0.40*) = depth ___ (ft)

$$100 \text{ ft}^3 / 65 \text{ ft}^2 / 0.40 = 3.9 \text{ ft}$$

Option 2 Final Drywell Dimensions for stone pit 13 ft length x 5 ft width x 4 ft depth

Design Option 3 – this option is for prefabricated underground storage chambers

- a. Check with the manufacturer to determine the capacity of each chamber chosen. For this example the capacity of one underground storage chamber is 50 gallons

$$1 \text{ chamber} = 50 \text{ gallons}$$

- b. Convert the “stormwater runoff volume” (section ‘c’ above) from cubic feet to gallons.
(1 cubic feet (ft³) = 7.48 gallons)

“Stormwater runoff volume” ___ (ft³) x 7.48 gallons/ft³ = stormwater runoff volume ___ (gallons)
100 ft³ x 7.48 gallons/ft³ = 748 gallons

- c. Calculate the number of chambers needed based on the “stormwater runoff volume” in gallons

“Stormwater runoff volume” _____ (gal) / capacity of 1 rain barrel _____ (gal) = _____ barrels
748 gallons / 55 gallons per rain barrel = 13.6 chambers or **14 chambers**