

Porous Pavement Reservoir Volume

Calculating Storage Volume

To calculate the storage volume of a permeable pavement's reservoir area, three variables need to be found: The depth of the reservoir layer (D_r), the porosity of reservoir layer (P_r), and the area of the permeable surface (A_s). Multiplying these three variables results in the Storage Volume (V_s).

$$V_{storage} = D_{reservoir} \times P_{reservoir} \times A_{surface}$$

$(ft^3) \qquad \qquad (ft) \qquad \qquad (0-0.99) \qquad \qquad (ft^2)$

As variables:

$$V_s = D_r \times P_r \times A_s$$

(Assume $P_r = 0.35$ for all problems)

Calculating Rainfall Volume

Multiplying the rainfall totals (T_r) in inches and the area of a given surface (A_s) results in the Storm Volume (V_{storm}).

$$V_{storm} = T_{rainfall} \times A_{surface}$$

$(ft^3) \qquad \qquad (in/12) \qquad \qquad (ft^2)$

As variables:

$$V_{storm} = T_r \times A_s$$

Source: <https://cbtrust.org/wp-content/uploads/EPA-SW-Lesson-Plan-Book.pdf>

EXAMPLE 1:

If an 80 ft by 20 ft parking lot has a reservoir layer that is one ft deep, what is its storage volume?

First, find the necessary variables:

$$A_s = 80 \text{ ft} \times 20 \text{ ft} = 2400 \text{ ft}^2$$

$$D_r = 1 \text{ ft}$$

$$P_r = 0.35$$

(Assume $P_r = 0.35$ for all problems)

Then, plug the variables into the equation:

$$V_s = 1 \text{ ft} \times 0.35 \times 2400 \text{ ft}^2$$

Finally, multiply to solve for the storage volume:

$$V_s = 840 \text{ ft}^3$$

Problem 1: If a 45 ft by 63 ft parking lot has a reservoir layer that is one foot deep, what is the storage volume?

Problem 2: If a 73 ft by 59 ft parking lot has a reservoir layer that is 1.5 feet deep, what is the storage volume?

Problem 3: What is the volume of rain that will be distributed on a 150 ft by 48 ft parking lot if the total rainfall is 3 inches? List your answer in both cubic feet and gallons. (1 cubic foot = 7.481 gallons)