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Rain Garden Site Selection (Rooftop and Driveway/ Parking Lot)

Water Resources Program

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New Jersey Marine Sciences Consortium
Sea Grant New Jersey

Applying knowledge to improve water quality
Northeast States & Caribbean Islands Regional Water Program
A Partnership of USDA CSREES & Land Grant Colleges and Universities

Walk the Property

Identify the following…

- Rooftop gutters and downspouts (if any)
  - Do they discharge above ground?
  - Are they directly connected to the road?
  - Are they directly connected to the underground storm sewer
- Existing stormwater infrastructure
  - Curb/gutter for the parking lot or driveway
  - Catch basins and storm sewers
    - Look into the catch basins
    - What is the direction of pipe flow?
  - Open channel conveyance swales/ditches
  - Detention basins
- Topography – flat vs. sloped
- Type of existing vegetation (if any)

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Walk the Property

Determine the various pathways of the stormwater runoff on the property

- Which of the pathways are “impervious pathways?”
- Where does the water ultimately go?
  - Nearby stream or lake
  - A detention basin before a stream or lake
- Other signs that identify the pathways
  - Erosion
  - Patches of dead grass
  - Areas of sedimentation

Ultimate Goal: You need to determine a good place to “disconnect” the impervious pathway

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Make Observations During Storms

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Rain Garden Placement

- The rain garden should be at least 10 feet from the house so infiltrating water doesn't seep into the foundation.
- Ensure adequate square footage (100 – 300 s.f.).
- Do not place the rain garden within 25 feet of a septic system.
- Do not put rain garden in places where the water already ponds or the lawn is always soggy.
- Avoid seasonably-high water tables within two feet of the rain garden depth. (e.g. 2 ½' if rain garden is 6" deep)
- Select a flat part of the yard for easier digging as a first option.
- Avoid large tree roots.

http://clean-water.uwex.edu/pubs/raingarden/rgmanual.pdf

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Determine Existing Utility Lines

http://www.nj1-call.org

NJ One Call:

811

Rooftop Scenario

- Easiest scenario for estimating the drainage area
- Calculate the volume of water that discharges to the downspout
- If no gutters, follow the drip line with a ditch that conveys water into the rain garden

What if the gutters connect directly to the storm sewer system underground?

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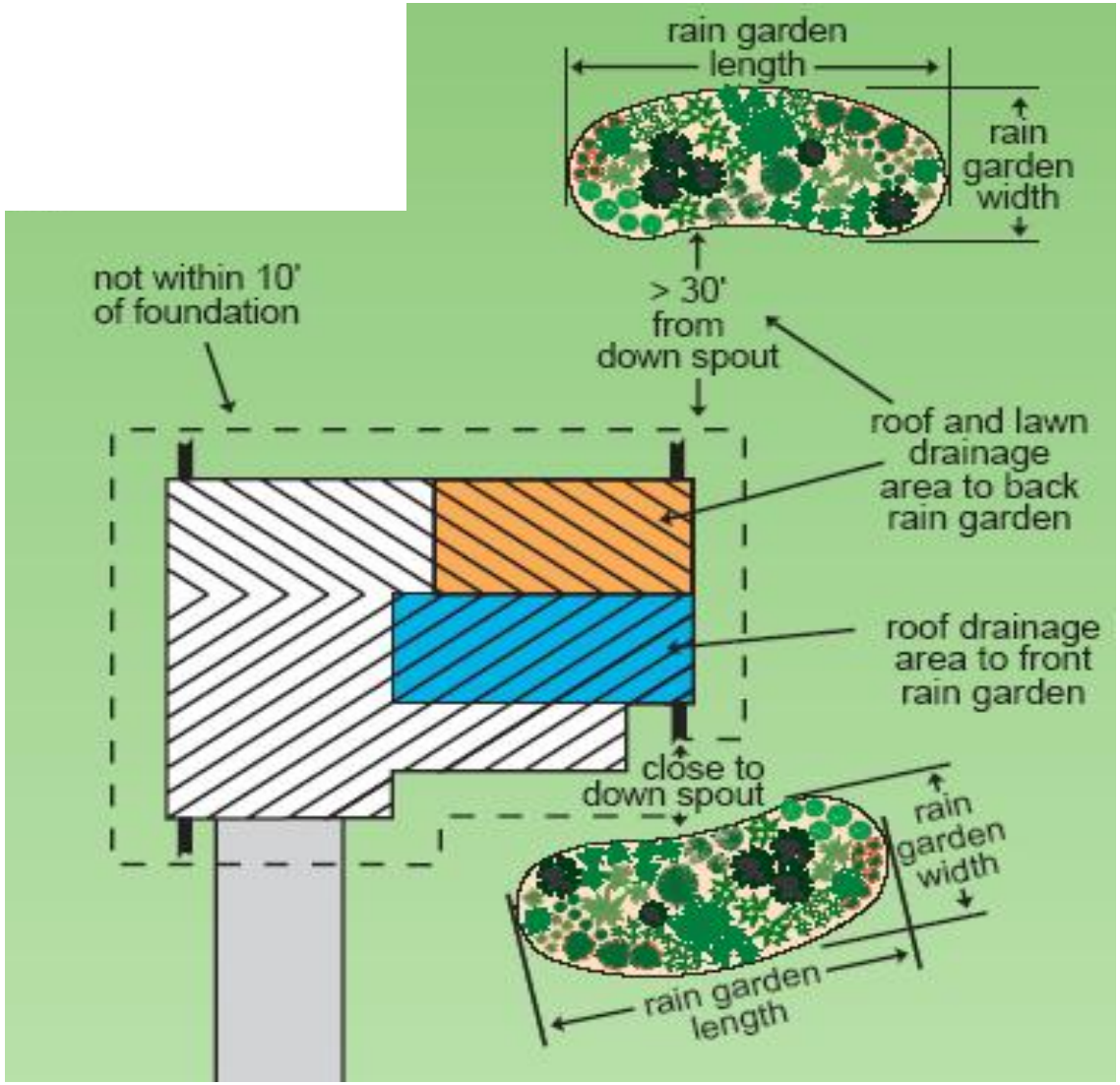
Placement Options - Rooftop



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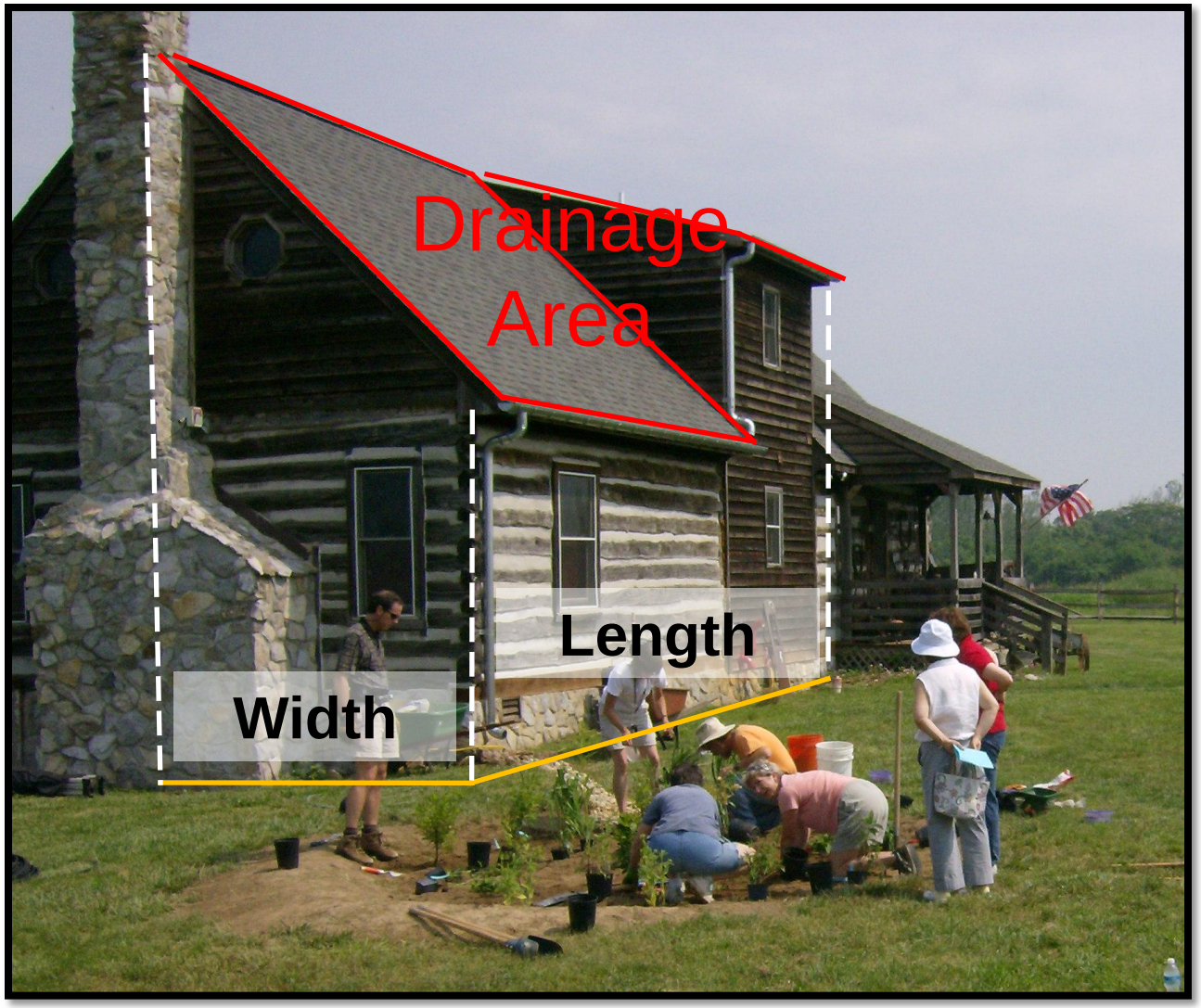
Placement Options - Rooftop

Surface Area = Length x Width



Hockman Farm, Winchester, Virginia

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Placement Options - Rooftop

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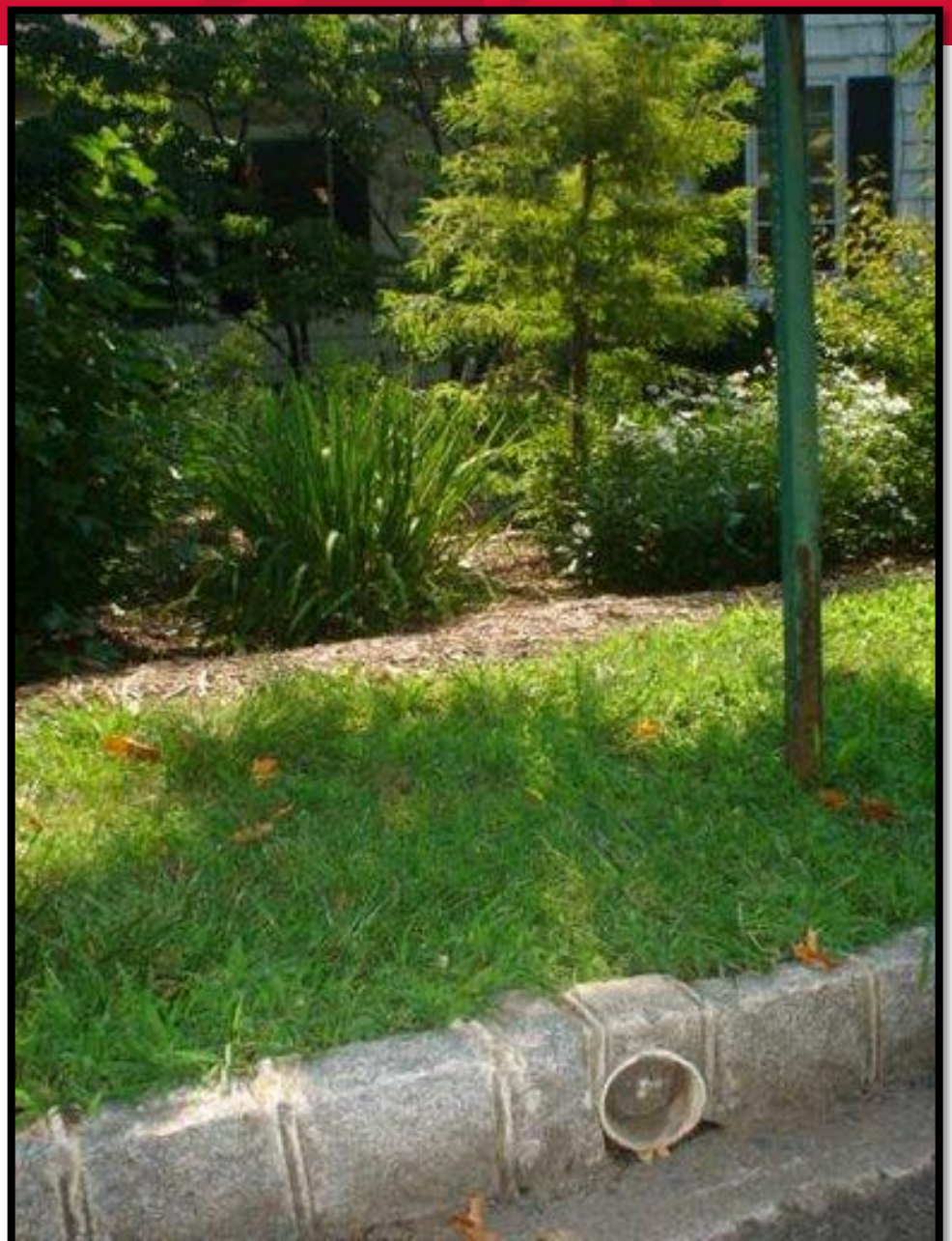
Placement Options - Rooftop



Rooftop Scenario

- Try to disconnect the downspouts before they enter the underground pipes
- Divert the water to an above ground rain garden using PVC pipe and fittings and/or corrugated plastic pipe
- If you cannot disconnect at the downspout try “day-lighting” (if the underground pipe if it is near the surface of the lawn)
  - Only attempt this if you are able to design the rain garden for the entire drainage area
  - Be careful of more than one downspout connecting to the same underground pipe

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Road, Driveway, or Parking Lot Scenario

With no curb

Road, Driveway, or Parking Lot Scenario

With a curb (curb cut needed)

Photo Credit:
Barr Engineering,
Minneapolis, MN

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Road, Driveway, or Parking Lot Scenario

- Estimating the drainage area can be difficult
- Surveying equipment is helpful
- What can you do?
  - Obtain site plans and/or speak with the building manager
  - Use the “get wet” method—go out in the rain.
- Consider…
  - Parking lots and driveways are often pitched to convey water to one side or both sides
    (look for a slight ridge in the center)
  - Sediment deposits along curbs are evidence of flow direction
  - If there is not curb, dead grass patches and erosion are evidence of where the water leaves the asphalt

But even if you can accurately estimate the drainage area, you might not be able to handle such a large rain garden project

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Road, Driveway, or Parking Lot Scenario

How to Handle a Curb Cut

- The goal is to divert the water into a rain garden before it enters the catch basin

- Make use of the existing infrastructure in the case of overflow (above 1.25 inches of rain)
  - The rain garden berm must not be lower then the elevation of the parking lot asphalt
  - Reinforce the berm by making it wider/taller, if necessary. Or use a retaining wall.

Curb cut at RCE of Monmouth County/ Agriculture Building

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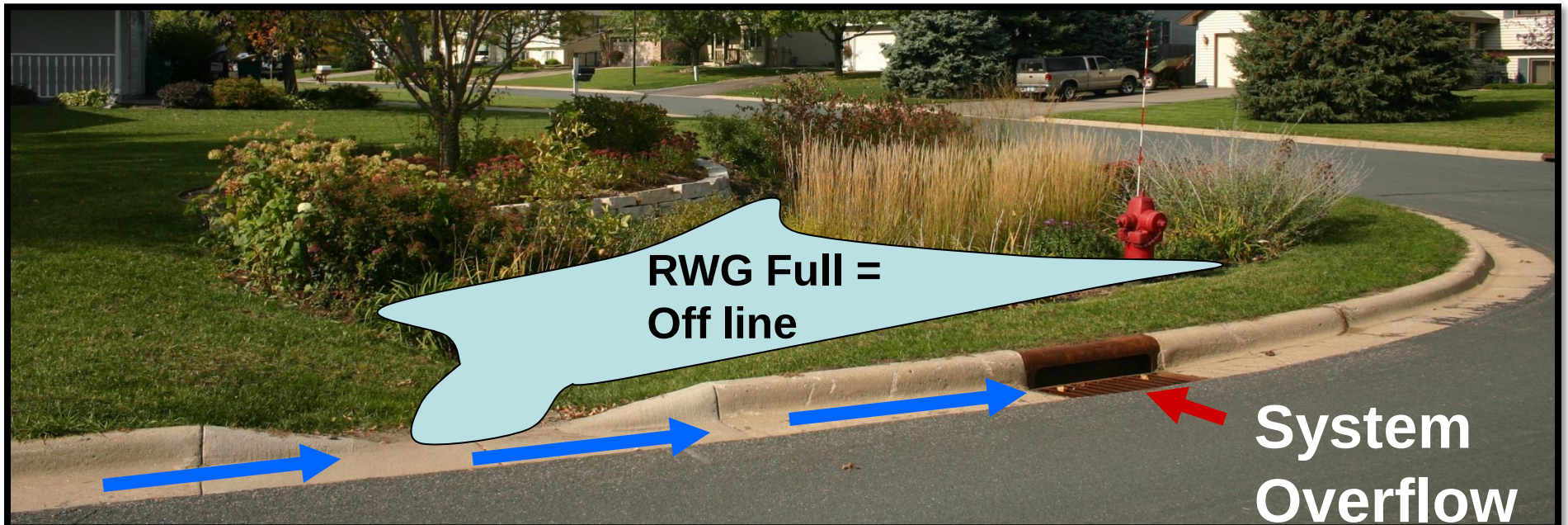
Road, Driveway, or Parking Lot Scenario



Diverting the Pathway

- You are changing the direction of flow
- Rain gardens are designed for 1.25 inches of rain
- Determine where the overflow would go for a storm larger than 1.25 inches
  - Would diverting the water into a rain garden create more of a problem for overflow?
  - Take note of the down-slope infrastructure—can it handle the overflow in the event of a storm greater than 1.25 inches?

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Size of the Rain Garden

- The size of the rain garden is a function of volume of runoff to be treated and recharged.

- Typically, a rain garden is sized to handle New Jersey's Water Quality Design Storm: 1.25 inches of rain over two hours.

- A typical residential rain garden ranges from 100 to 300 square feet.

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Depth of the Rain Garden

- Between four and eight inches deep is ideal
- Depth depends upon lawn slope
  - If the slope is less than 4%, it is easiest to build a 3 to 5-inch deep rain garden.
  - If the slope is between 5 and 7%, it is easiest to build one 6 to 7 inches deep.
  - If the slope is between 8 and 12%, it is easiest to build one about 8 inches deep.

http://clean-water.uwex.edu/pubs/raingarden/rgmanual.pdf

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Rain Garden Sizing Table for NJ's Water Quality Design Storm

Rain Garden Sizing Table Based on New Jersey's Water Quality Design Storm			
Drainage Area	**Size of 3" Deep Rain Garden**	**Size of 6" Deep Rain Garden**	**Size of 8" Deep Rain Garden**
500 ft^2	200 ft^2	100 ft^2	75 ft^2
750 ft^2	300 ft^2	150 ft^2	112 ft^2
1000 ft^2	400 ft^2	200 ft^2	149 ft^2
1500 ft^2	600 ft^2	300 ft^2	224 ft^2
2000 ft^2	800 ft^2	400 ft^2	299 ft^2

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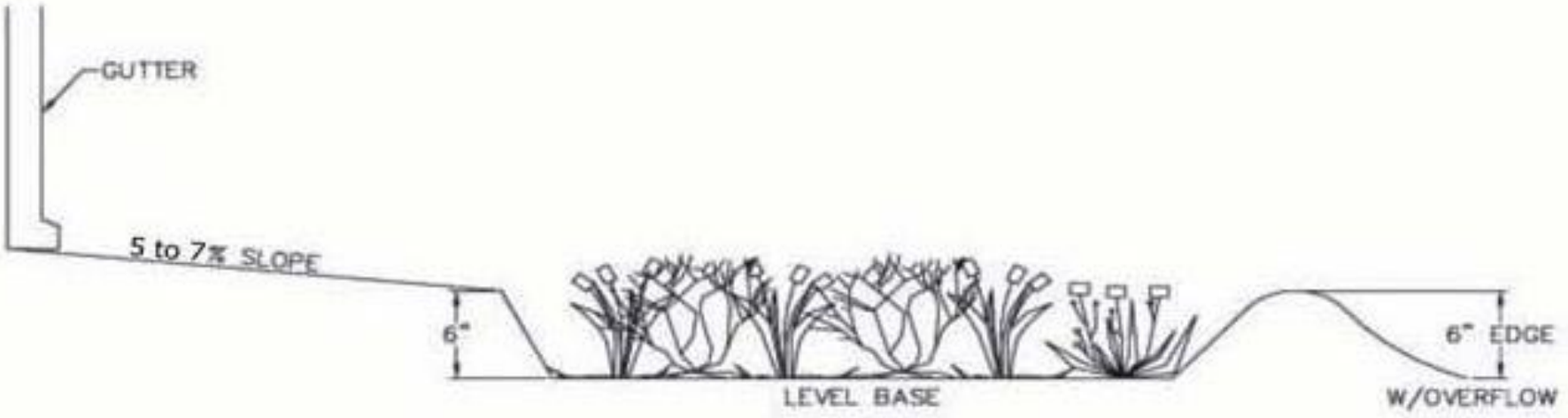
Keep Your Rain Garden Level

Figure 4. Plants at base of a 6-inch deep Rain Garden



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Find the Slope of the Lawn

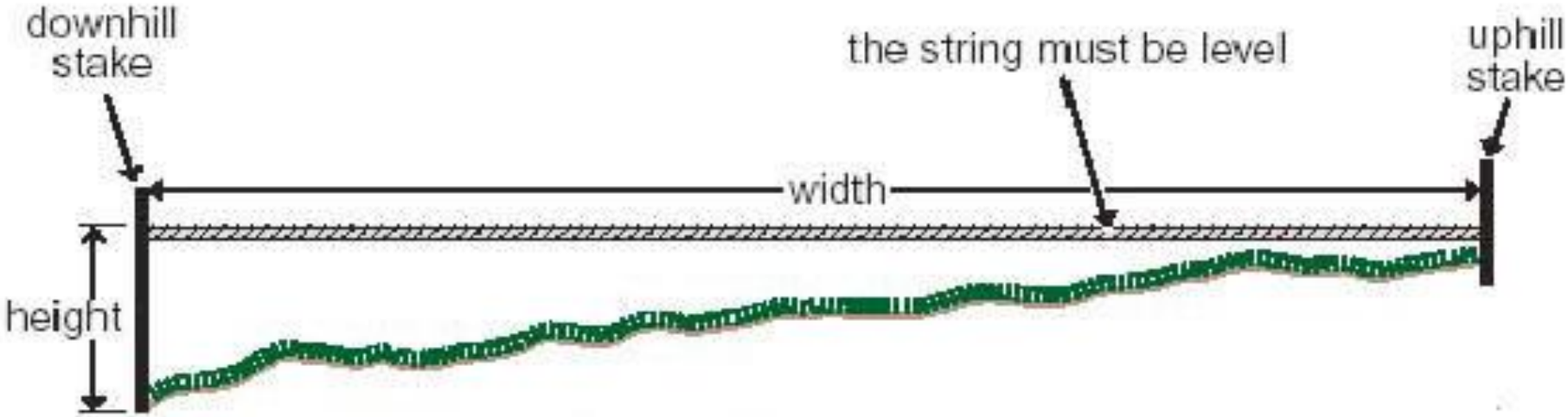

Figure 3 The string should be tied to the base of the uphill stake, then tied to the downhill stake at the same level.

$$\frac{\text{Height}}{\text{Width}} \times 100 = \% \text{ Slope}$$

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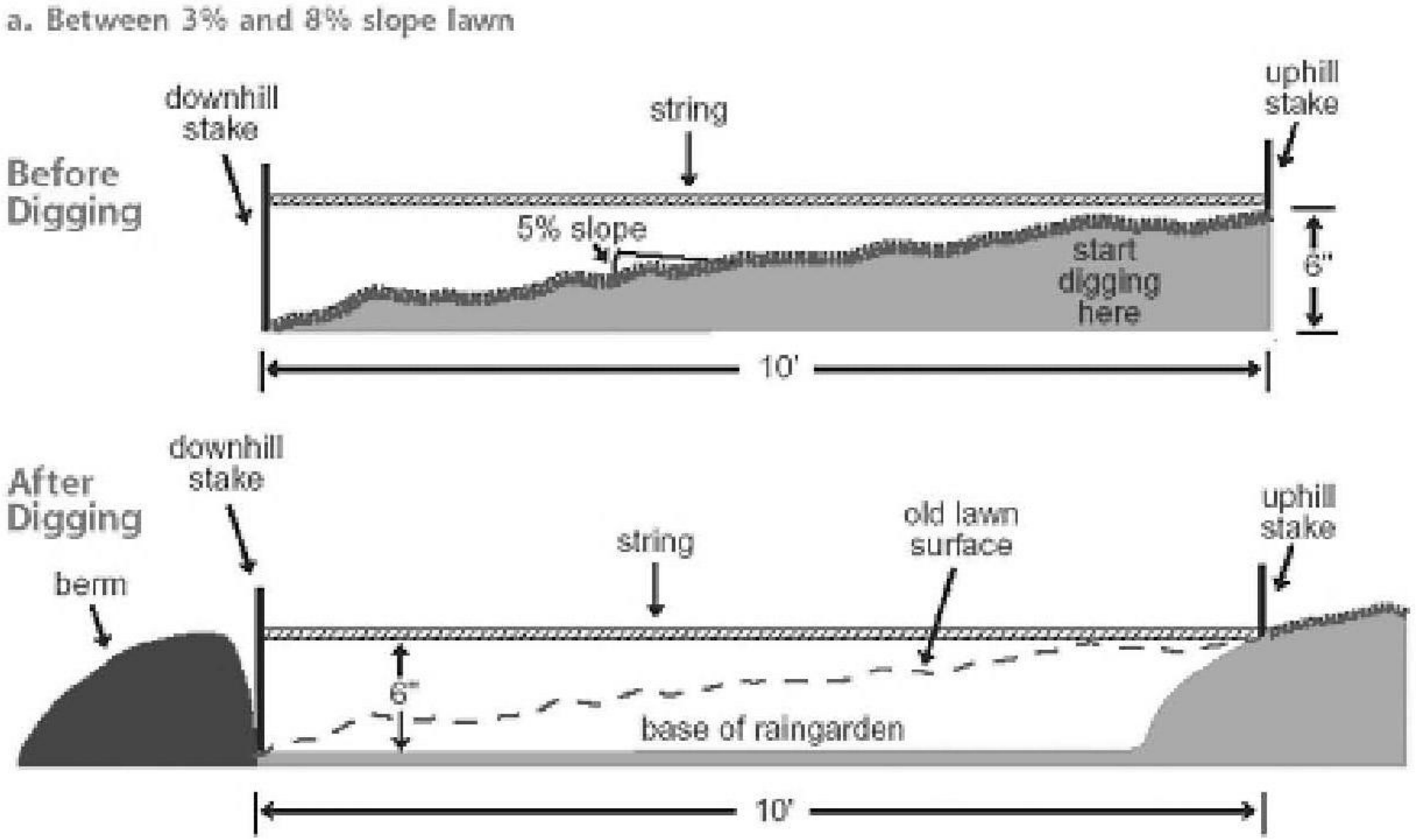
Digging Your Garden (3-8% Slope)



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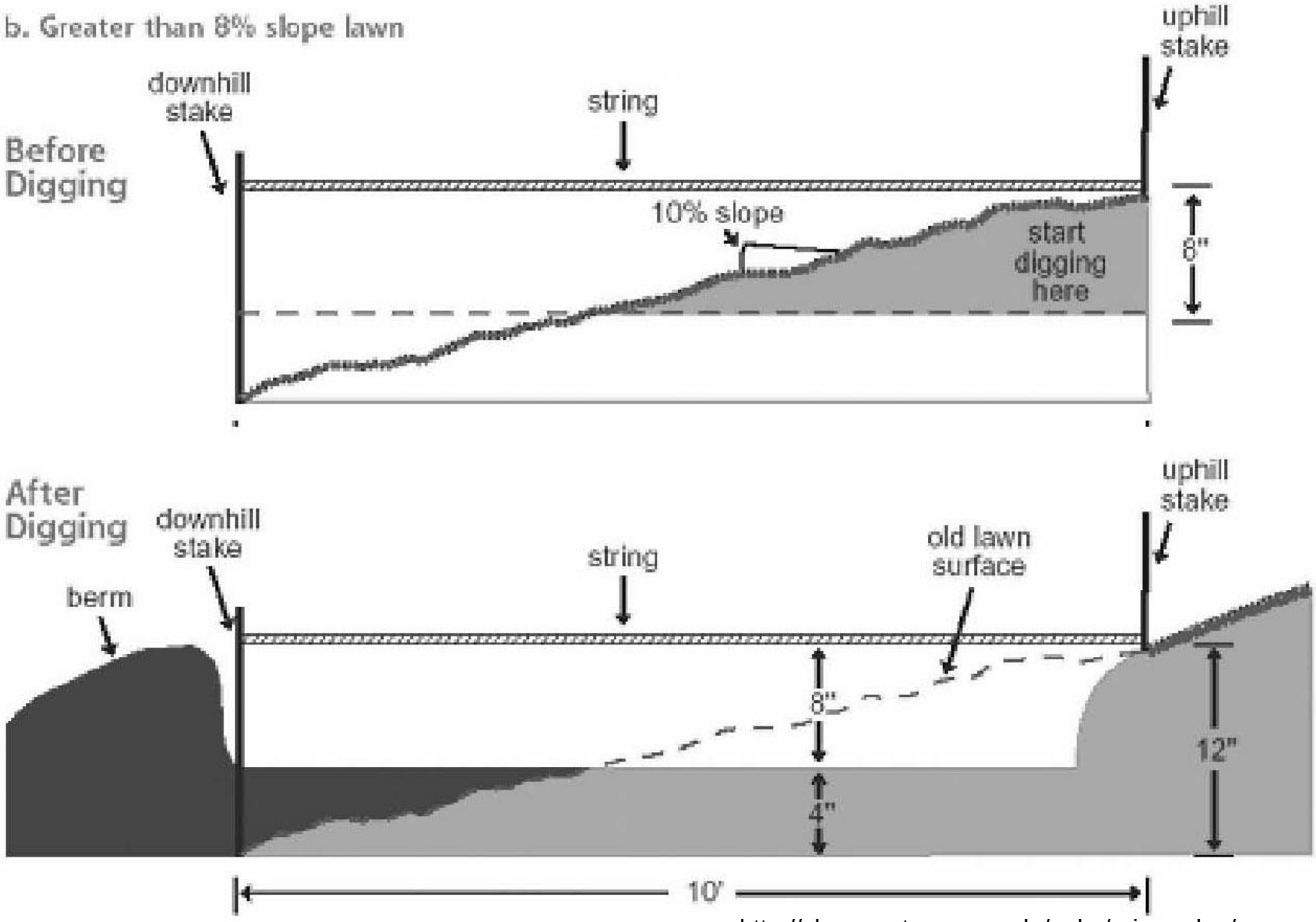
Digging Your Garden (>8% Slope)



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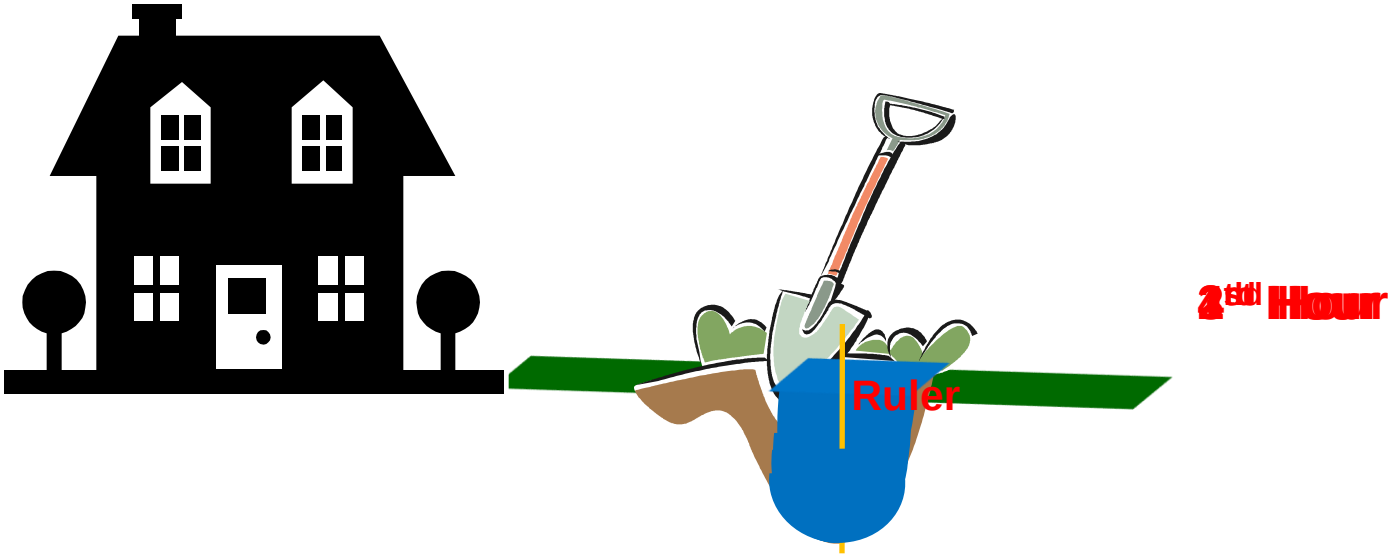
Percolation Test



Water should be completely drained within 24 hours.

Ideal percolation rate ~ 1.5 inches/ hour

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24 Hour Method

- Perform your percolation test
  - 1.5 inches/hour is ideal (sandy/sandy loam)
- If water percolates completely within 24 hours…
  - Still acceptable but decreasing the depth is advised
- If water does not percolate completely within 24 hours…
  - Determine the 24-hour rate
  - Use it as your maximum depth

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Soil Test

- Sample the soil and send to the Rutgers Soil Testing Lab for:
  - Nutrient analysis/ recommendations
  - pH analysis/ recommendations
  - Percent sand/ silt/ clay or textural class

$15 for the first two; $75 for all three

- Optimal sand content for a rain garden is 70%

- Soil Texture Test

  Roll soil into a ball in hand and see how it forms
  - Hard ball – Clay/Silt soil
  - Soft ball – Loamy soil
  - No ball – Sandy soil

Loamy soil is the BEST soil for a rain garden

Gloucester County 4-H Fairgrounds

But, don't worry – clay/silt and sandy soils can be amended to get the preferred loamy soil texture