

# Groundwater Recharge Perc Test

The Perc Test must be done by a professional with the proper equipment.  
A signed copy of the test results on a Perc form must be submitted .

## Test Preparation

- Must have a minimum of 3 holes at the proposed depth in the recharge area.
- The holes shall be 6" to 10" in diameter with 2" of gravel or stone at the bottom.

## Running the Test

- \* *No initial presoak required.*
- The first two 30 minute readings shall be the presoak.
- After the first two 30 minute reading
  - If water remains in the hole—use 30 minute readings
  - If no water remains in the hole—use 10 minute readings

## Stabilization

- Take a minimum of eight readings or until 1/4 inch or less between the highest and lowest readings of four consecutive readings for sabilization (not including the pre-soaks).

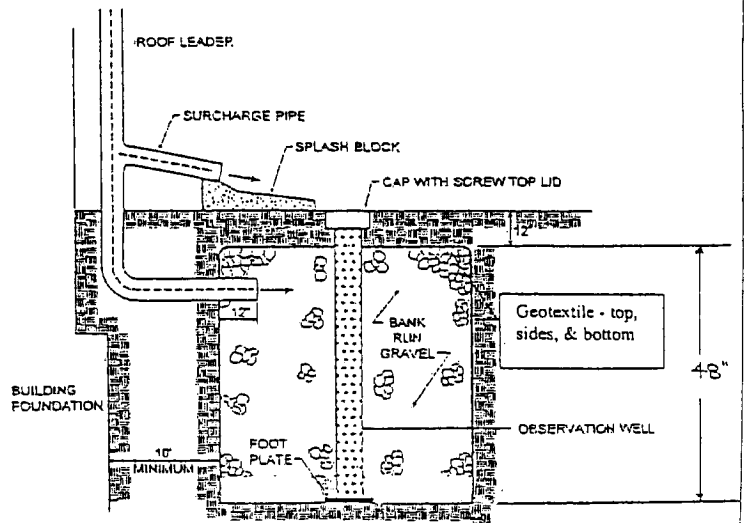
Perc rates for dry well/ ground water recharge systems  
System must drain completely within 96 hours.

Max System depth	Minimum Perc Rate	
(FT)	Inches/hour	Inches/1/2 hour
5	5/8	5/16
4	1/2	1/4
3	3/8	3/16
2	1/4	1/8
1	1/8	1/16

### Example

1/2"/hr. = 48"/96 hrs. Therefore use 48" or 4 ft

TYPICAL DRY WELL CONFIGURATION



## ORDINANCE APPENDIX B

### **Stormwater management procedures for projects between five hundred (500) and one thousand five hundred (1,500) square feet of proposed impervious area and less than five thousand (5,000) square feet of earth disturbance**

#### **Who is affected by these requirements?**

Radnor Township's new stormwater ordinance affects all NEW commercial and residential development in the Township. Individual home construction projects on single-family lots which result in less than five hundred (500) square feet of impervious area (including the building footprint, driveway, sidewalks, and parking areas) and less than five thousand (5,000) square feet of earth disturbance are not required to submit formal drainage plans to the Township or the County; however, they are still encouraged to address water quality and groundwater recharge criteria specified in the Stormwater Ordinance (Sections 405 and 406).

#### **Do I require professional services to meet these requirements?**

This brochure has been developed to assist the individual homeowner in meeting the water quality and groundwater recharge goals of this Ordinance. If the guidelines presented in this brochure are followed, the individual homeowner will not require professional services to comply with these water quality and groundwater recharge goals.

#### **What do I need to send to the Municipality?**

Even though a formal drainage plan is not required for individual lot owners, a brief description of the proposed infiltration facilities, including types of material to be used, total impervious areas and volume calculations as shown below, and a simple sketch plan showing the following information shall be submitted to the Township along with or as part of the grading permit application prior to the construction:

- Locations of proposed structures, driveways, or other paved areas with approximate size in square feet.
- Location of any existing or proposed on-site septic system and/or potable water wells showing rough proximity to infiltration facilities.

#### ***Determination of Recharge Volume***

The amount of recharge volume that should be provided can be determined by following the simple steps below. Impervious area calculations should include all areas on the individual lots that are covered by roof area or pavement which would prevent rain from naturally percolating into the ground, including sidewalks, driveways, or parking areas. Sidewalks, driveways, or patios that are constructed with gravel or turf pavers must be included in this calculation.

Example Recharge Volume:

STEP 1 – Determine Total Impervious Surfaces:

House Roof (Front)	12 ft. x 48 ft.	=	576 sq. ft.
House Roof (Rear)	12 ft. x 48 ft.	=	576 sq. ft.
Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	6 ft. x 20 ft.	=	120 sq. ft.
			-----
			2,016 sq. ft.

STEP 2 – Determine Required Infiltration Volume (Rv) Using the Following Equation

$$Rv = \frac{1.0 \text{ inch} \times (\text{total impervious area in square feet})}{12} = \text{cubic feet of recharge}$$

$$Rv = \frac{1.0 \text{ in} \times 2,016 \text{ sq. ft.}}{12} = 168 \text{ cu. ft.}$$

If the above volume will be stored underground in a stone pit. Allowance must be made for the volume of stone added.

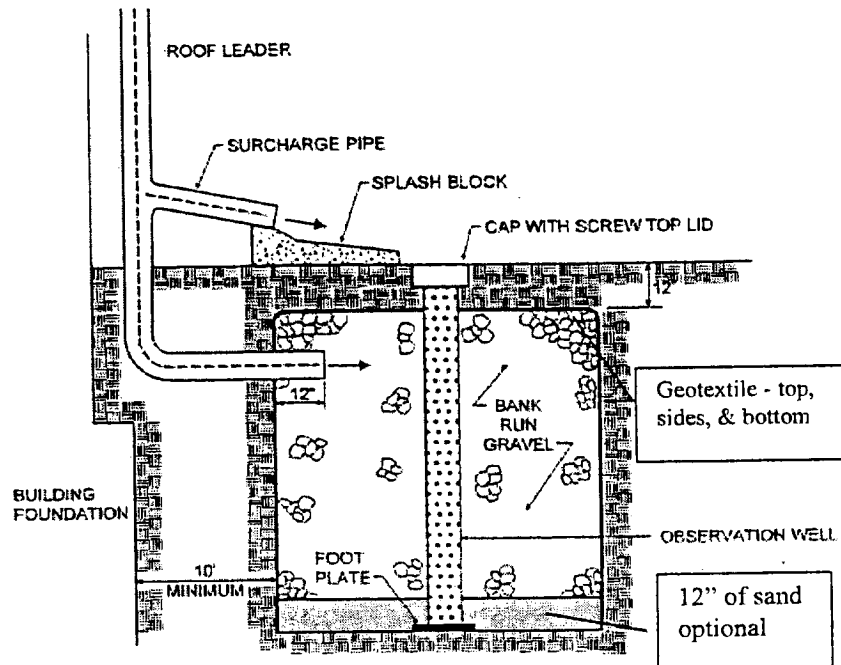
STEP 3 – Sizing of Select Infiltration Method

The following pages show several methods of infiltrating stormwater runoff from residential areas. Their appropriateness depends on the amount of infiltration volume required and the amount of land available. More than one method can be implemented on a site, depending on site constraints. Dry wells should be used only for receiving runoff from roof drains. Infiltration trenches are appropriate for receiving runoff from driveways, sidewalk, or parking areas. Other methods may be appropriate, but these should be discussed with the Township Engineer prior to installation.

**Dry Wells**

Dry wells are effective methods of infiltrating runoff from roof leaders. These facilities should be located a minimum of ten (10) feet from the building foundation to avoid seepage into your basement. A dry well can be either a structural prefabricated chamber or an excavated pit filled with crushed stone. Construction of a dry well should be performed after all other areas of the site are stabilized to avoid clogging. During construction, compaction of the subgrade soil should be avoided, and construction should be performed with only light machinery. Depth of dry wells in excess of three and one half (3½') feet should be avoided. Gravel fill should be an average one and one half to three (1.5 – 3.0) inches in diameter. Dry wells should be inspected at least four (4) times annually as well as after large storm events.

## TYPICAL DRY WELL CONFIGURATION



Source: Maryland Stormwater Design Manual

### Example Sizing:

#### STEP 1 – Determine Total of Impervious Surfaces

House Roof Area (front only) draining to downspout (from above): 12 ft. x 48 ft. = 576 sq. ft.

#### STEP 2 – Determine Required Infiltration Volume Using Equation

$$\frac{1.0 \text{ in.} \times 576 \text{ sq. ft.}}{12} = 48 \text{ cu. ft.}$$

$$\frac{48 \text{ cu. ft.}}{0.40^*} = 120 \text{ cu. ft.} \quad (* \text{ assume } 40\% (0.40) \text{ void ratio in gravel bed – if AASHTO \#1 stone is used})$$

#### STEP 3 – Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3.5 ft; Set W = L for a square chamber

$$120 \text{ cu. ft.} = 3.5 \times L \times L; L = 5.9 \text{ ft. round up to } 6.0 \text{ ft}$$

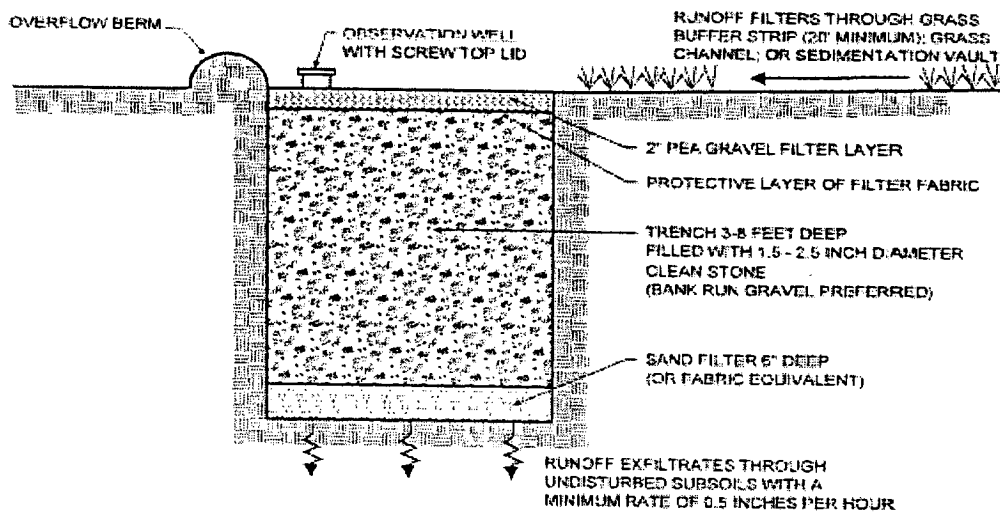
Final facility dimensions: 3.5 ft (D) x 6.0 ft. (W) x 6.0 ft. (L)

## Infiltration Trenches

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

FIGURE B-2

### TYPICAL INFILTRATION TRENCH CONFIGURATION



Source: Maryland Stormwater Design Manual

#### Example Sizing:

#### STEP 1 – Determine Total Impervious Surfaces

Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	6 ft. x 20 ft.	=	120 sq. ft.
			-----
			864 sq. ft.

#### STEP 2 – Determine Required Infiltration Volume Using Equation

$$\frac{1.0 \text{ in.} \times 864 \text{ sq. ft.}}{12} = 72 \text{ cu. ft.}$$

$$\frac{72 \text{ cu. ft.}}{0.4 * } = 180 \text{ cu. ft. (* assume 40\% void ratio in gravel bed)}$$

STEP 3 – Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3 ft: determine required surface area of trench

$$180 \text{ cu. ft.} / 3 \text{ ft.} = 60 \text{ sq. ft.}$$

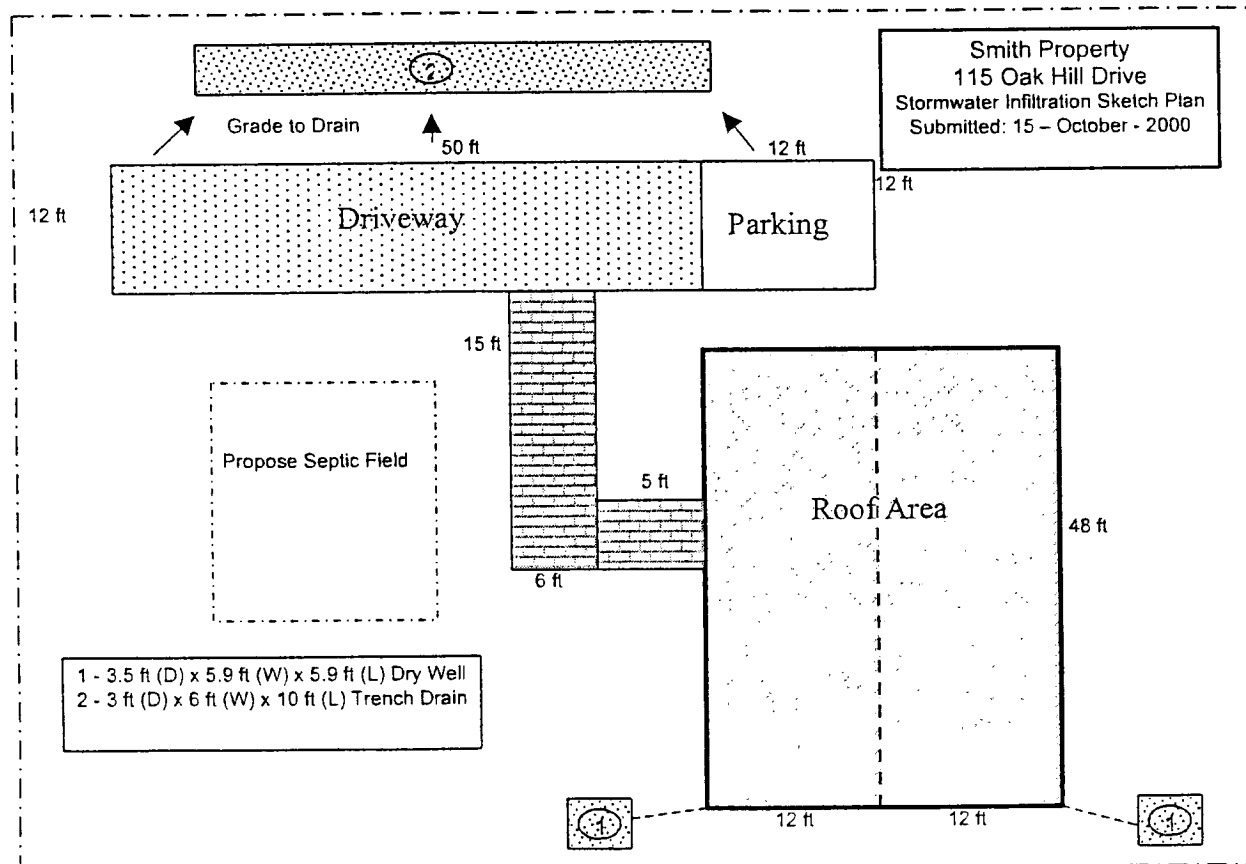
The width of the trench should be greater than 2 times its depth (2 x D); therefore, in this example a trench width of 6 feet is selected;

Determine trench length: L = 60 sq. ft. / 6 ft. = 10 ft..

Final trench dimensions: 3 ft. (D) x 6 ft. (W) x 10 ft. (L)

FIGURE B-3

SAMPLE SITE SKETCH PLAN



Source: Maryland Stormwater Design Manual