

OF NEW JERSEY

Rain Garden Design (Rooftop and Driveway/ Parking Lot)















Rain Garden Design Checklist

- ✓ Determine drainage area (rooftop or driveway/ parking lot)
- ✓ Measure drainage area
- ✓ Measure percent slope
- ✓ Correspond percent slope to rain garden depth
- Correspond drainage area to rain garden size using New Jersey's Water Quality Design Storm (1.25" rain over 2 hours)
- ✓ Analyze soil (soil texture, percolation test, soil compaction)
- ✓ Determine soil amendments, if necessary
- ✓ Determine rain garden inlet
- ✓ Determine erosion potential
- ✓ Determine rain garden overflow
- ✓ Determine mulch quantity
- ✓ Determine plant quantity
- ✓ Summarize rain garden design



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Determine Drainage Area & Measure Drainage Area

Rooftop Scenario



Hockman Farm, Winchester, Virginia



Determine Drainage Area & Measure Drainage Area

Driveway/ Parking Lot Scenarios





Determine Drainage Area & Measure Drainage Area

Area of Square/Rectangle = Length x Width



Area of Triangle = (Base x Height) / 2



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Measure Percent Slope



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

Height x 100 = % Slope Width



Correspond Percent Slope to Rain Garden Depth

Percent Slope	Typical Depth
≤ 4%	3"-5"
5% - 7%	6"-7"
8% - 12%	8" maximum depth
> 12%	Consider another
	location

Exception: Sites with poor percolation or high percentage of clay soils will be shallower with a larger surface area since they percolate slowly (see Tips for Rain Gardens in Clay Soils worksheet)

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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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Correspond Drainage Area to Rain Garden Size using NJ's Water Quality Design Storm

How did we do this?

[Drainage Area (square feet) x NJ' [Dept	<u>s Water Quality Design Storm</u> h (feet)]	<u>n (feet)]</u> = Size of Rain Garden (square feet)
Rooftop Example: Image: state s	Rooftop #1: Length = 10' Width = 20' Drainage Area = Length x Width = 10' x 20' = 200 ft ² Rooftop #2: Length = 10' Width = 10' Drainage Area = Length x Width = 10' x 10' = 100 ft ²	CHEAT SHEET ✓NJ's Water Quality Design Storm = 1.25" = 0.1' ✓ 3" = 0.25' ✓ 6" = 0.50' ✓ 8" = 0.67'
Possible Rain Garden % Slope = 6% = 6" deep rain garden	Total Drainage Area = DA of Rooftop = $200 \text{ ft}^2 + 100 \text{ ft}^2$ = 300 ft^2 [$300 \text{ ft}^2 \times 0.1$ '] [0.50 ']	67 ft ² rain garden 67 deep

Correspond Drainage Area to Rain Garden Size using NJ's Water Quality Design Storm

How did we do this?

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Analyze Soil

• Soil texture

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
- Percolation test
- Soil compaction

Ruler Hour

Wire Flag Test Poke wire flag in ground

- Easily penetrates 6-8" or more
- Compacted, difficult to insert

Optimal sand content for a rain garden is 70%



General Soil Amendments Amounts for a 100 sq ft Rain Garden that is 6 Inches Deep

Soil Amendment	Amount for 100 sq ft Rain Garden
Coarse Sand (Bank Run Sand)	1 cubic yard
Compost	1 cubic yard
Fertilizer	Follow Soil Test Result Recommendations
Lime	Follow Soil Test Result Recommendations





Gloucester County 4-H Fairgrounds



Where will the excess stormwater runoff go in a heavy storm event?

- Overflow is away from buildings
- Berm higher near building
- Overflow sheets over lawn or garden



Gloucester County 4-H Fairgrounds

- Overflow sheets over driveway or walkway
- Flows onto street an existing storm drain can be used as an outlet for a rain garden



How did we determine how much coarse sand to add?

	Class	Texture	Recommended Amendments	
Soil T exture	A	Sandy	Compost helpful, but not required	
Class	В	Silt Ioam/Loam	Add 1"-2" concrete or bank-run sand	
	С	Sandy clay/ Loam	Add 2"-4" concrete or bank-run sand	How many
	D	Clayey	Add 2"-4" concrete or bank-run sand	of coarse
(inches of so	$\left(\frac{nd}{d}\right) \times (d)$	Rain garden sı	urface area in square feet) ———————————————————————————————————	Cubic words
		27	- (.uon yaras

Use sand with a mixture of grain sizes. Do not use mason or ball field sand.



How will the stormwater runoff enter the rain garden?

- Extended downspout/gutter
- Stone or concrete spillway
- Across lawn via a gradual slope
- Vegetated or stone-lined swales



- Diversion berm along the bottom of slope
- Paved surface



Will the velocity and erosion of the stormwater runoff be a problem?

- No
- Yes, erosion is possible. Address with:
 - Grading
 - Rocks or obstructions to slow flow
 - Rocks to stabilize
 - Erosion control blanket



Photo Credit: RCE of Monmouth County



- Triple-shredded hardwood mulch with no dye is used in a rain garden
- Mulch should be maintained at a 3 depth in a rain garden
- The benefits of mulch:
 - Keeps soil moist, which allows for percolation of rain water
 - Protects plants and makes
 weeding easier
 - Minimizes erosion of the rain garden soil





Determine Mulch Quantity

Amount of Mulch Required for a Three Inch Thick Layer

Size of Rain Garden	Approximate Amount of Mulch
25 square feet	0.25 cubic yard
50 square feet	0.50 cubic yard
100 square feet	1.0 cubic yard
200 square feet	2.0 cubic yards

(Triple-Shredded Hardwood Mulch with No Dye)



Springfield Municipal Annex Building, Union County



Approximate Amount of Plants Based on Future Mature Size

Size of Rain Garden	Approximate Amount of Plants
100 square feet	 1 Small Tree (Optional) 7 Shrubs 24 Herbaceous Species
200 square feet	1 Small Tree (Optional) 14 Shrubs 48 Herbaceous Species



Leonard Park, Morris County



- Determine rain garden size and depth, what soil amendments are needed (if necessary), mulch quantity, plant quantity, and other materials (river rock, deer fencing, soaker hose, etc.)
- Use the Rain Garden Site Visit Worksheet (Pre-Installation) for



Leonard Park, Morris County