RAIN GARDEN REBATE PROGRAM

PILOT RAIN GARDEN EDUCATION WORKSHOP FOR PROPERTY OWNERS IN SOMERVILLE

August 2013

NEW JERSEY EST. 1981 WATER SUPPLY AUTHORITY

RUTGERS New Jersey Agricultural Experiment Station

Water Resources Program

Assent Statement

- "This workshop is part of a research project conducted by Rutgers Cooperative Extension Water Resources Program to determine whether financial rebate incentives encourage property owners to install a rain garden on their property. Participation is voluntary and is open to all property owners in the Borough of Somerville, New Jersey. If you do not want to participate in this study please do not fill out the workshop survey.
- For further information contact Sara Mellor at 14 College Farm Road, New Brunswick, NJ 08901, 848-932-6747 or saramellor@envsci.rutgers.edu".

What happens to the rain in our watersheds?

What is stormwater?

Stormwater is the water from rain or melting snows that can become “runoff,” flowing over the ground surface and returning to lakes and streams.

Pollutants Found in Runoff

Sediment
Soil particles transported from their source

Biochemical Oxygen Demand (BOD)
- Oxygen depleting material
  - Leaves
  - Organic material

Toxics
- Pesticides
  - Herbicides
  - Fungicides
  - Insecticides
- Metals (naturally occurring in soil, automotive emissions/ tires)
  - Lead
  - Zinc
  - Mercury
- Petroleum Hydrocarbons (automotive exhaust and fuel/oil)

Nutrients
- Various types of materials that become dissolved and suspended in water (commonly found in fertilizer and plant material):
  - Nitrogen (N)
  - Phosphorus (P)

Bacteria/ Pathogens
Originating from:
- Pets
- Waterfowl
- Failing septic systems

Thermal Stress
Heated runoff, removal of streamside vegetation

Debris
Litter and illegal dumping

Impervious surfaces

Impervious surfaces

The Impact of Development on Stormwater Runoff

more development → *More impervious surfaces* → *more stormwater runoff*

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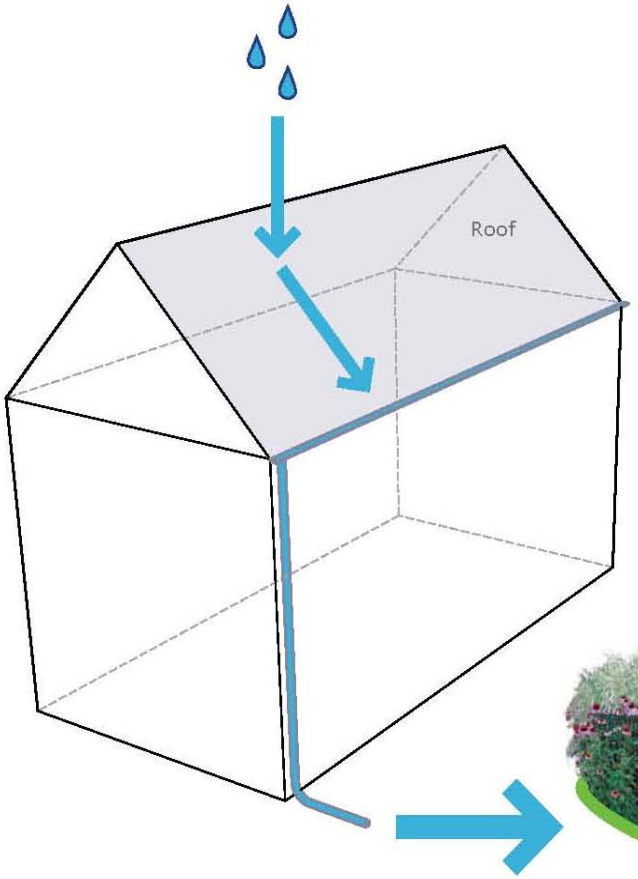
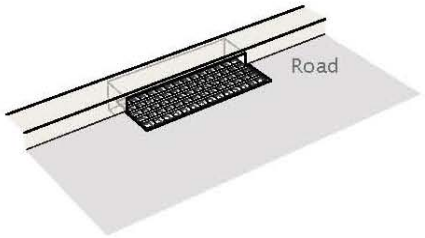
Connected or Disconnected?

The Solution…



PLACE A RAIN GARDEN BETWEEN
TWO IMPERVIOUS SURFACES

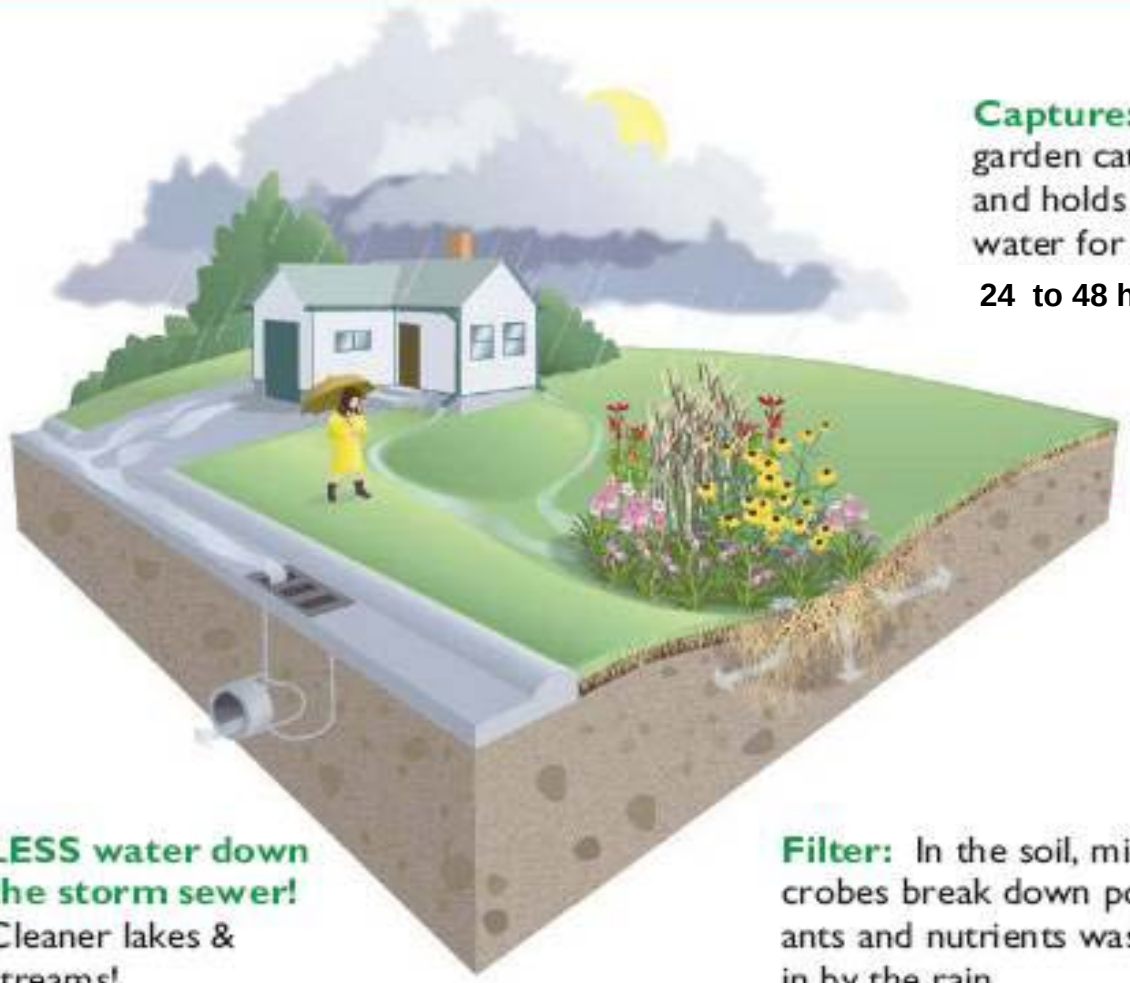
REDUCE THE AMOUNT
OF RUNOFF ENTERING
STORM SEWERS



Rain Gardens

A rain garden is a landscaped, shallow depression that is designed to intercept, treat, and infiltrate stormwater at the source before it becomes runoff. The plants used in the rain garden are native to the region and help retain pollutants that could otherwise harm nearby waterways.

Rain Gardens



Capture: A rain garden catches runoff and holds standing water for no more than **24 to 48 hours.**

Soak: Deep-rooted plants loosen the soil, creating a sponge zone. Water soaks in and groundwater aquifers are recharged.

LESS water down the storm sewer!
Cleaner lakes & streams!

Filter: In the soil, microbes break down pollutants and nutrients washed in by the rain.

Courtesy of City of Maplewood, MN

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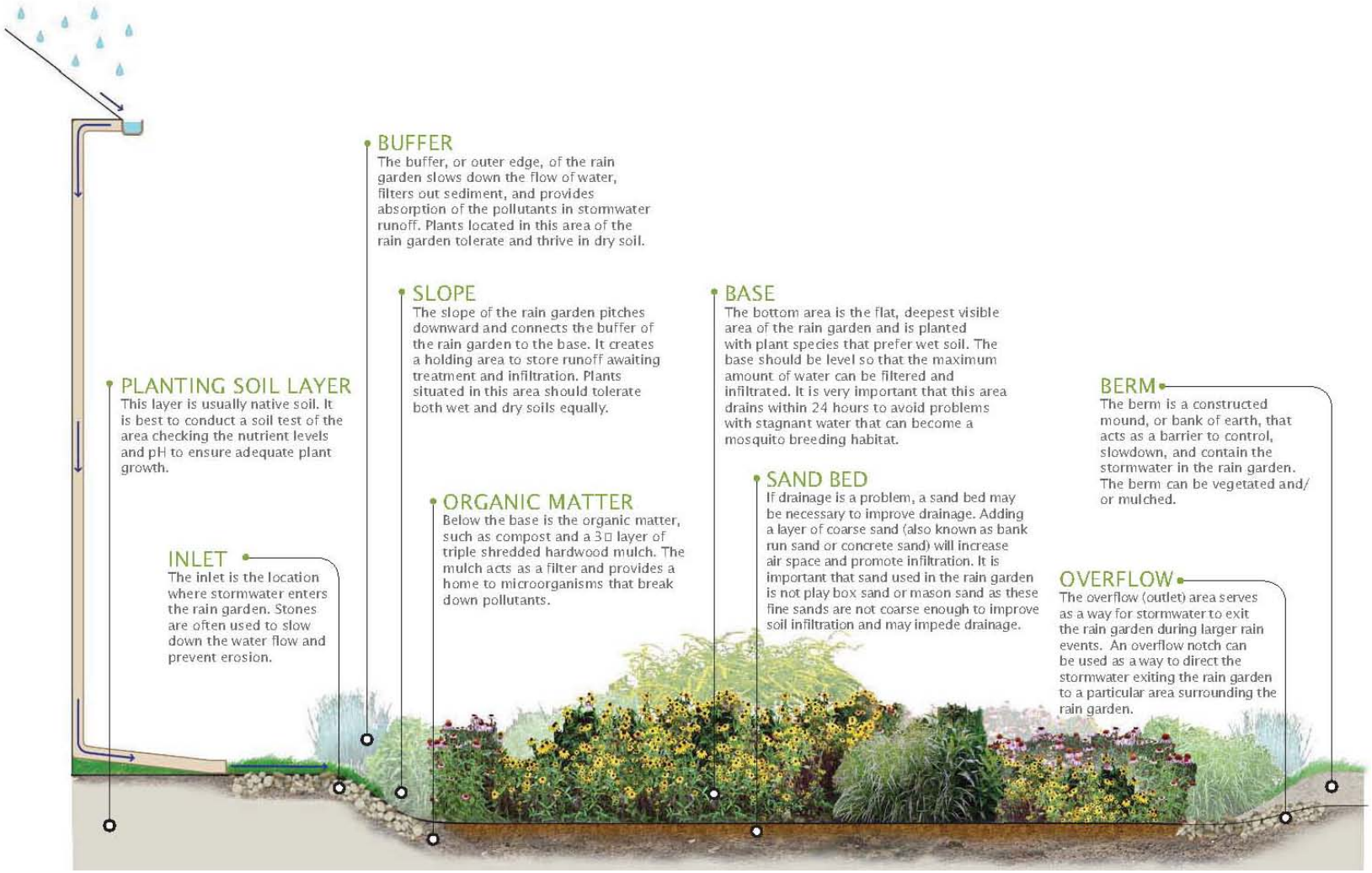
PARTS OF A RAIN GARDEN

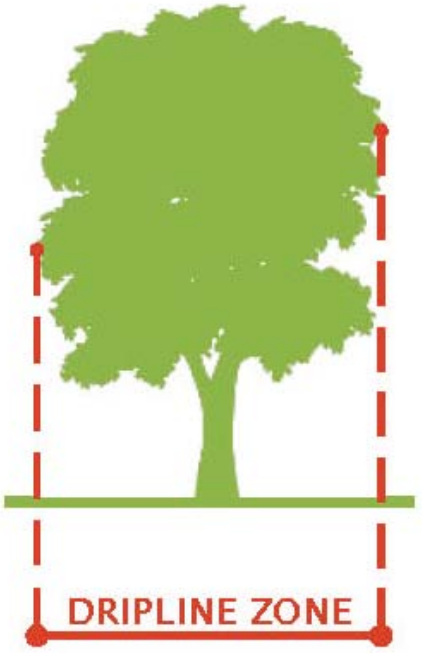


SITE SELECTION & DESIGN

PLANNING YOUR RAIN GARDEN

SITE SELECTION

1. Next to a building with a basement, rain garden should be located min. 10′ from building; no basement: 2′ from building
2. Do not place rain garden within 25′ of a septic system
3. Do not situate rain garden in soggy places where water already ponds
4. Avoid seasonably-high water tables within 2′ of rain garden depth
5. Consider flat areas first – easier digging
6. Avoid placing rain garden within dripline of trees
7. Provide adequate space for rain garden

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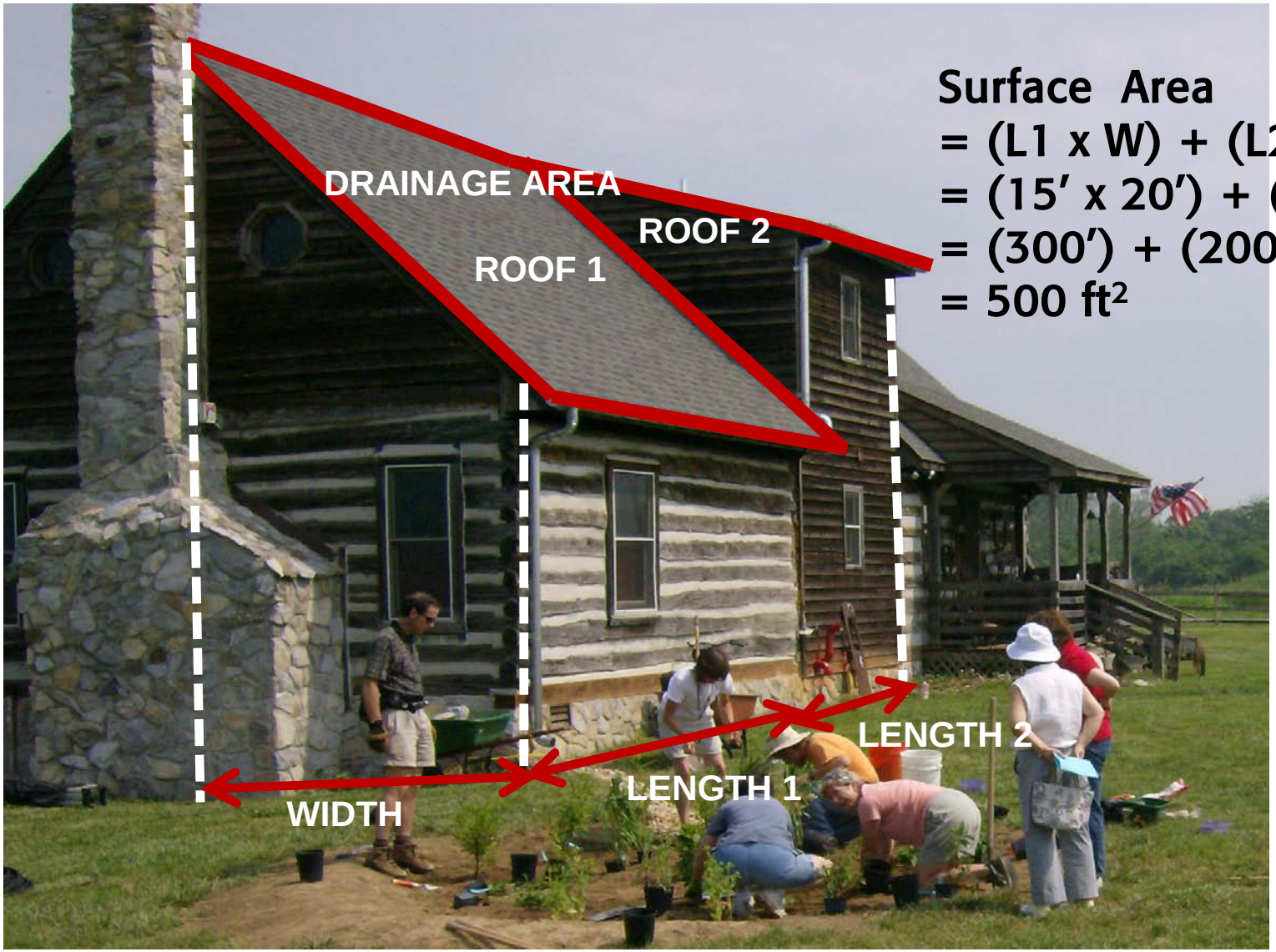
CALL BEFORE YOU DIG

- NJ One Call: 1-800-272-1000
- Free markout of underground gas, water, sewer, cable, telephone, and electric utility lines
- Call at least 3 full working days, but not more than 10 days, prior to planned installation date
- Do not place rain garden within 5′ horizontally and 1′ vertically from any utilities

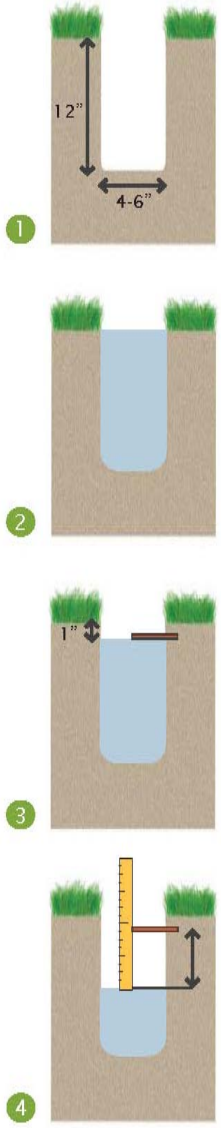
DRAINAGE AREA CALCULATION



Surface Area
= (L1 x W) + (L2 x W)
= (15′ x 20′) + (10′ x 20′)
= (300′) + (200′)
= 500 ft²

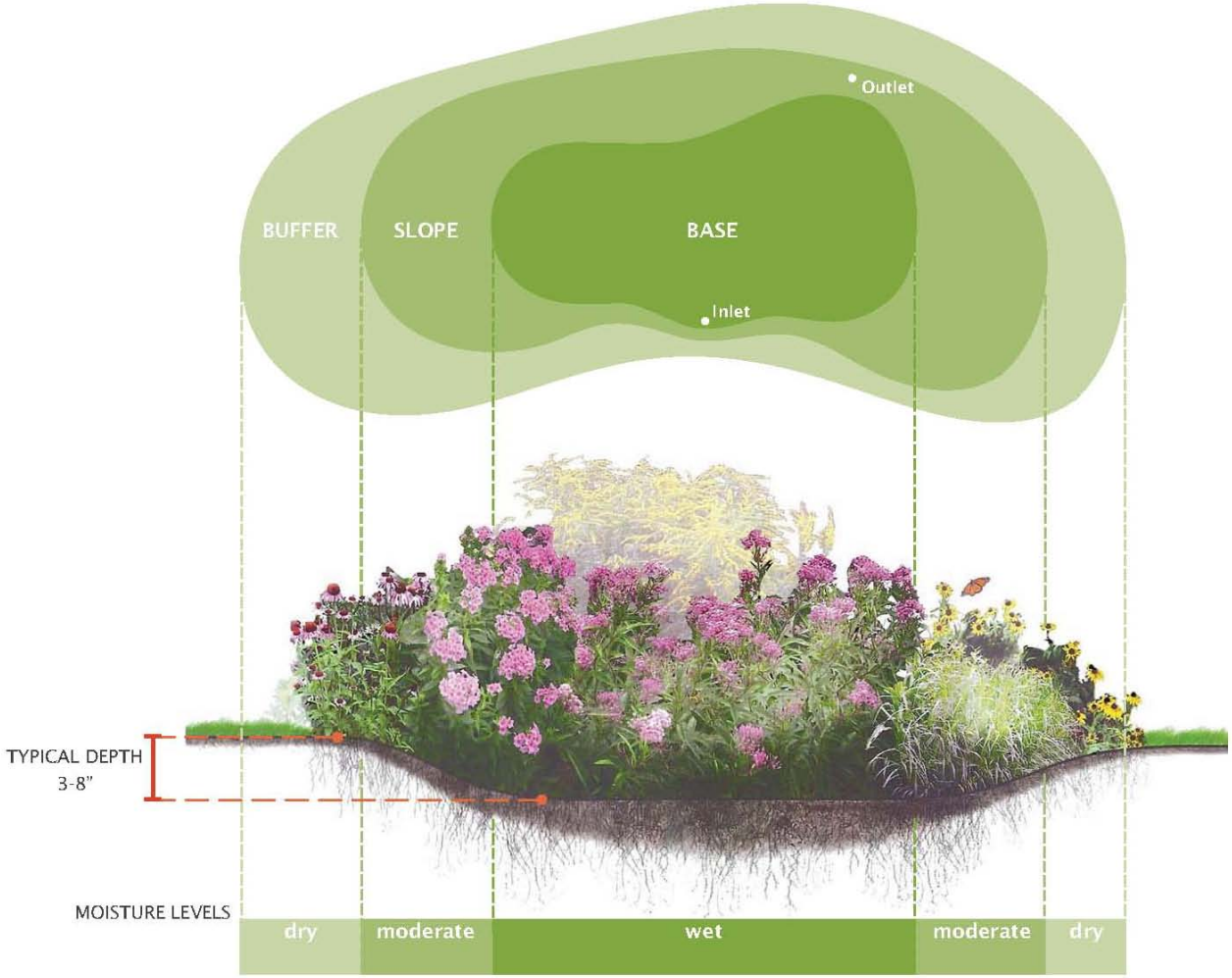
DRAINAGE AREA: THE ROOFTOP SCENARIO

CHECK YOUR SOIL



- Infiltration/Percolation Test
  1. Dig a hole in the proposed rain garden site (12" deep, 4-6" wide)
  2. Fill with water to saturate soil and then let stand until all the water has drained into the soil
  3. Once water has drained, refill the empty hole again with water so that the water level is about 1" from the top of the hole
  4. Check depth of water with a ruler every hour for at least 4 hours
  5. Calculate how many inches of water drained per hour

DETERMINING THE DEPTH OF THE RAIN GARDEN



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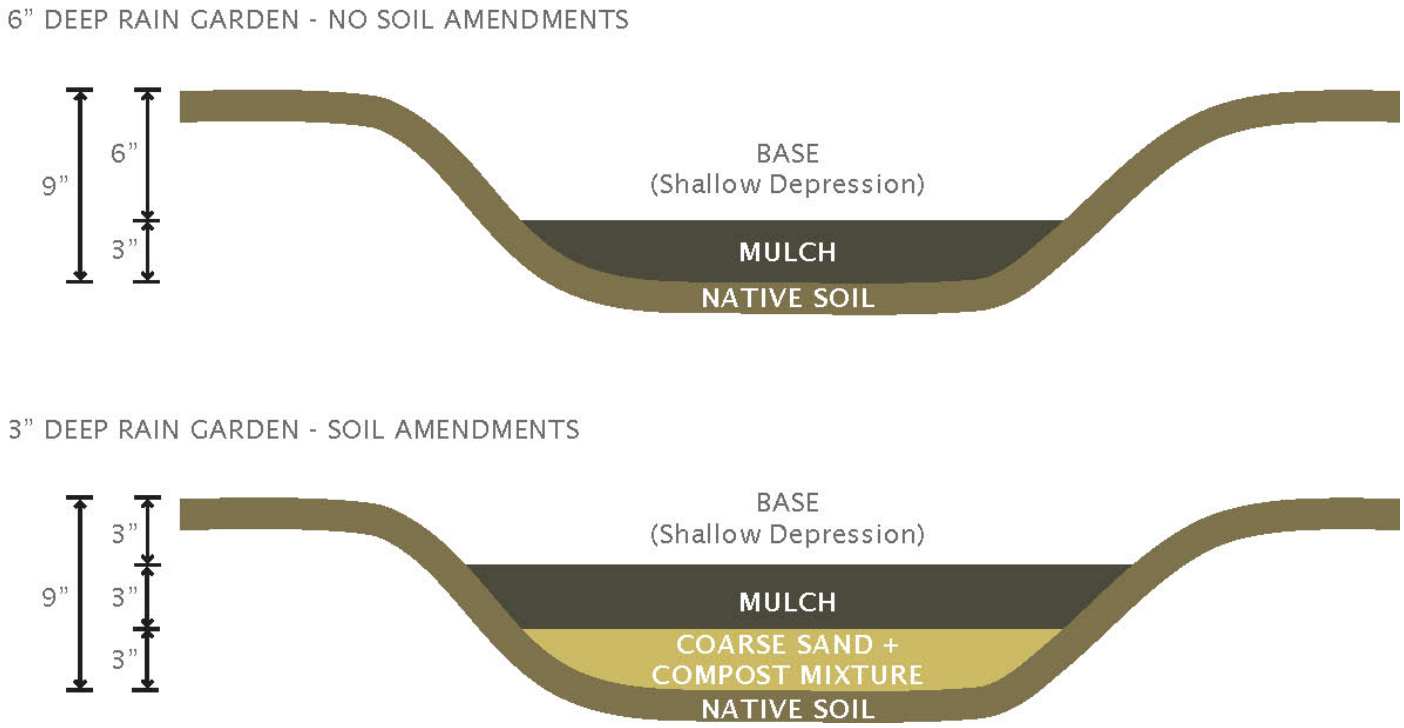


- Depth of rain garden is dependent upon the soil texture found at the site of the rain garden
- Depth is usually 3-8 inches

DETERMINING THE SIZE OF THE RAIN GARDEN

- The size of the rain garden is dependent upon the amount of runoff entering the rain garden

Rain Garden Sizing Table

Based on New Jersey's Water Quality Design Storm (1.25" of rain over 2 hours)

Drainage Area	Size of 3" Deep Rain Garden CLAY SOIL*	Size of 6" Deep Rain Garden SILTY SOIL	Size of 8" Deep Rain Garden SANDY SOIL
500 ft^2	200 ft^2	100 ft^2	75 ft^2
750 ft^2	350 ft^2	150 ft^2	112 ft^2
1,000 ft^2	400 ft^2	200 ft^2	149 ft^2
1,500 ft^2	600 ft^2	300 ft^2	224 ft^2
2,000 ft^2	800 ft^2	400 ft^2	299 ft^2

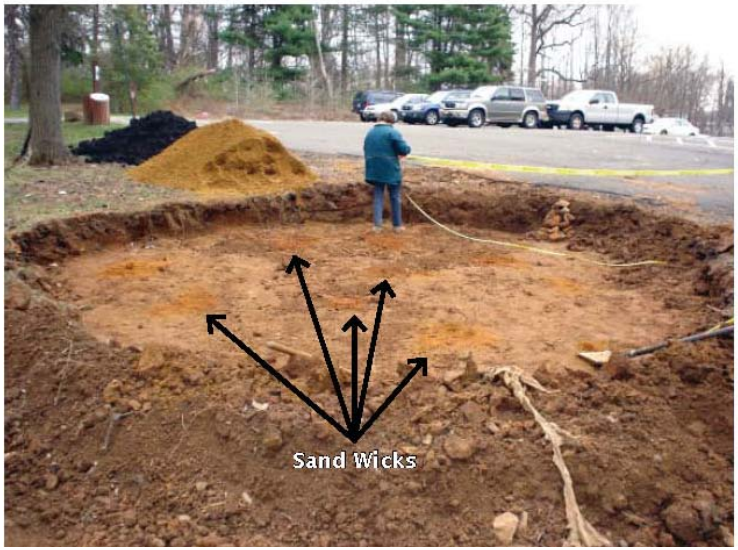
*SOIL TEXTURE AMENDMENTS NEEDED

SOIL TEXTURE AMENDMENTS

- Soil texture amendments improve the rain garden's infiltration rate.

SOIL QUALITY AMENDMENTS

- Soil quality amendments improve the rain garden's growing conditions for plants
- Improve soil's nutrient capacity



REMEMBER:
Your rain garden should NOT be permanently filled with water – it should drain within 24 hours.

DETERMINING THE INLET AND OVERFLOW

- Stormwater runoff enters the rain garden from an **inlet**
- Stormwater exits through the **overflow**

PREVENTING EROSION

- Slope no greater than 3:1
- Slow down velocity of water flowing through rain garden
  - Add rocks to inlet area

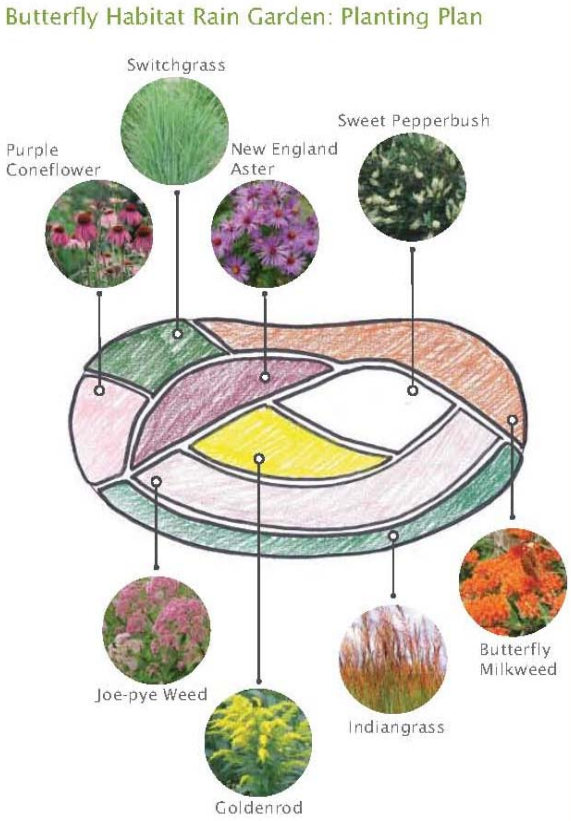
DETERMINING MULCH QUANTITY

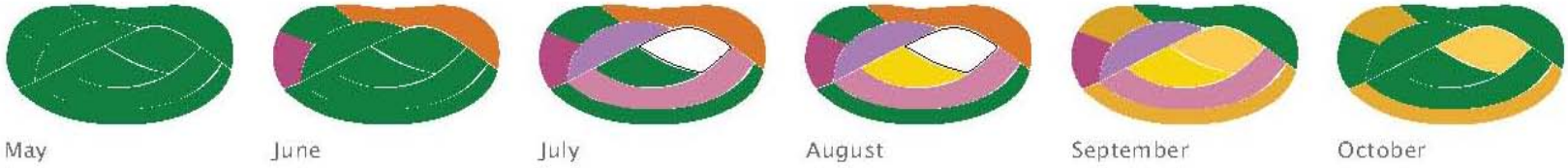
- Allow for a 3" depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden
- Every 100 square feet of rain garden needs 1 cubic yards (3" depth)

RAIN GARDEN DESIGN

SHAPING YOUR RAIN GARDEN

- Use a garden hose or rope to outline the desired shape of your rain garden on the ground
- Many rain gardens are in the shape of a circle or kidney bean, but your rain garden can take on whatever shape you prefer





SELECTING PLANTS FOR YOUR RAIN GARDEN

- The success of your rain garden depends on selecting the right plants for the right place
- Plant your rain garden with plants adapted for your specific site
- **Native plants** can thrive without a lot of care, extra water, fertilizer, or pesticides
- **Native plants** are tolerant to dry and wet conditions

PLANT SELECTION

Select species based upon the following qualities:

- Plant size
- Moisture tolerances
- Sun preferences
- Plant aggressiveness
- Salt tolerance
- Habitat creation

PLANTING DESIGN TIPS

- Plants that prefer wet conditions should be planted in the deepest part (the base) of the rain garden
- Create depth in the rain garden by placing large and tall plants in the back, smaller plants in the front
- Plant masses of the same species together in odd numbers
- Incorporate plants that have visual interest in the fall and winter
- Native plants provide habitat to animals and require less watering

THE FUN PART!

INSTALLING YOUR RAIN GARDEN

STEP ONE

- Delineate rain garden area

- Remove existing grass with a shovel or machinery

STEP TWO

- Excavate to design depth based on necessary storage and soil amendment requirements

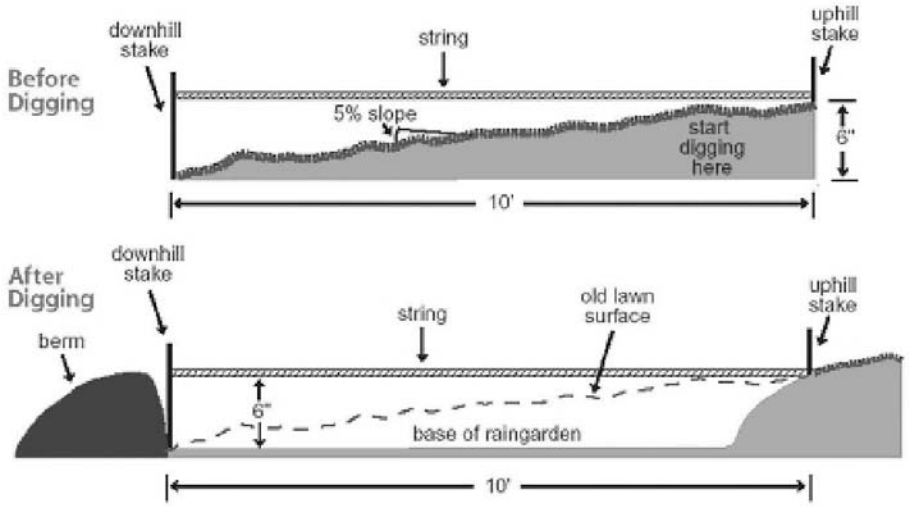
STEP THREE

- Add soil amendments, if necessary

- Combine amendments with existing soil using shovels or rototiller
- Loosen and prepare soil for grading and planting

STEP FOUR

- Prepare the berm, if necessary



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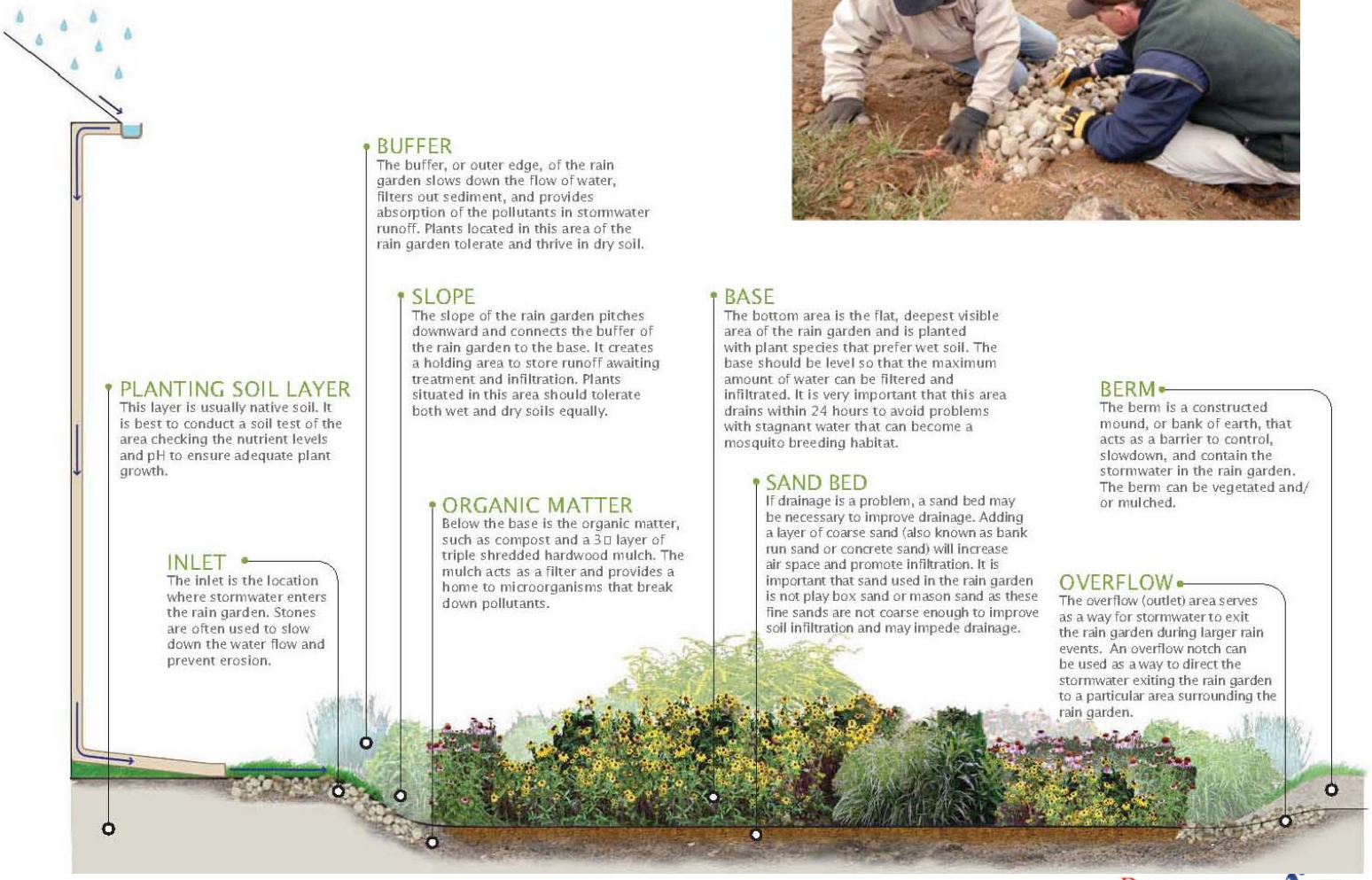
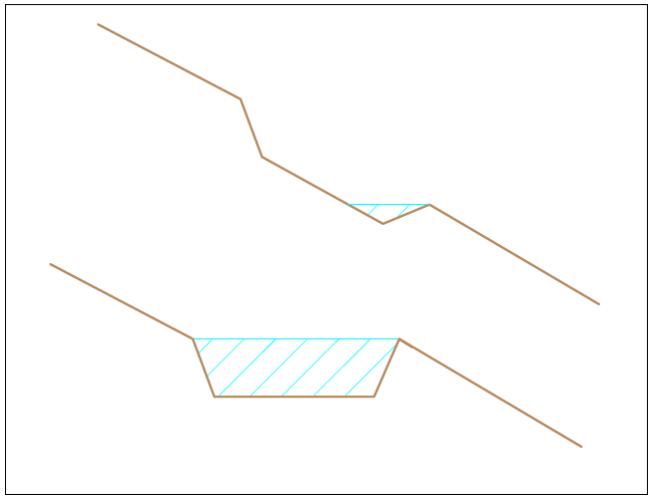
STEP FIVE

- Prepare the overflow



STEP SIX

- Level the rain garden base



STEP SEVEN

- Plant native species







STEP EIGHT

- Apply mulch

- Allow for a 3" depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden

- For every 100 square feet of rain garden, you will need about 1 cubic yard of mulch (3" depth)

STEP NINE

- Water Plants

STEP TEN

- Appreciate a job well done

INSPECTION AND MAINTENANCE

MAINTAINING YOUR RAIN GARDEN

MAINTENANCE MEASURES

WEEKLY TASKS:

1. Watering
2. Weeding
3. Inspecting

ANNUAL TASKS:

1. Mulching
2. Pruning
3. Re-planting
4. Removing sediment
5. Soil Testing
6. Harvesting Plants
7. Cleaning of Gutters
8. Replacing materials (stone, landscape fabric)

- For detailed maintenance practices go to the Rain Garden Rebate Program website to view a Maintenance PowerPoint Presentation

RAIN GARDEN PLANTING DESIGN

DESIGN AESTHETICS

- Formal or traditional design
  - Shrub bed
  - Perennial garden
  - Hedges
- Naturalized planting & design
  - Butterfly garden
  - Meadow (warm season grasses & wildflowers)
  - Buffer plantings

SITE CONSTRAINTS

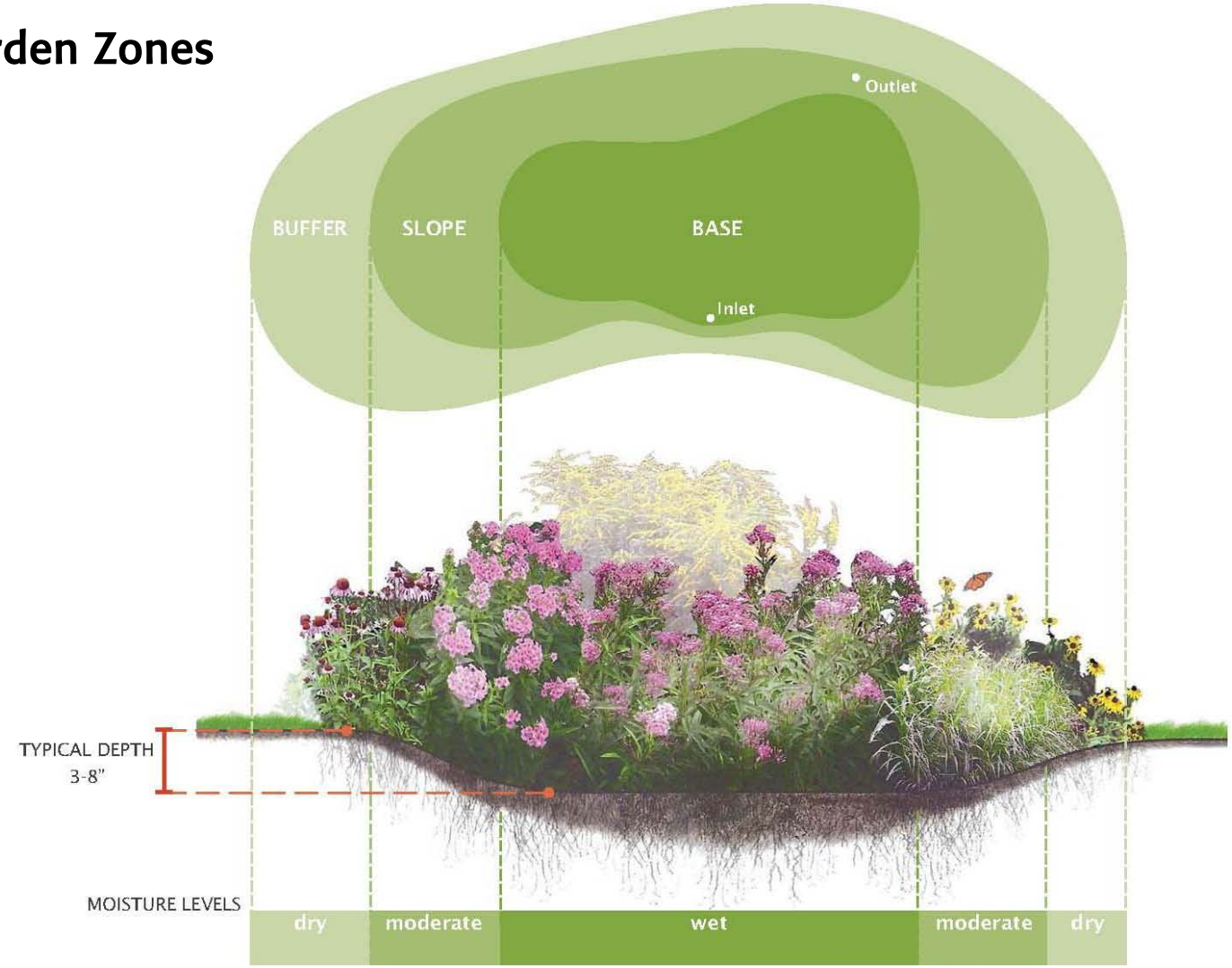
- Sun vs. shade
- Exposure/wind
- Soil characteristics
- Hydrologic conditions
- Road salts
- Vehicle/pedestrian traffic

PLANTS IN THE RIGHT PLACE…

Courtesy of Pinelands Nursery & Supply

PLANTING DESIGN: Wet + Dry Conditions

Rain Garden Zones



SELECTING PLANT SPECIES

- Mature plant size
  - Proximity to buildings and utility lines
  - Pruning and shaping
- Seasonal interest
  - Flowers
  - Fall color
  - Winter character
- Beneficial wildlife
  - Flowers for butterflies
  - Fruits for song birds

GRASSES & GROUND COVERS

BUFFER

- Broomsedge
- Bearberry
- Panic grass
- Switchgrass
- Little bluestem
- Indiangrass

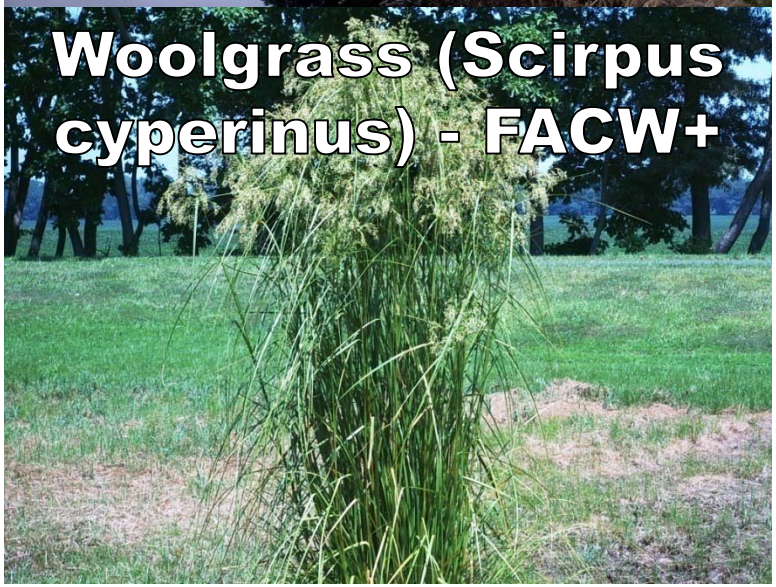
BASE

- Big bluestem
- Virginia wild-rye
- Switchgrass
- Wool grass

SLOPE

- Bluejoint grass
- Sedges
- Fowl mannagrass
- Softrush

GRASSES & GROUND COVERS



WILDFLOWERS & FERNS

BUFFER

- Butterfly milkweed
- Wild indigo
- Purple coneflower
- Beebalm
- Black-eyed susan

BASE

- New England aster
- New York aster
- Columbine
- Coreopsis
- Joe-pye weed
- Blazing star
- Sensitive fern
- Cinnamon fern
- Ironweed

SLOPE

- Swamp milkweed
- Marsh marigold
- Turtlehead
- Boneset
- Rose-mallow/hibiscus
- Blueflag iris
- Cardinal flower
- Blue lobelia

WILDFLOWERS & FERNS

TREES & SHRUBS

BUFFER

- Hackberry
- Red Bud
- Pepperbush
- American Holly
- Bayberry
- Witchhazel
- White Oak
- Red Oak
- Arrowwood Viburnum

BASE

- Red Maple
- Service Berry
- River Birch
- Silky Dogwood
- Red-twig Dogwood
- Inkberry Holly
- Winterberry
- Sweetbay Magnolia

SLOPE

- River Birch
- Buttonbush
- Silky Dogwood
- Green Ash
- Swamp White Oak
- Pin Oak
- Cranberrybush Viburnum

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TREES & SHRUBS

PLANTING DESIGN

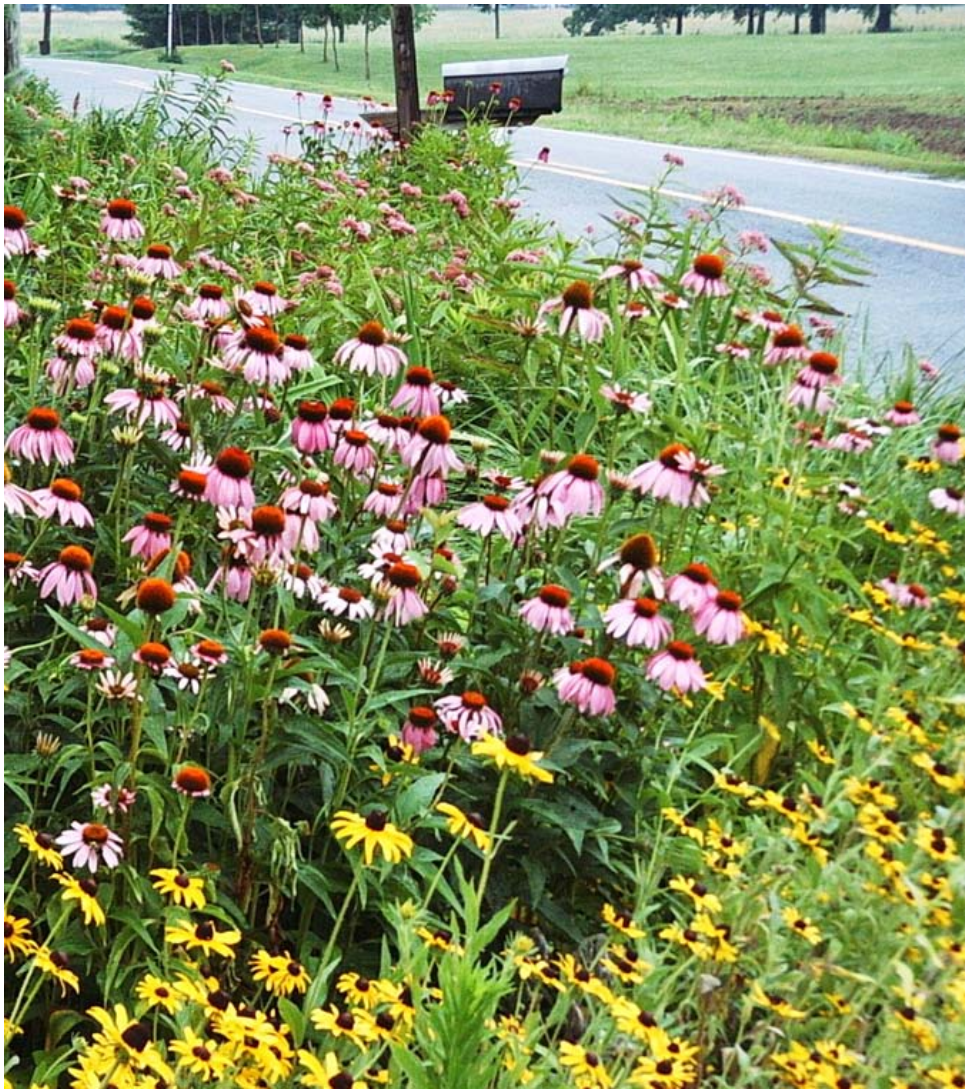
Considerations:

- Native Species
- Tolerance of both wet + dry conditions
- Mature size of plants
- Aesthetics (layering, clustering, unity)
- Value for wildlife

PLANTING DESIGN: Native Plants

NATIVE PLANTS:

- Provide habitat areas
- Adapted to local conditions
  (soil, temperature, weather)
- Attract other natives
  (migratory birds, beneficial insects and butterflies)
- Reduce the need for irrigation
- Reduce the need for maintenance
- Reduce the use of fertilizer
- Reduce the use of pesticides
- Absorb water more efficiently than turf-style grasses



PLANTING DESIGN: Mature Size of Plants

At time of installation

Springfield Township Municipal Annex Building
Springfield, NJ

First growing season

Second growing season

Third growing season

Fourth growing season

Take Home Handouts

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water.rutgers.edu

Prior to technical support session, please email this form along with your photos to Sara at saramellor@envsci.rutgers.edu

RAIN GARDEN
DESIGN FORM

WHAT AMOUNT OF TIME DO YOU HAVE TO PUT TOWARDS MAINTAINING YOUR GARDEN?

- ☐ LOW (0-2 hours per month)
- ☐ MEDIUM (3-5 hours per month)
- ☐ HIGH (6+ hours per month)

HOW BIG DO YOU WANT YOUR RAIN GARDEN TO BE?

_____ FEET LONG X _____ FEET WIDE

WHAT ARE THE GARDEN SITE'S CONDITIONS?

SUN	☐ Full shade	☐ Partial shade	☐ Sunny
SOIL	☐ Sandy soil	☐ Loam soil	☐ Clay soil
DRAINAGE	☐ Well drained	☐ Poorly drained	☐ Compacted
SLOPE	☐ Flat	☐ Slight	☐ Steep

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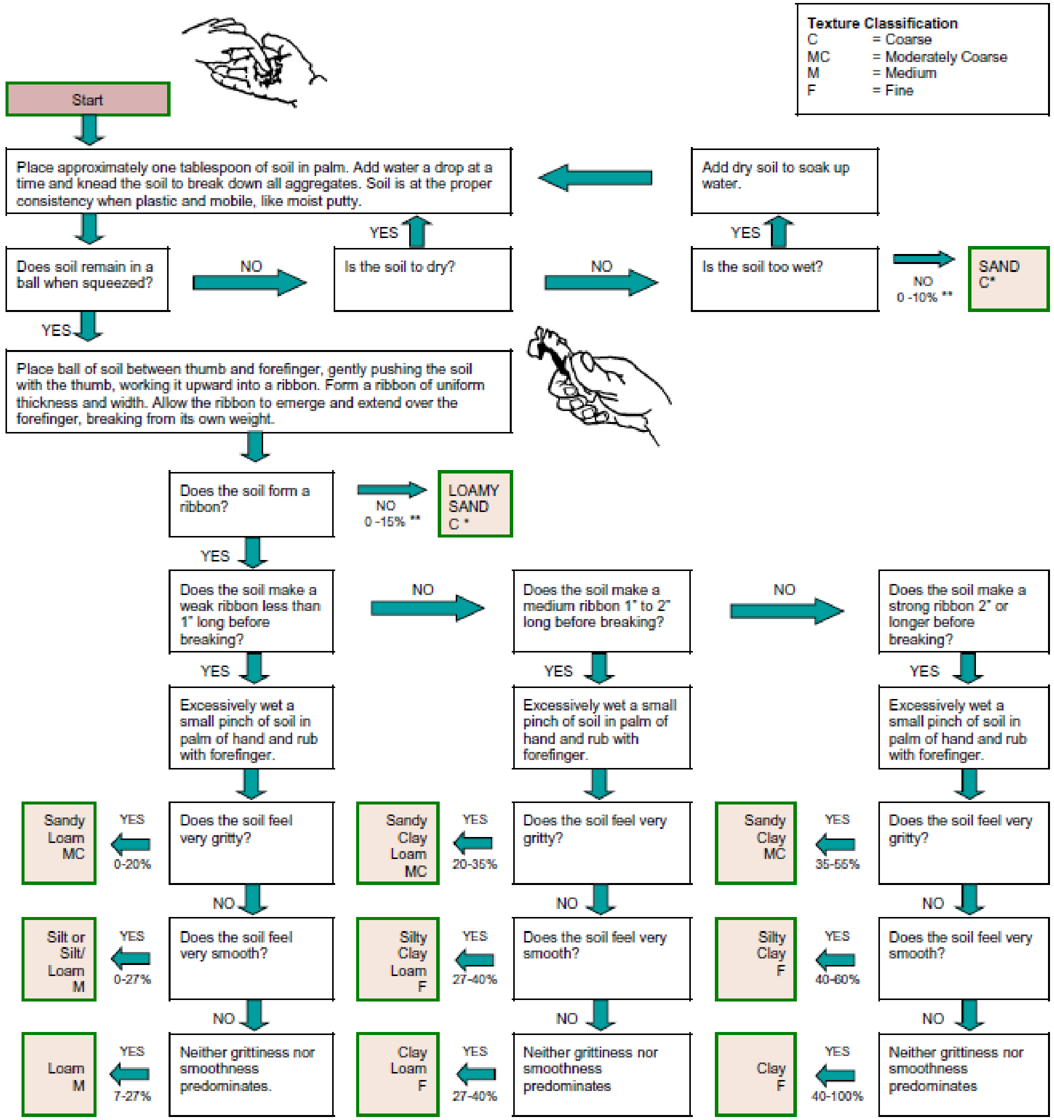
Determining Soil Texture by the "Feel Method"



* Sand Particle size should be estimated (very fine, fine, medium, coarse) for these textures. Individual grains of very fine sand are not visible without magnification and there is a gritty feeling to a very small sample ground between the teeth. Some fine sand particles may be just visible. Medium sand particles are easily visible. Examples of sand size descriptions where one size is predominant are; very fine sand, fine sandy loam, loamy coarse sand.

** Cay percentage range.

Modified from: Thien, Steven J., Kansas state University, 1979 Jour. Agronomy education.

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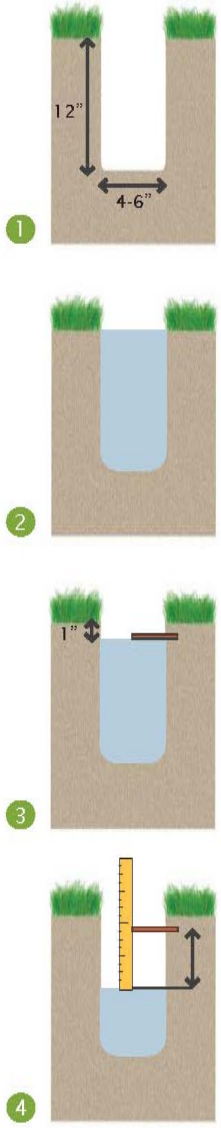
CHECK YOUR SOIL



- Infiltration/Percolation Test
  1. Dig a hole in the proposed rain garden site (12" deep, 4-6" wide)
  2. Fill with water to saturate soil and then let stand until all the water has drained into the soil
  3. Once water has drained, refill the empty hole again with water so that the water level is about 1" from the top of the hole
  4. Check depth of water with a ruler every hour for at least 4 hours
  5. Calculate how many inches of water drained per hour

HOW MUCH OF YOUR PROPERTY IS MADE UP OF IMPERVIOUS SURFACES?

_____ SQ. FT

WHAT IS THE DRAINAGE AREA OF YOUR PROPOSED RAIN GARDEN SITE?

_____ SQ. FT

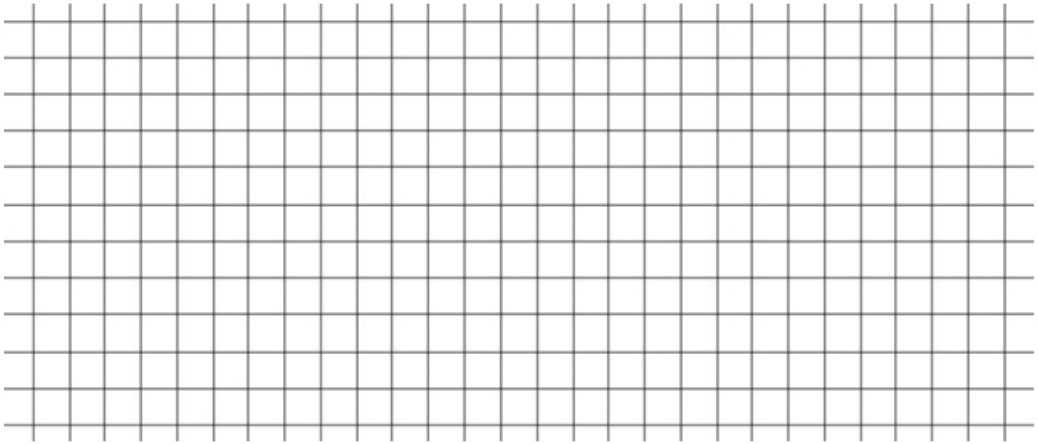
DO YOU HAVE A BASEMENT?

☐ YES ☐ NO

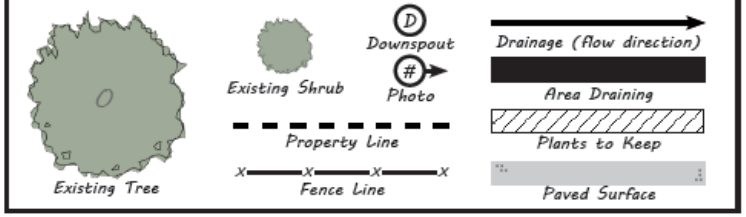
LANDSCAPE DESIGN PLAN

Draw a plan of your Rain Garden location, including the maximum area you are willing to dedicate to the garden. Please also attach a photo or two of the proposed area and mark on the plan where each photo was taken and the view it shows. Consider and include these details in your sketch on the graph paper below.

- Activites in your yard (i.e. kids playing, grilling, washing your car):
- Irrigation zones if applicable (i.e. sprinkler systems, drip irrigation):
- Sun/shade, wet/dry, steep slope, drainage patterns:
- Color preference for plants:
- Plant height restrictions:
- Block and hatch existing plants you want to keep



COMMON LANDSCAPE SYMBOLS



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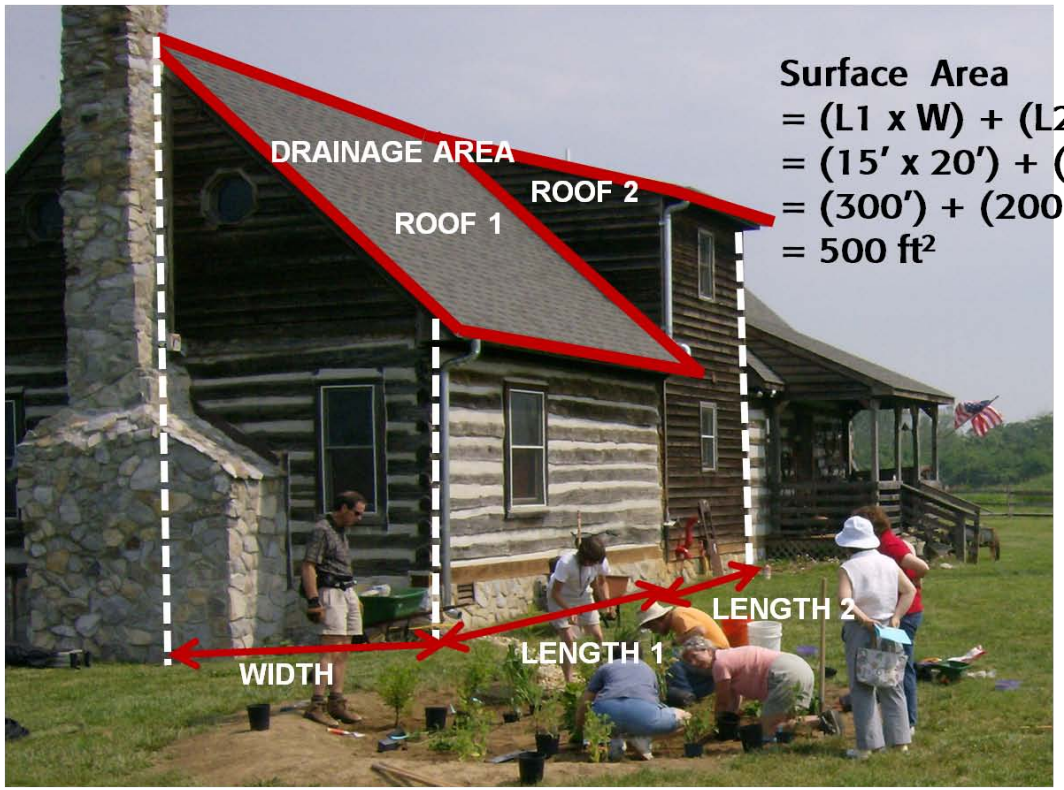
Handout Guidance

Impervious Surfaces:

- Rooftop(s)
- Driveway(s)
- Walkway(s)
- Deck(s)
- Patio(s)
- Shed(s)

Drainage Area:



Design Example