

# Green Infrastructure Champions Program

*This program is partially funded by the Rutgers New Jersey Agricultural Experiment Station, The Geraldine R. Dodge Foundation, NJ Sea Grant Consortium, The William Penn Foundation and is a collaboration of the Rutgers Cooperative Extension Water Resources Program and the Green Infrastructure Subcommittee of Jersey Water Works.*



**Please enter your full name and affiliation in the chat. This is how will take attendance.**



IMAGINE A BETTER NEW JERSEY



# Green Infrastructure Champion Training: Part 6 “Green Infrastructure Projects for Schools”

Chris Obropta and Toby Horton  
March 26, 2021  
Virtual Workshop



**RUTGERS**  
New Jersey Agricultural  
Experiment Station



# Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.





# Water Resources Program



*Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.*

# Why New Jersey Schools?

- 590 School Districts
  - 2,526 Public Schools
    - 2,005 Elementary Schools
    - 511 Secondary Schools
  - 88 Charter Schools
  - Public School Enrollment = 1.37 million
  - Charter School Enrollment = 45,982
  - Full-time classroom teachers = 116,351
- Need more math teachers at NJ Department of Education

# More on “why schools”

- Mostly old buildings and parking lots with little or no stormwater management
- Dedicated source of funding (\$8.03 billion in state aid in 2016-2017 + local property taxes)
- Educate the youth and the adults will follow
- Enhance all levels of teaching with outdoor education
- Innovative, interdisciplinary “outdoor classrooms”
- Highly visible sites
- Separate government – school board
- Free labor

**It is all about  
controlling  
runoff from  
impervious  
surfaces**



# Step 1: Depave



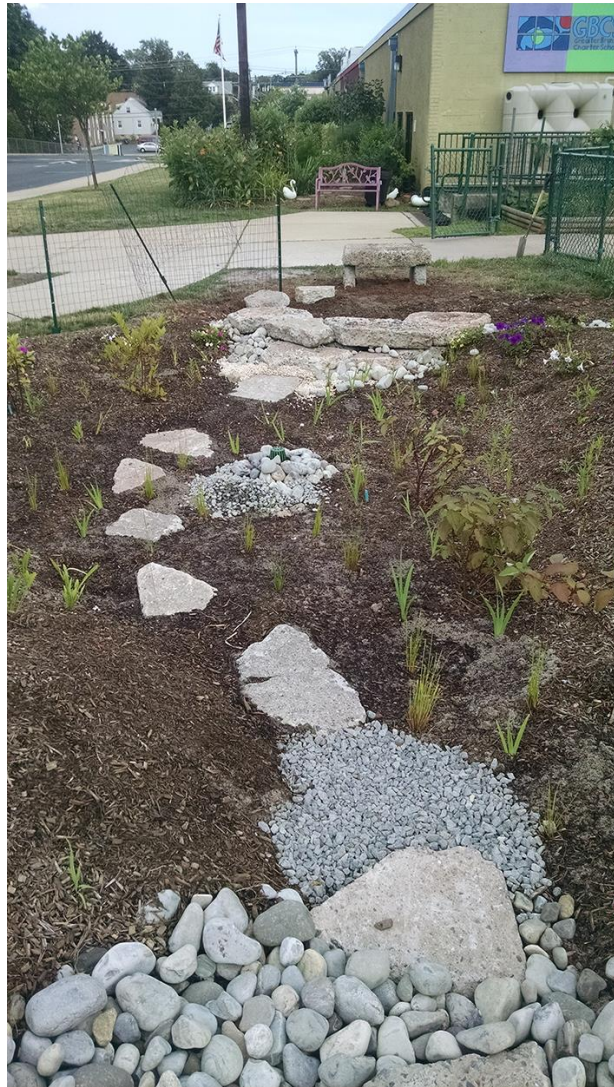


# Make Something with your De-Pavement



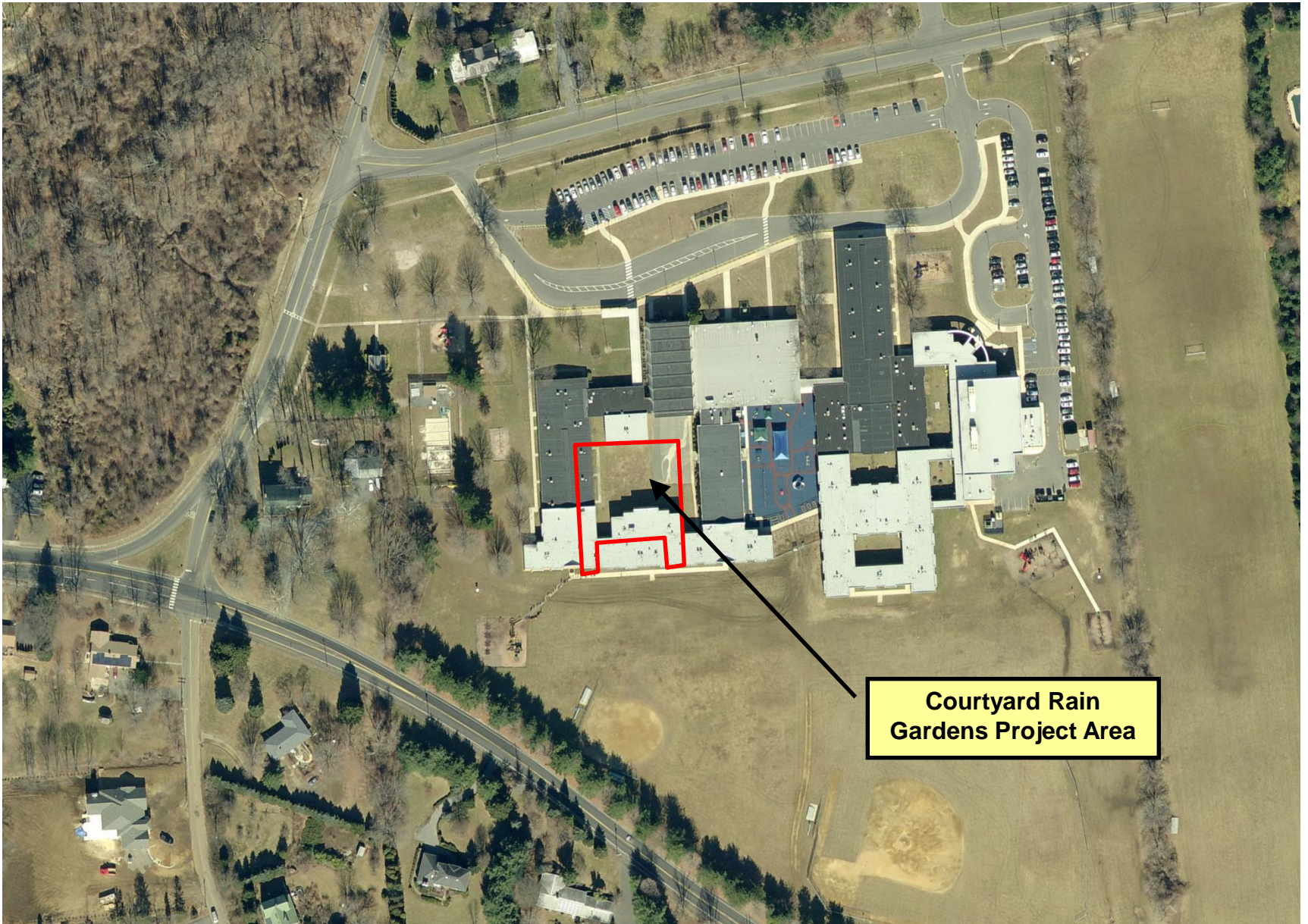
**Greater Brunswick Charter School**

# Make Something with your De-Pavement



**Greater Brunswick Charter School**

# Village Elementary School - Aerial



**Courtyard Rain  
Gardens Project Area**

# Existing Courtyard



# Existing Courtyard



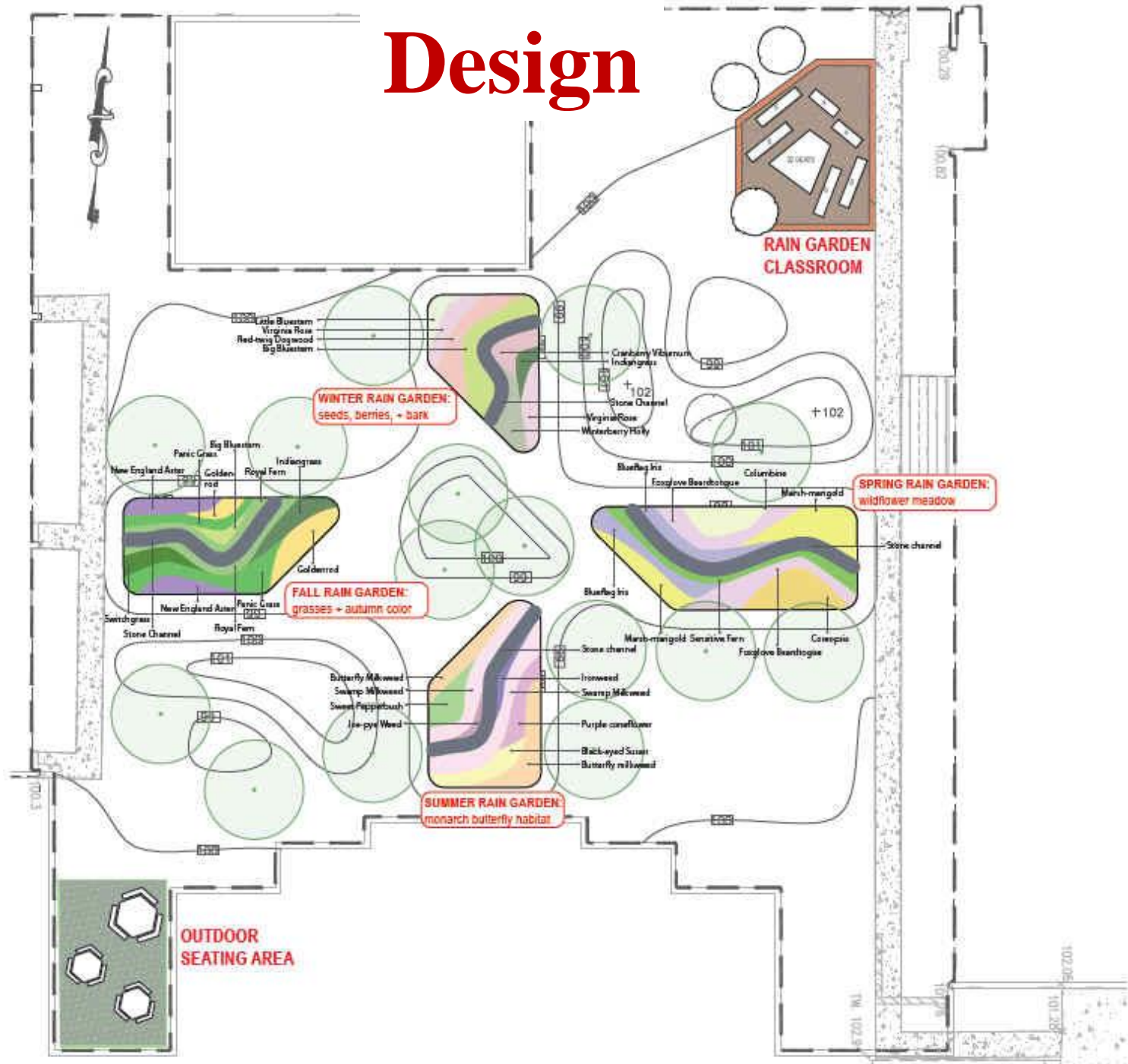
# Existing Courtyard



# Existing Courtyard



# Design









south garden































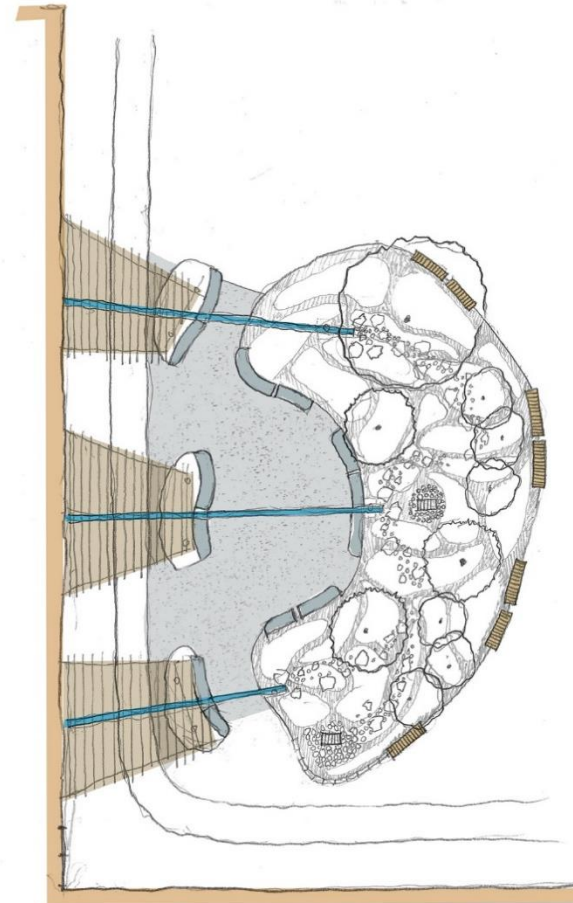
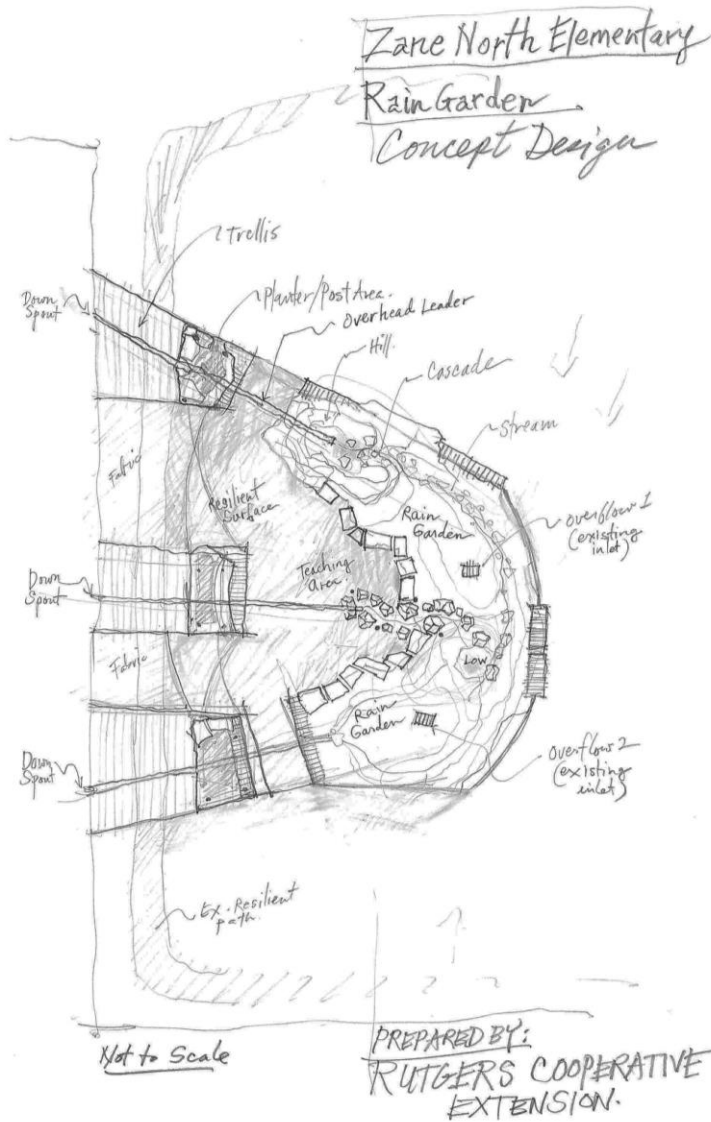




# ZANE NORTH ELEMENTARY



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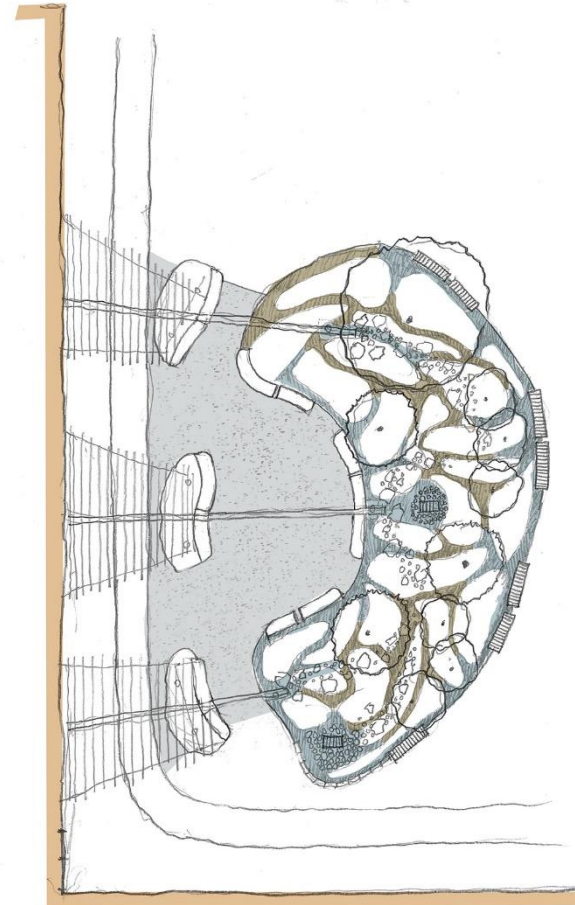
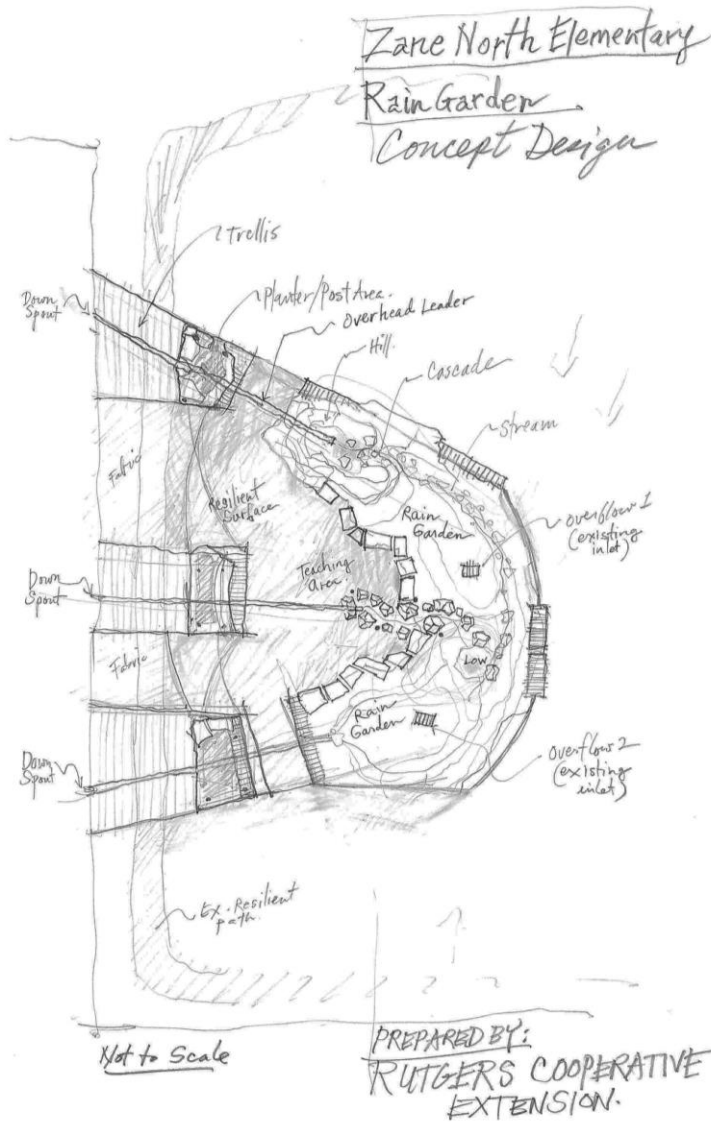


Site Elements: Infrastructure/Furnishings

Not to Scale  
Dimensions to be  
Verified in the Field

Zane North Elementary School  
Rain Garden Project  
Rutgers Cooperative Extension  
April 20, 2017

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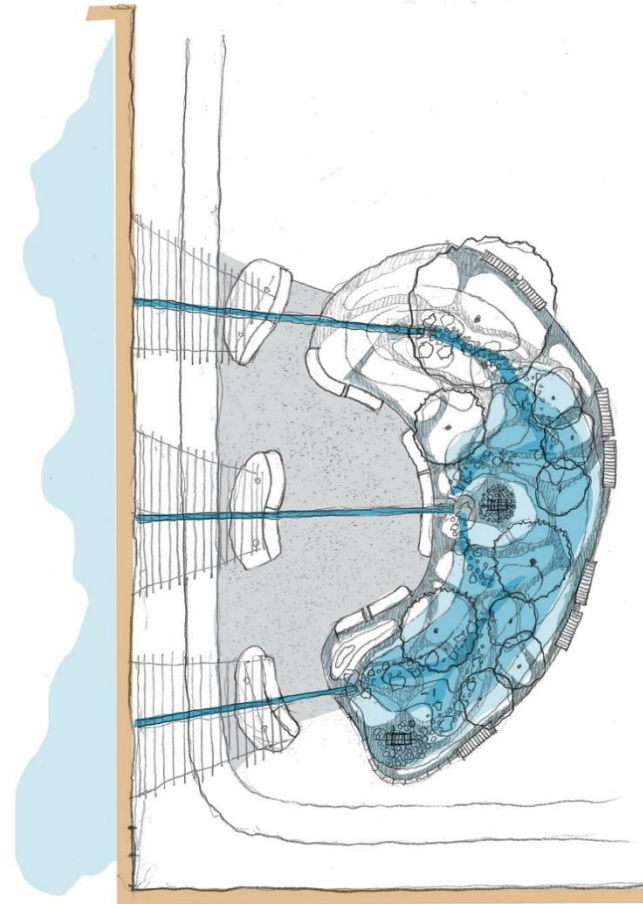
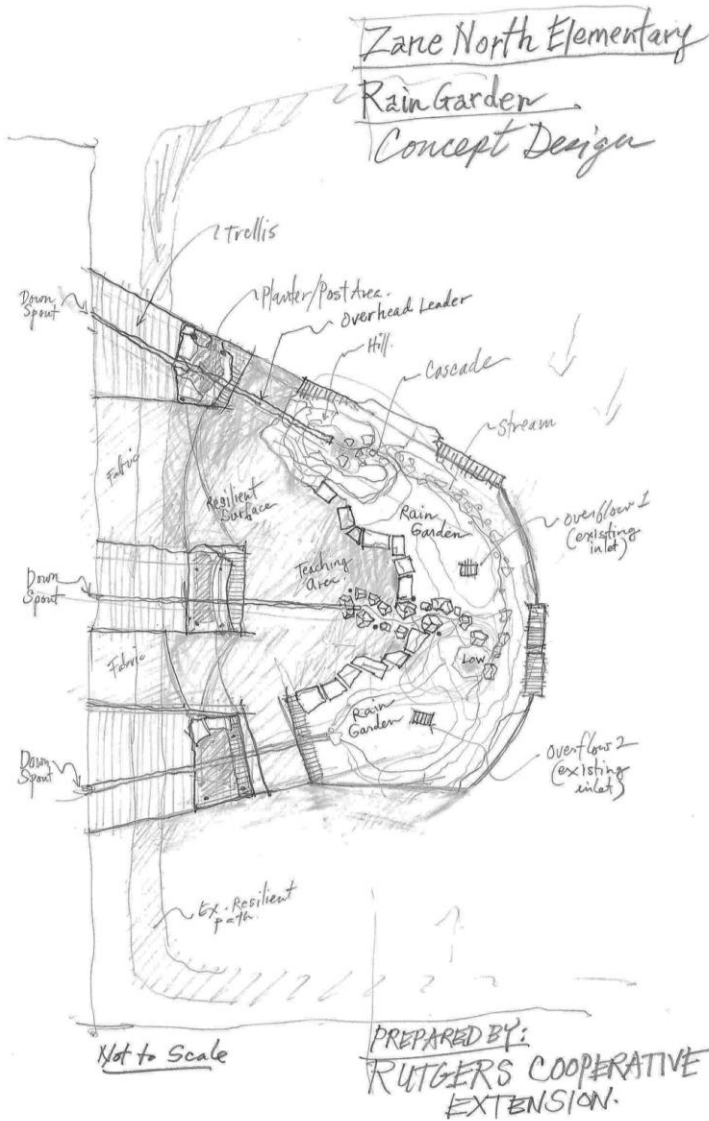


Narrow Garden Paths: Mulch and Gravel

**Not to Scale**  
Dimensions to be  
Verified in the Field

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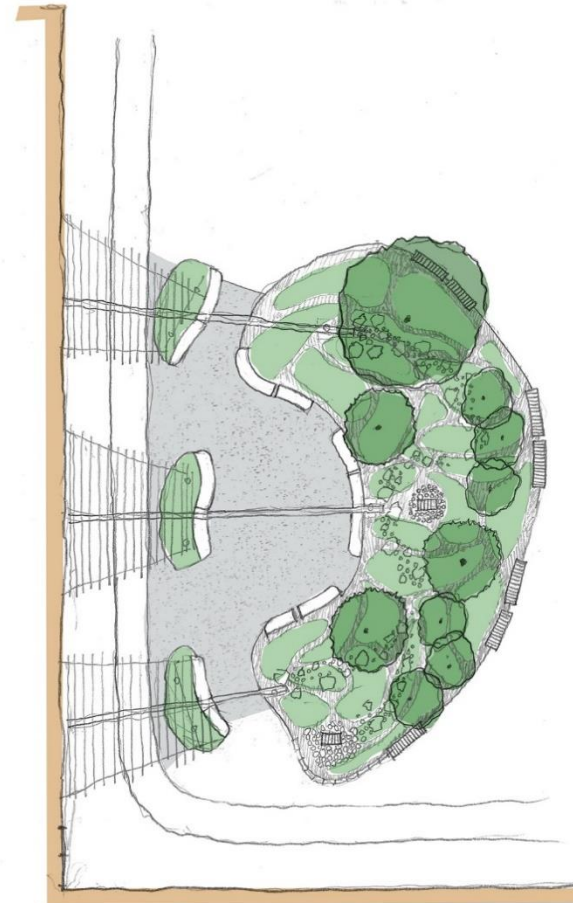
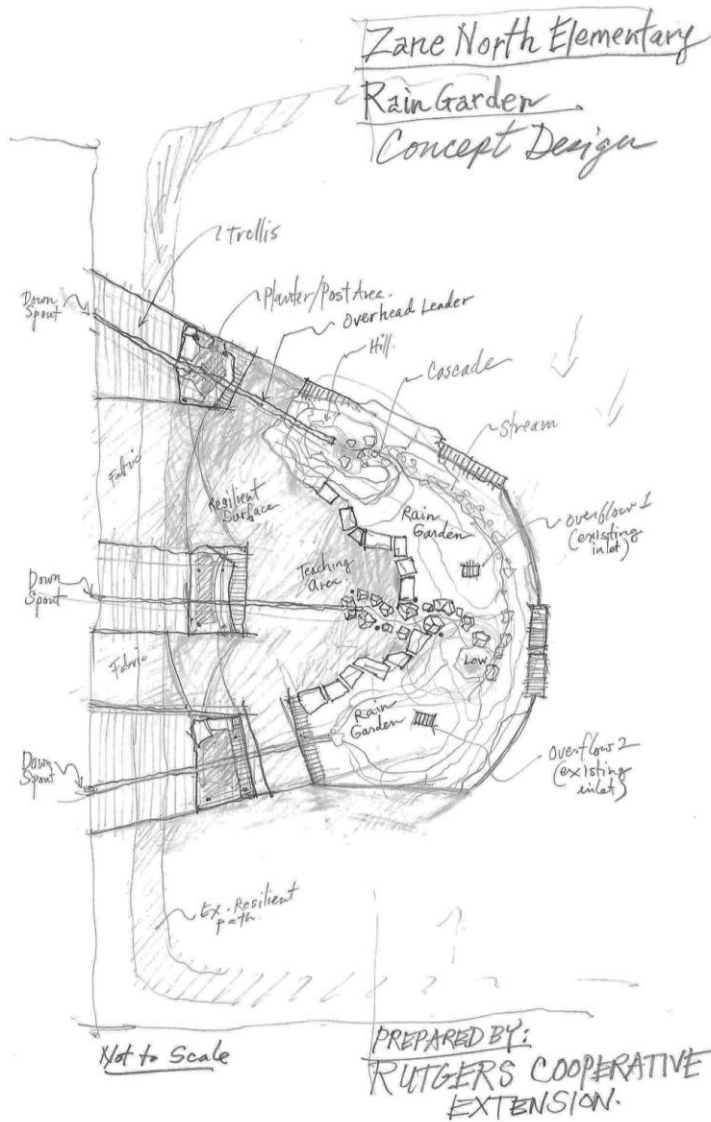


Water Flow and Infiltration Diagram

Not to Scale  
 Dimensions to be  
 Verified in the Field

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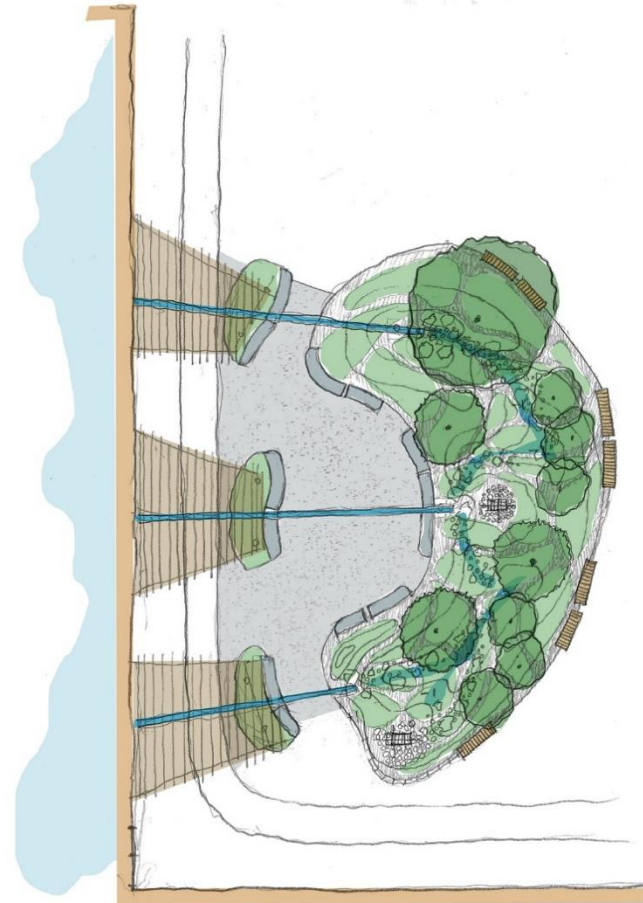
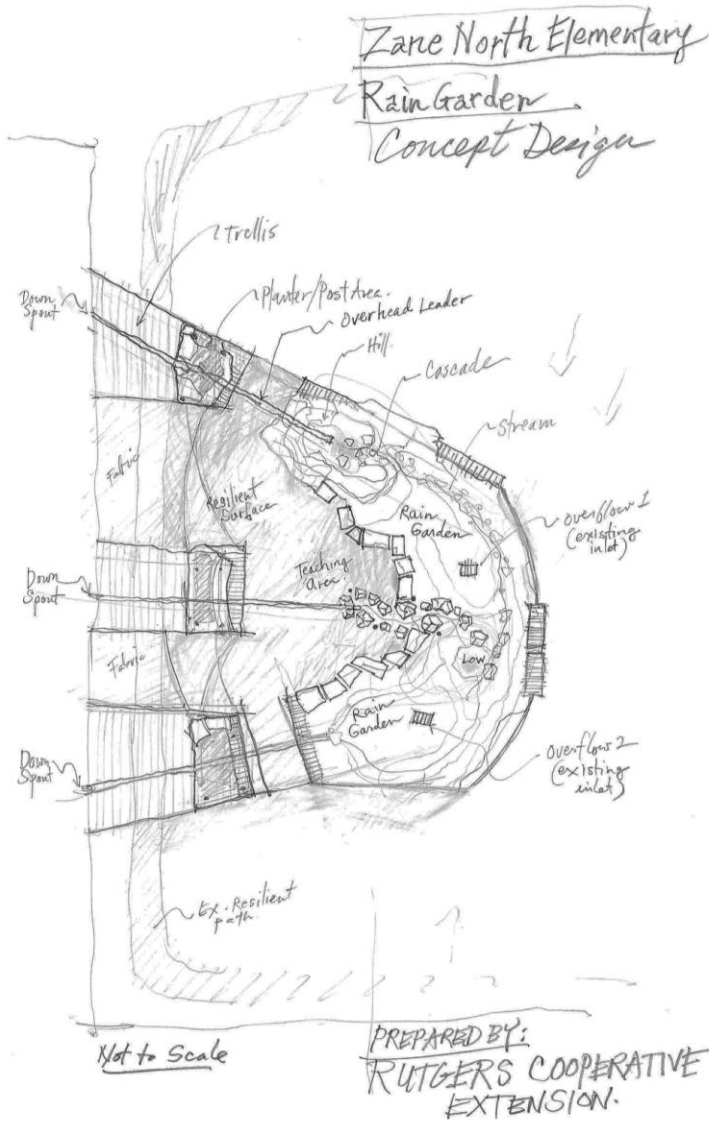
# ZANE NORTH ELEMENTARY



Not to Scale  
Dimensions to be  
Verified in the Field

Zane North Elementary School  
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April 20, 2017

# ZANE NORTH ELEMENTARY



Composite Plan

Not to Scale  
Dimensions to be  
Verified in the Field

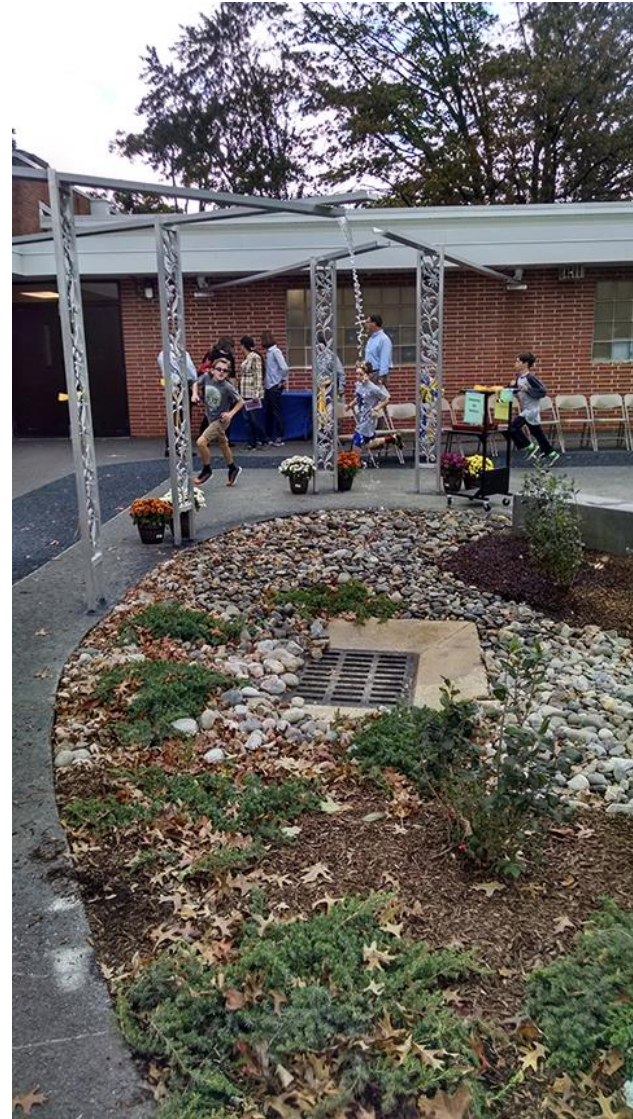
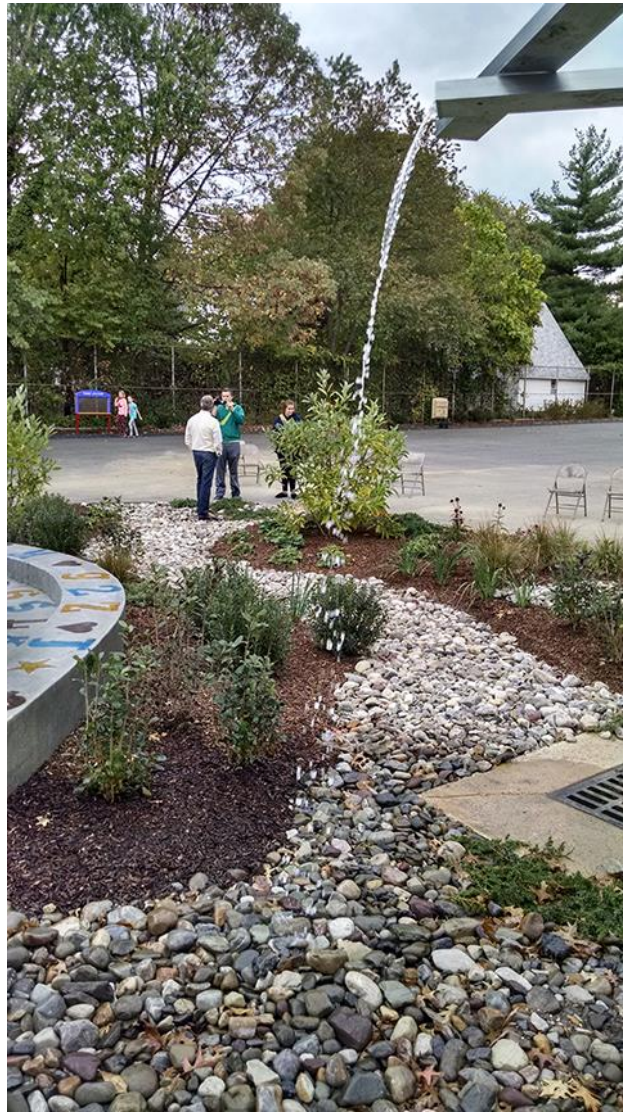
Zane North Elementary School  
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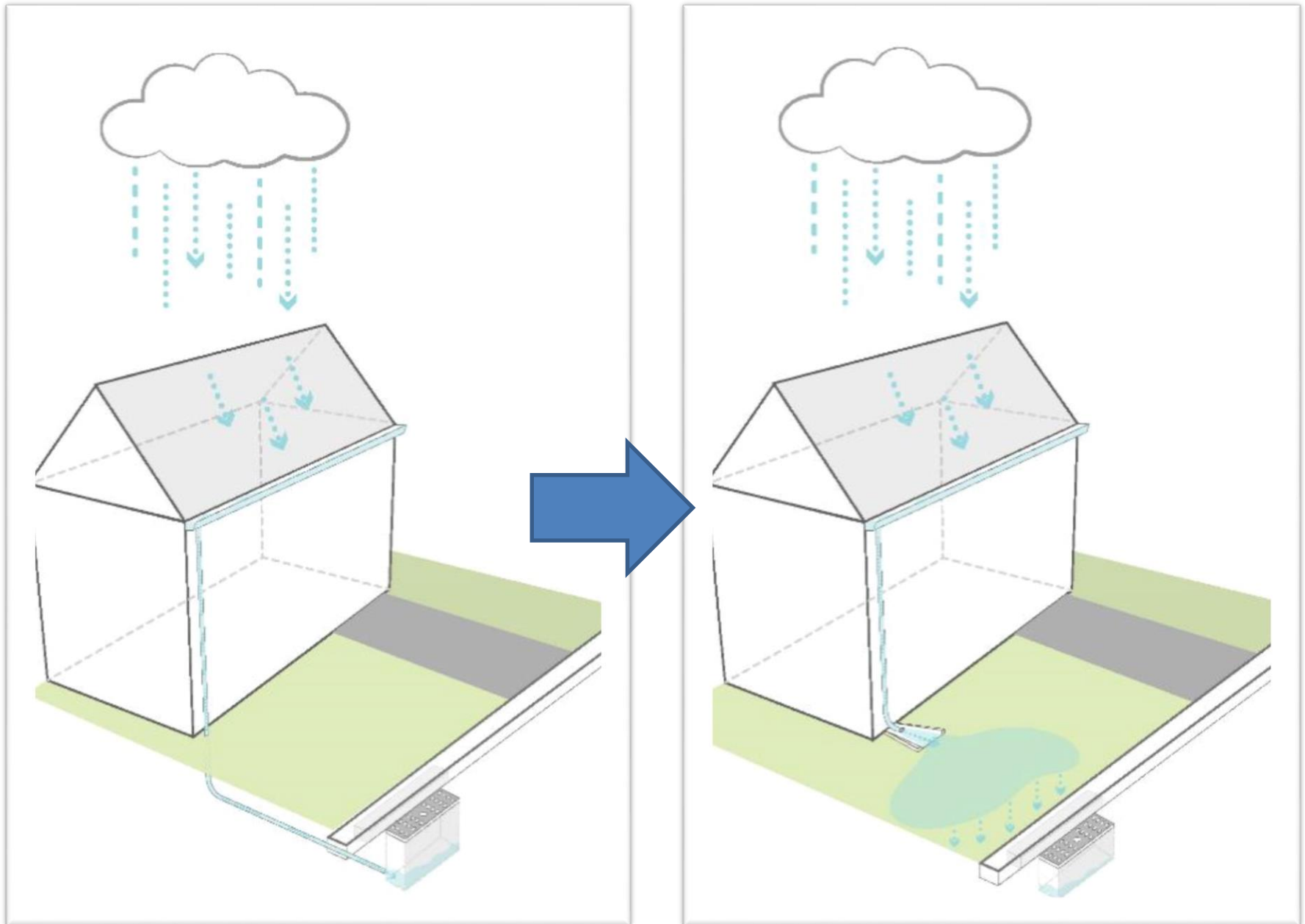




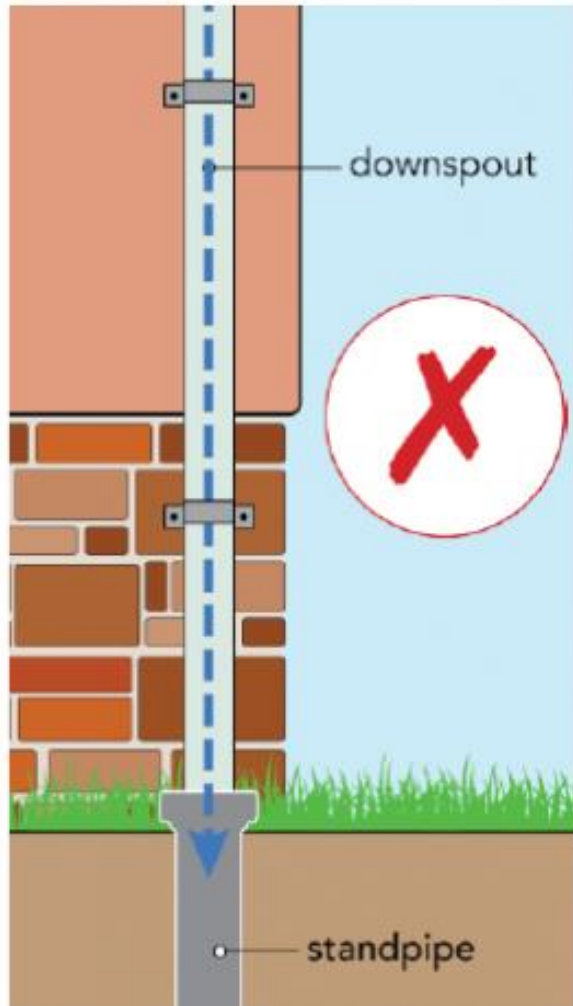
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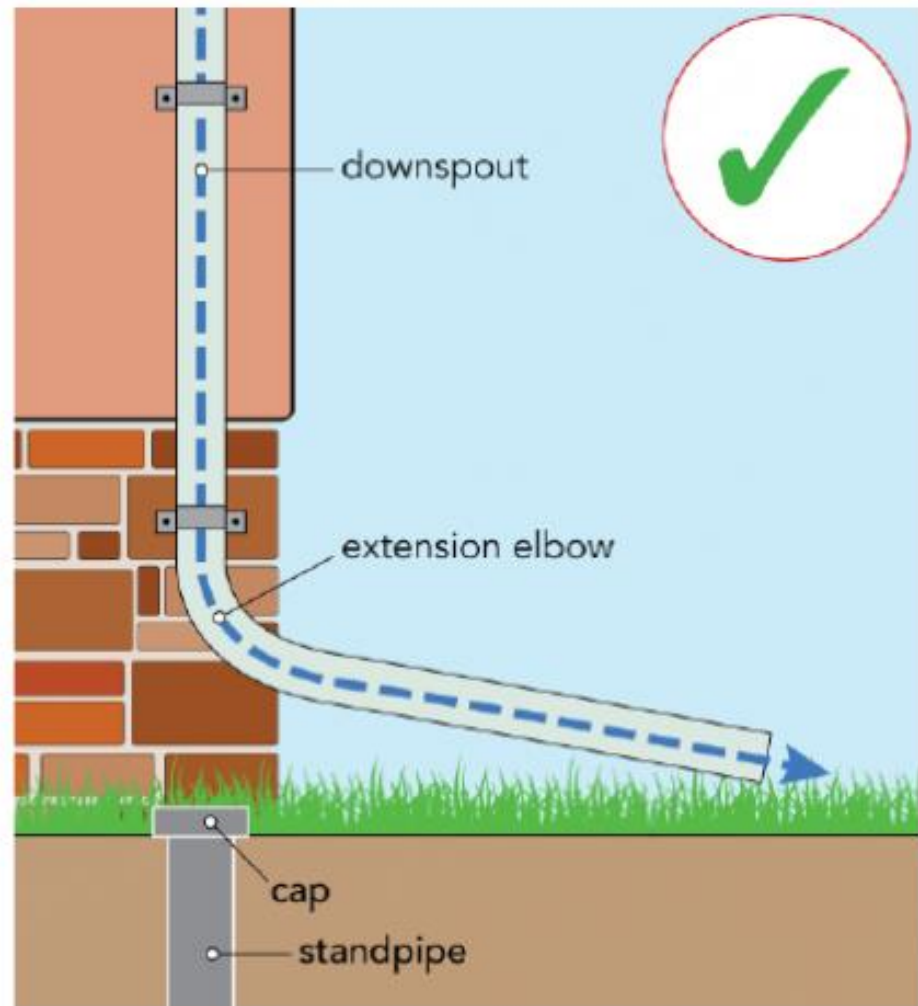
# Step 2: Simple Disconnection



# Downspout Disconnection

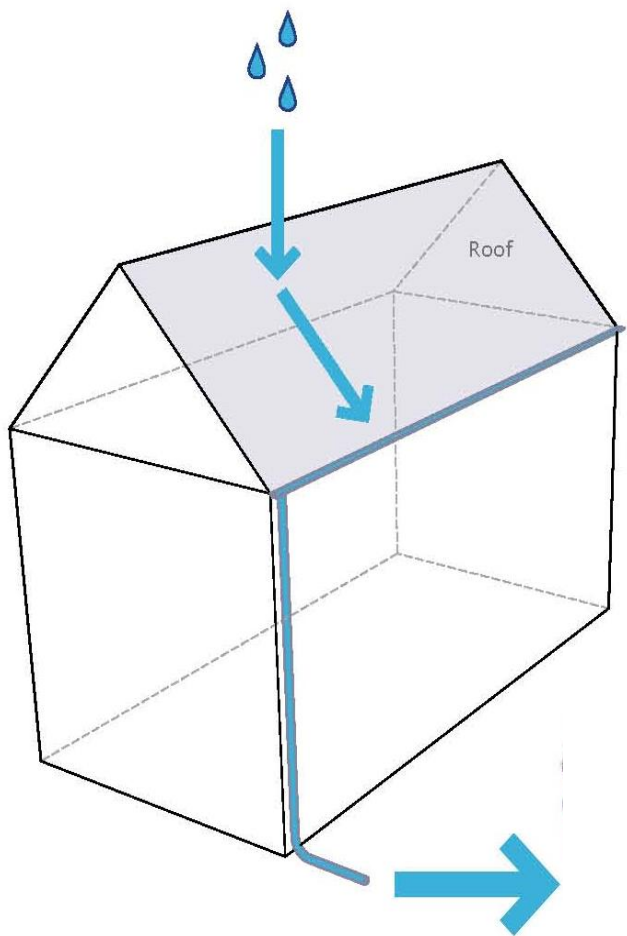


**DOWNSPOUT CONNECTED  
TO SEWER SYSTEM**



**DOWNSPOUT DISCONNECTED  
FROM SEWER SYSTEM**

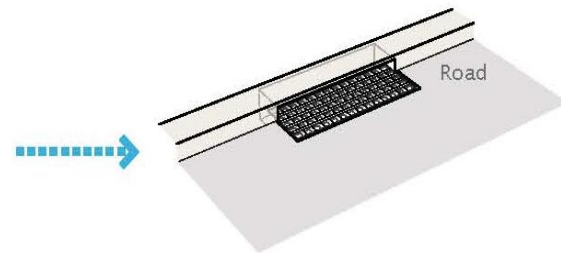
# Useful Water: Disconnect to a Rain Barrel or Cistern



Disconnect your downspout by installing a rain barrel

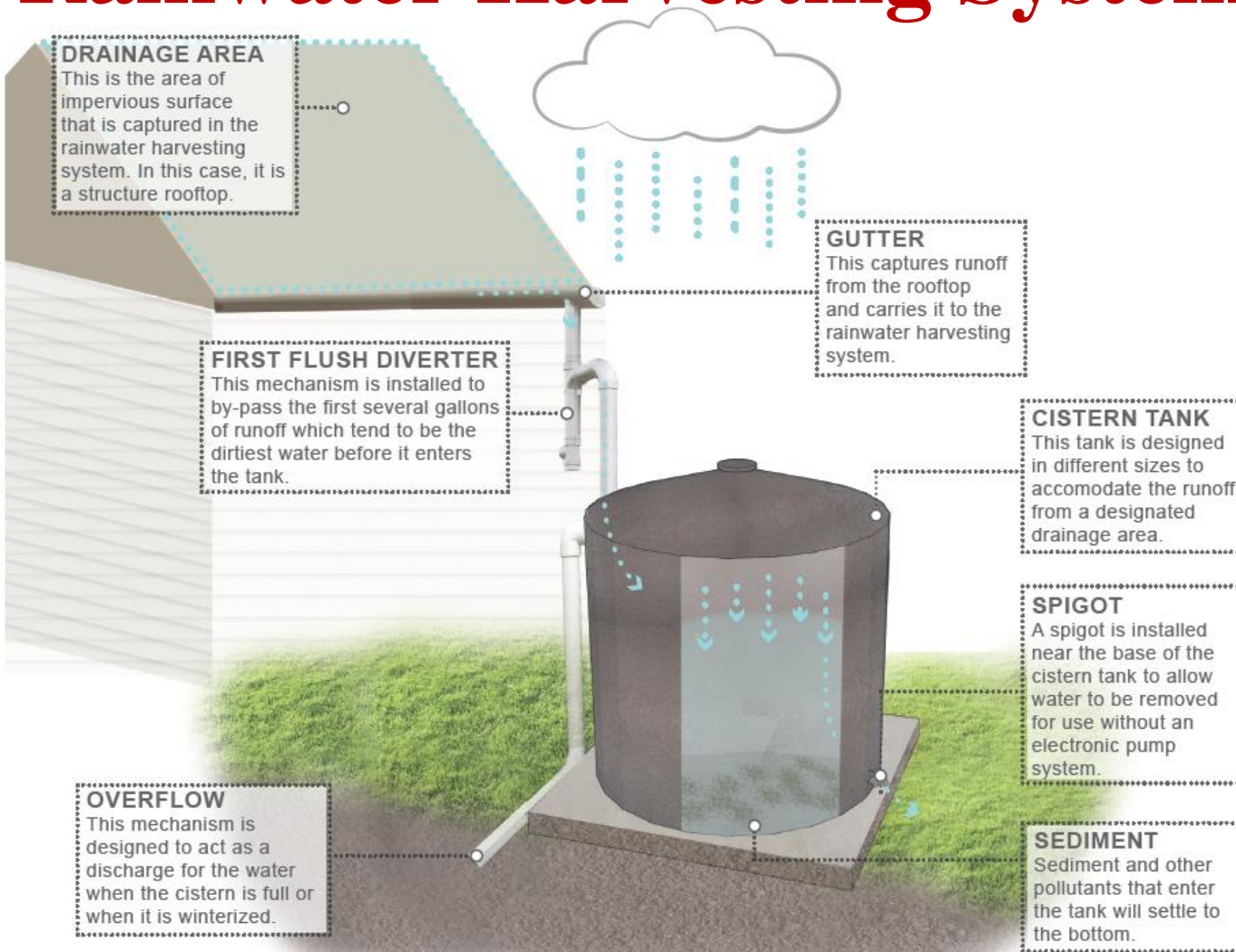


REDUCE THE AMOUNT OF RUNOFF ENTERING STORM SEWERS



Impervious area is now "disconnected" from flowing directly into the storm sewer system

# Useful Water: Rainwater Harvesting Systems



## From Problem to Utility











**Rain Garden**  
Water Quality and Wildlife Habitat  
Enhancement Project

This garden is designed to capture, treat, and infiltrate stormwater at the source before it becomes runoff. It helps prevent nonpoint source pollutants from entering nearby waterways. The plants are native to the region and attract wildlife.

Rain gardens are beautiful, low-maintenance, and inexpensive gardens that you can install at home!

[www.water.rutgers.edu](http://www.water.rutgers.edu)



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Kirby's





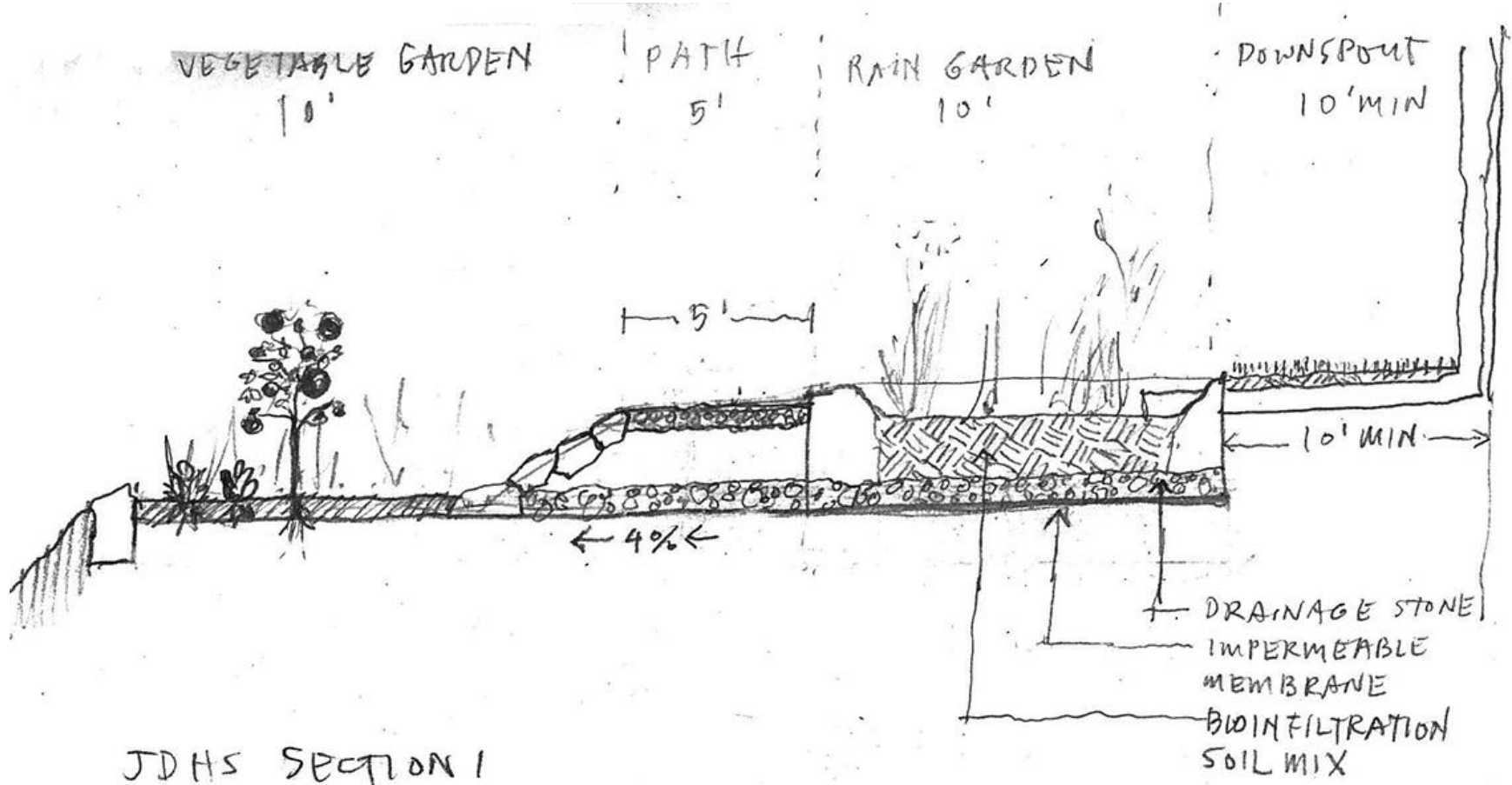








# Useful Water: Filter Stormwater through rain garden to root-water food beds

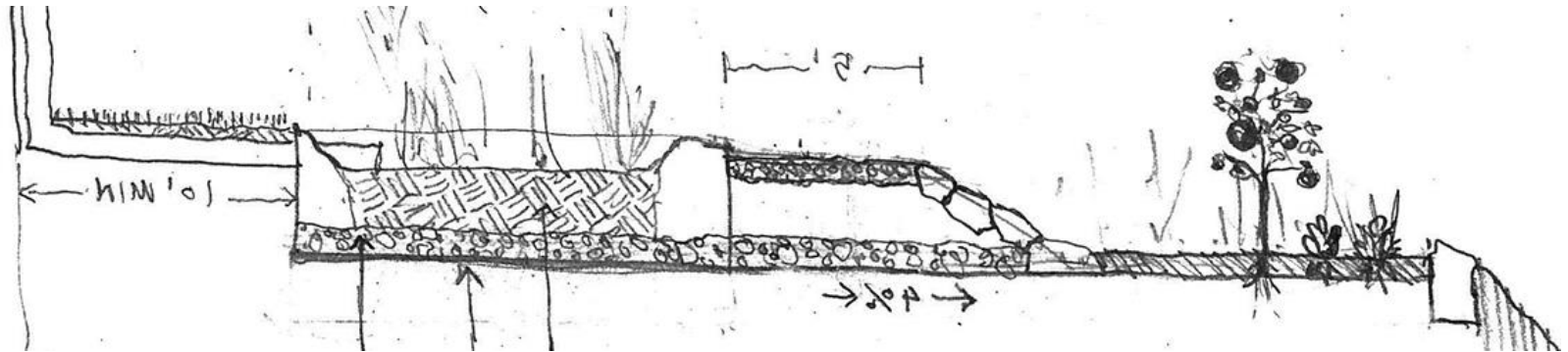
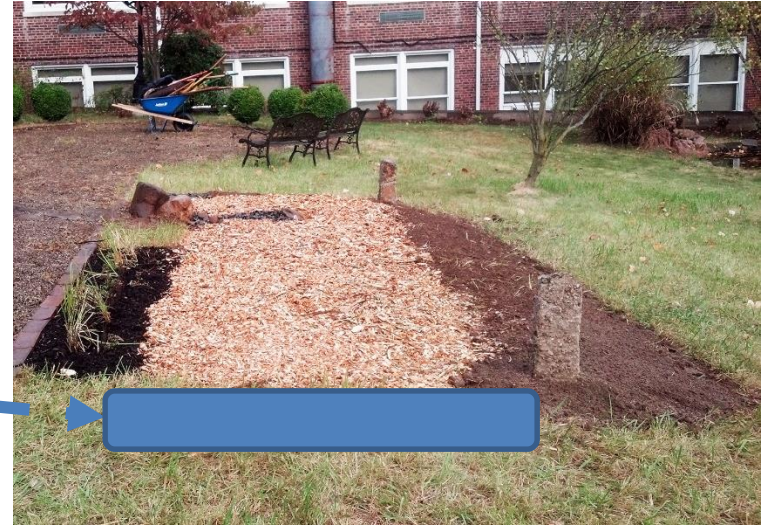




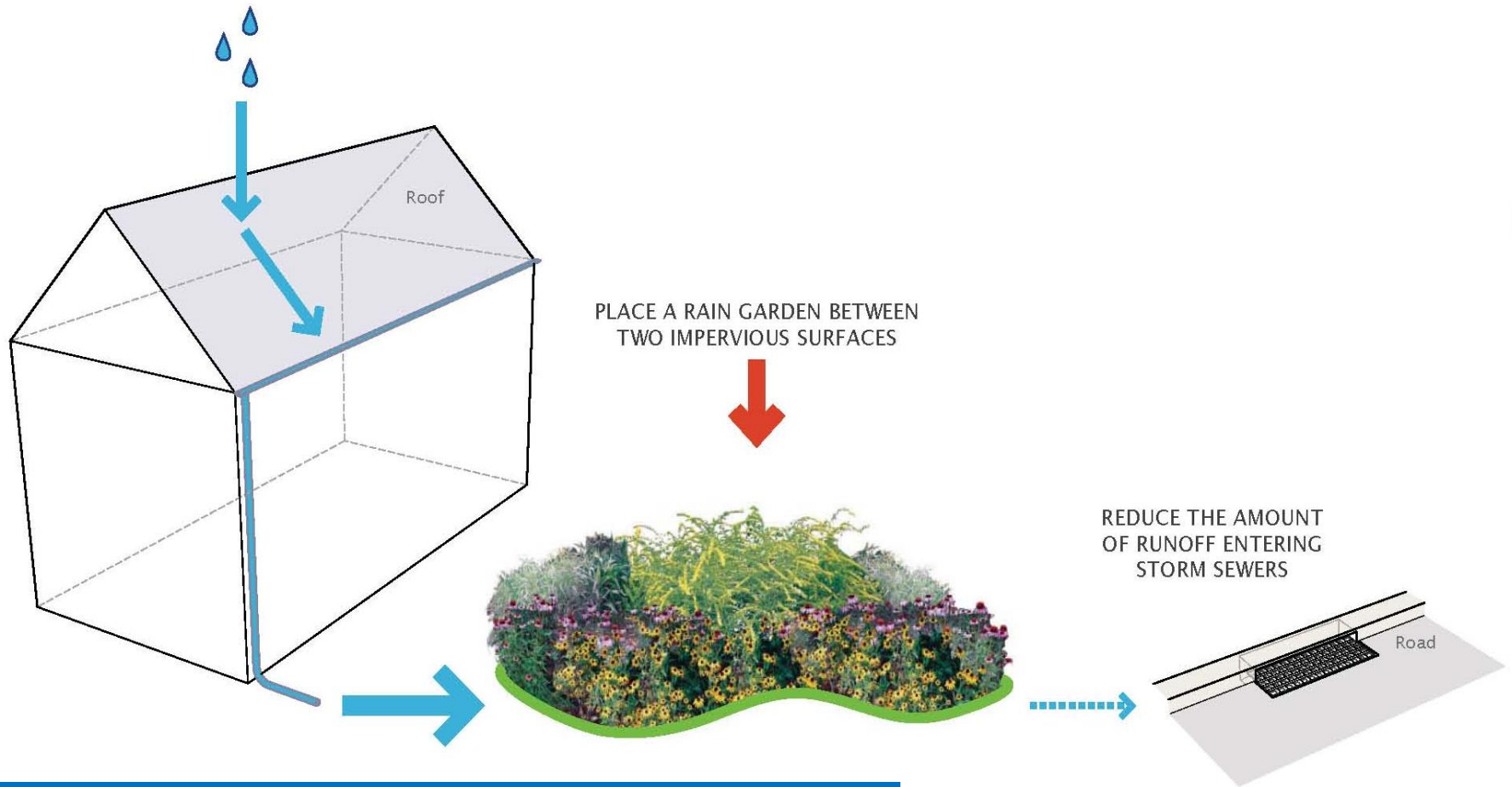
# Useful Water: Filter Stormwater through rain garden to root water food beds



# Useful Water: Filter Stormwater through rain garden to root water food beds

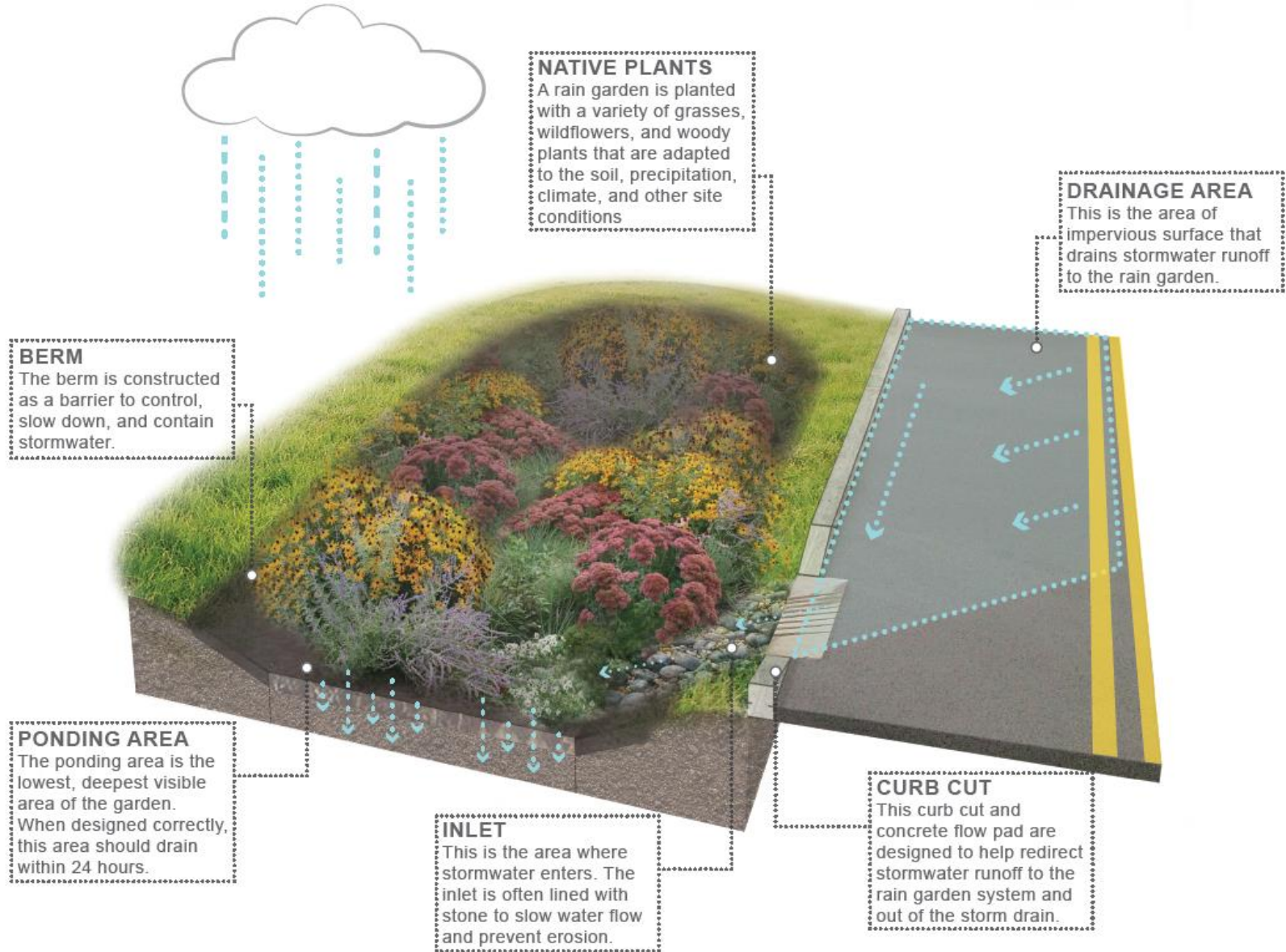


# Disconnect to a Rain Garden

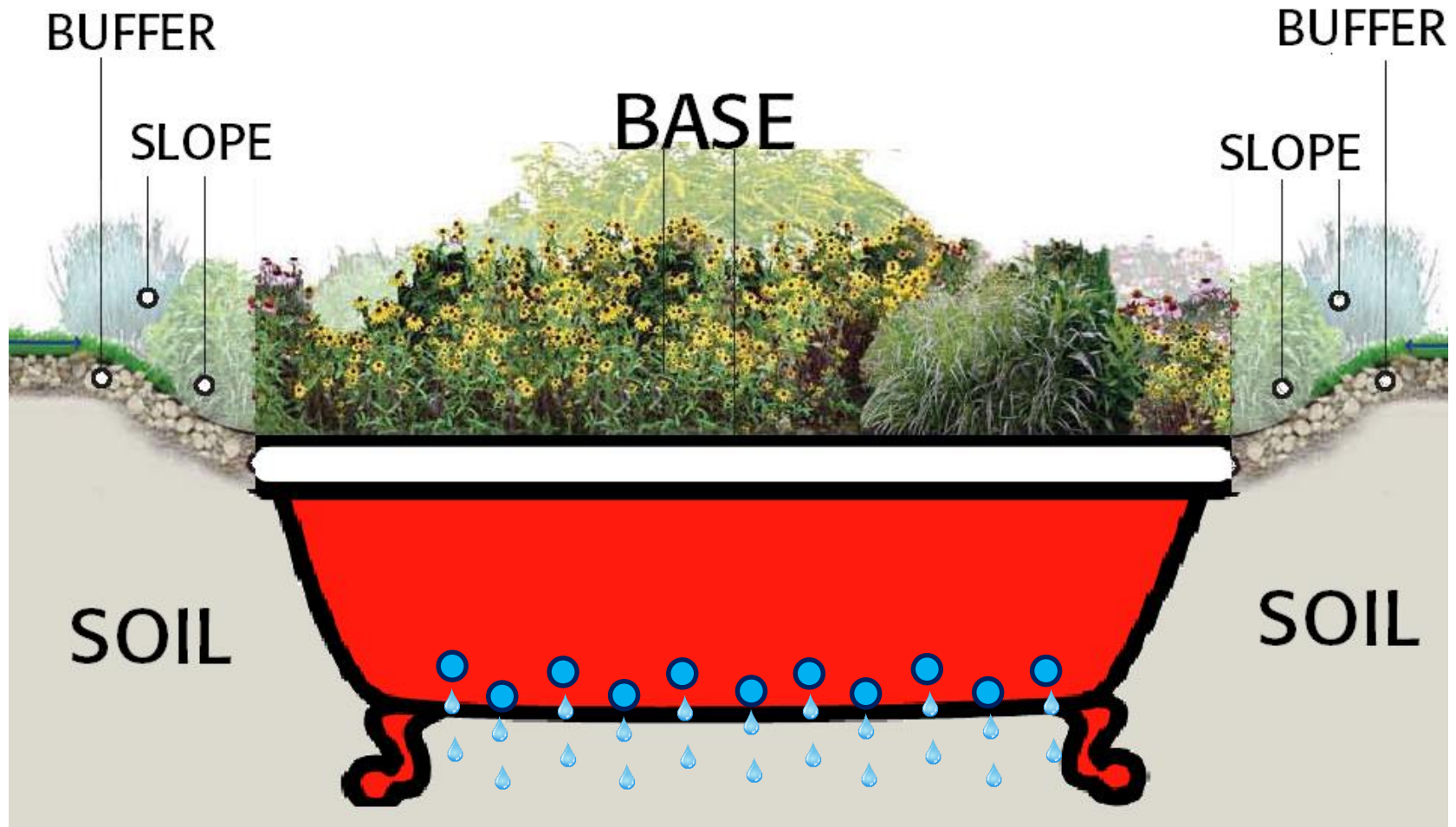


Rooftop runoff is now "disconnected" from flowing directly into the storm sewer system

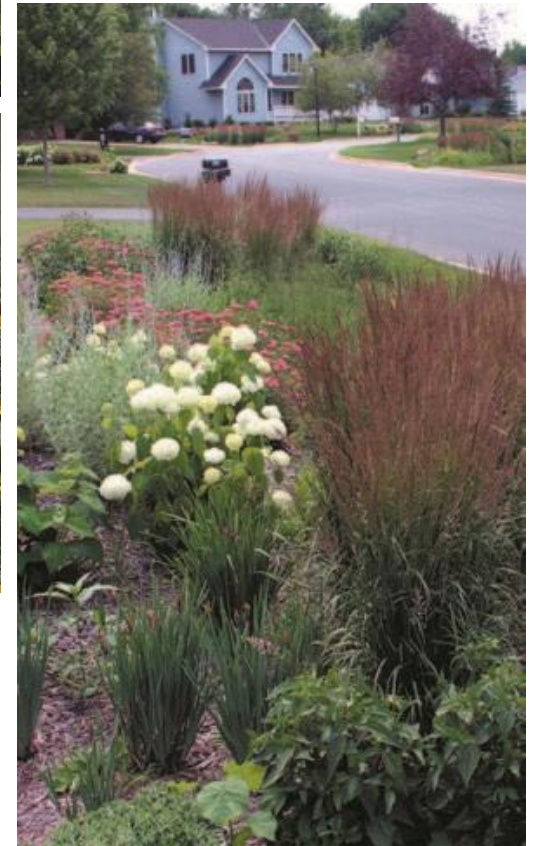
# Bioretention Systems/Rain Gardens



# PARTS OF A RAIN GARDEN



# Lots of Rain Gardens





# HAMILTON HIGH SCHOOL

## WEST



Mark out  
April 2014

2014

- Installed rain garden with assistance from the DPW
- Educated students about rain gardens and planted with them

2016

- Returned to conduct maintenance



Planting  
June 2014



Post Maintenance August 2016



# HAMILTON HIGH SCHOOL WEST



October 2018

- Educated the Life Skills students about non point source pollution, rain gardens and how to do maintenance
- Conducted hands on maintenance with the students



# TABERNAACLE MIDDLE SCHOOL



January 2018



October 2018



April 2018



October 2018



October 2018



October 2018

# WOODS ROAD ELEMENTARY SCHOOL



Site visit March 2011



Post excavation April 2011



Post planting May 2011



Follow up site visit June 2011



# WOODS ROAD ELEMENTARY SCHOOL



Site inspection August 2017



Maintenance August 2017

# ETHEL JACOBSON ELEMENTARY SCHOOL





Rain garden at Catto School in Camden, NJ



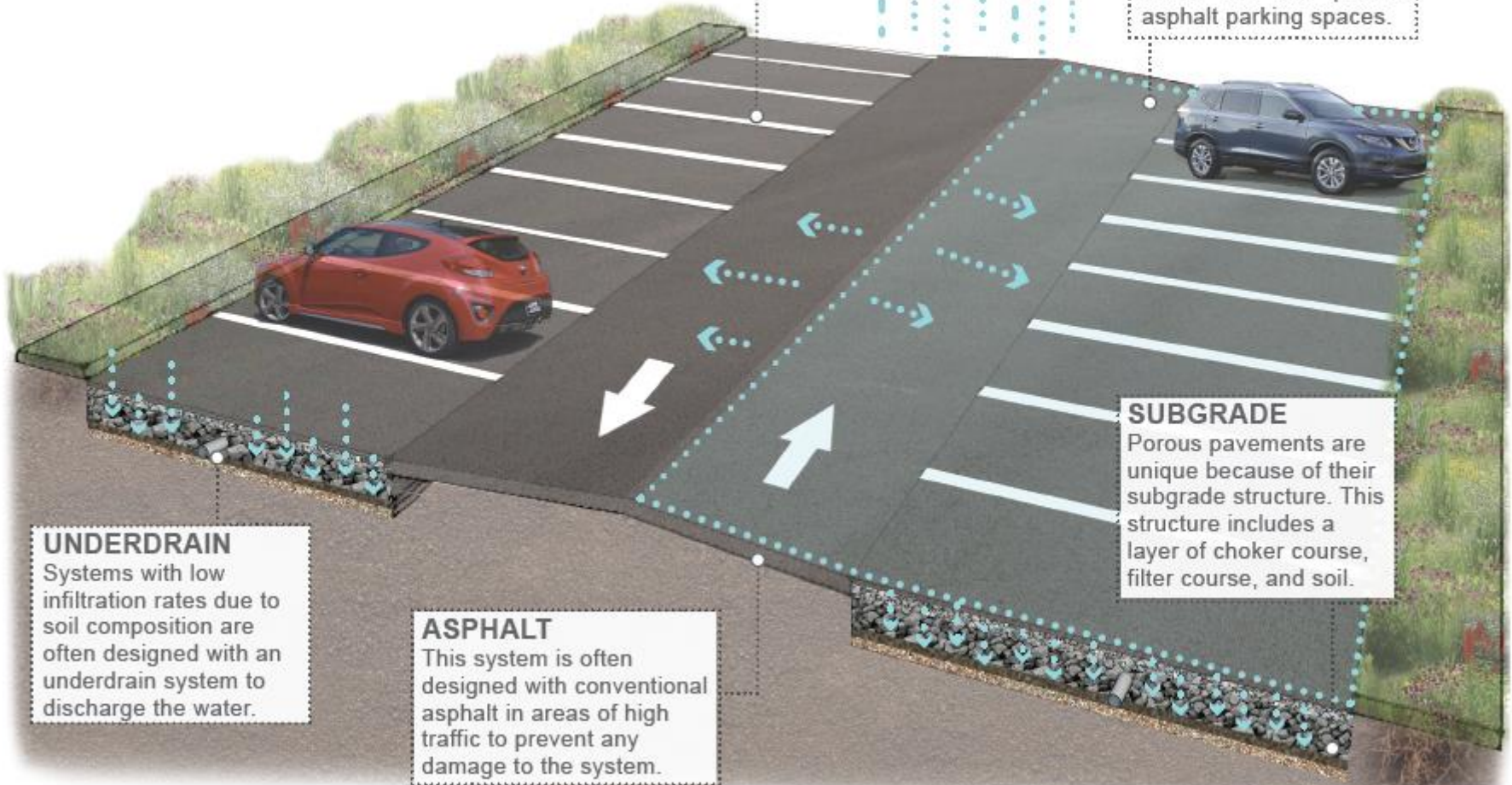
# Step 3: Convert to Permeable Pavement

## POROUS ASPHALT

It is common to design porous asphalt in the parking stalls of a parking lot. This saves money and reduces wear.

## DRAINAGE AREA

The drainage area of the porous asphalt system is the conventional asphalt cartway and the porous asphalt in the parking spaces. Runoff from the conventional asphalt flows into the porous asphalt parking spaces.



## UNDERDRAIN

Systems with low infiltration rates due to soil composition are often designed with an underdrain system to discharge the water.

## ASPHALT

This system is often designed with conventional asphalt in areas of high traffic to prevent any damage to the system.

## SUBGRADE

Porous pavements are unique because of their subgrade structure. This structure includes a layer of choker course, filter course, and soil.

# Permeable Pavements

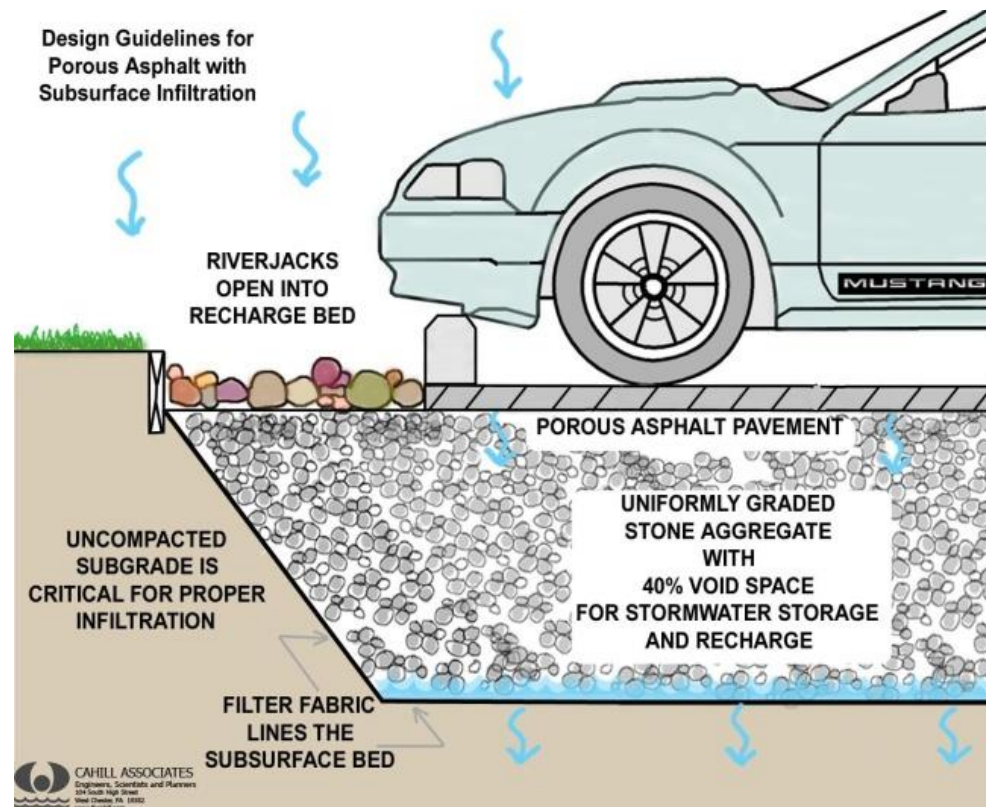
- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Ideal application for porous pavement is to treat a low traffic or overflow parking area



# ADVANTAGES

- Manage stormwater runoff
- Minimize site disturbance
- Promote groundwater recharge
- Low life cycle costs, alternative to costly traditional stormwater management methods
- Mitigation of urban heat island effect
- Contaminant removal as water moves through layers of system

# COMPONENTS







MEDICAL ARTS HIGH SCHOOL















# How do we get started?

- Be clear about what you have to offer the school and why you want to work with them
- Ensure them that you are not going to make more work for the teachers or administrators
- Do not scare them with a lengthy discussion on maintenance but inform them of the tasks
- Tell them how the work will be funded, don't be afraid to ask for funding but make sure they know you have skin in the game

# Educational Programming

- Educational program can vary in length
- Community-Based Project Learning was eight weeks – one day in the classroom per week and then building and planting a rain garden
- You can also educate the students when they plant the garden
- Students can continue these efforts beyond the classroom – Eagle Scout Project, National Honor Society, or simply a college resume builder

# **Jonathan Dayton High School Springfield**

- a) NJ Physiography modeled in the garden**
- b) Interpretive Design**
- c) Embedded Narrative**
- d) Local Aesthetics**
- e) Built with Town DPW and Board of Education Facilities Personnel**

# **“Physiography/Geology Teaching Garden”**

## **Design Goals:**

### **Demonstrate a rain garden that:**

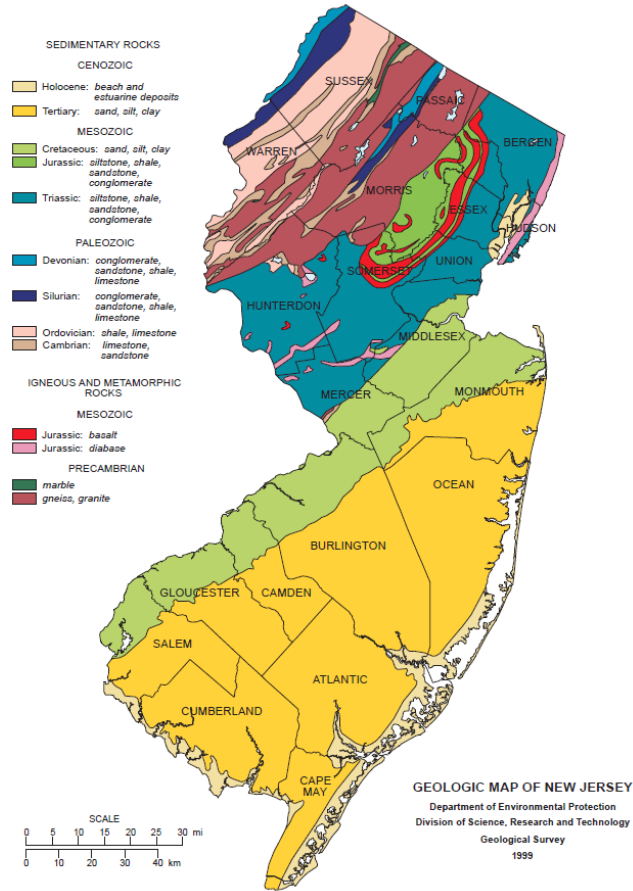
**Is useful as a teaching tool specific to place**

**Highlight New Jersey’s geology, and how it is connected to water and plants**

**Demonstrate the relationship between paving (imperviousness) and unpaved areas**

**Create interest in “real” landscapes by reference and mimicry in the garden**

# Beyond Water Control: Connecting with Geology, Soils and Plant Communities



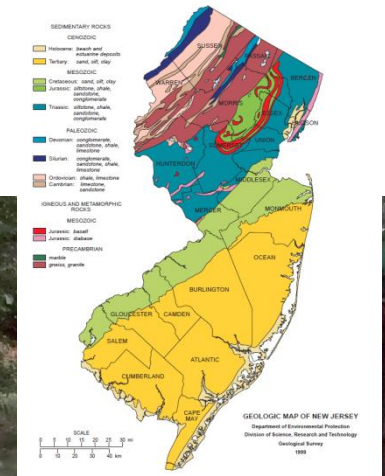
# Beyond Water Control: Educational Garden

Ridge &  
Valley

Highlands

Piedmont

Coastal Plain



Limestone  
Sandstone  
Concrete  
Granite  
Shale  
Gneiss  
Sand

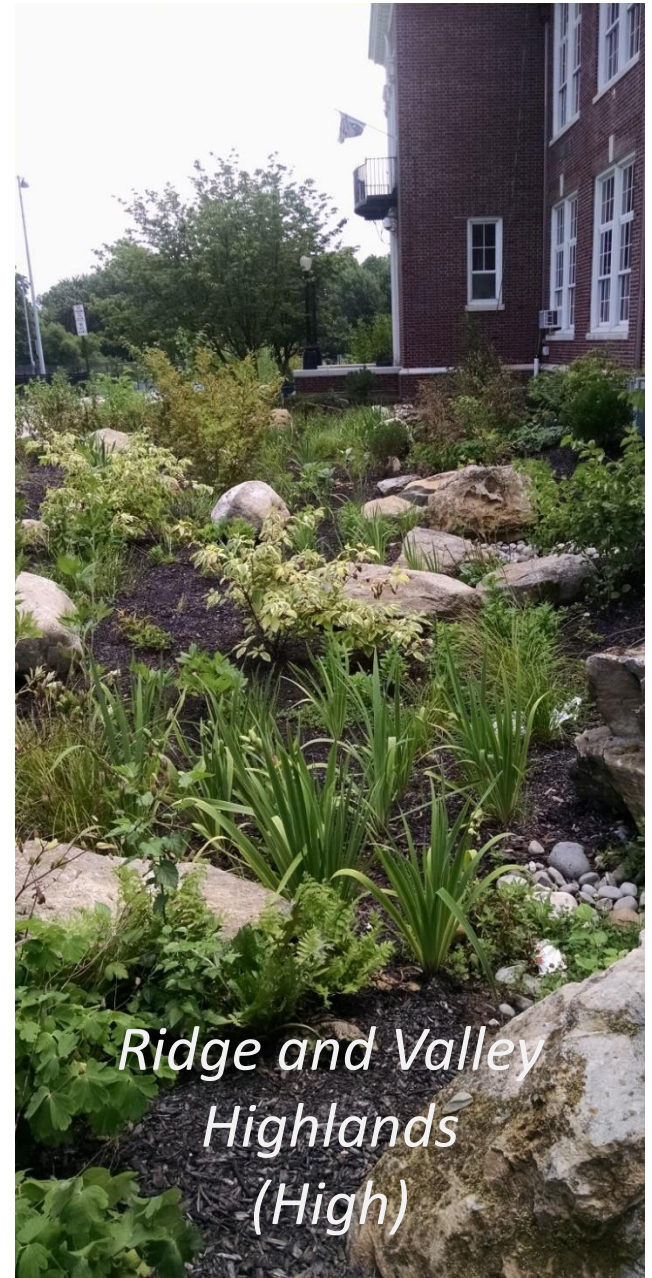




*Coastal Plain  
(Low)*



*Piedmont  
(Middle)*



*Ridge and Valley  
Highlands  
(High)*



*Coastal Plain  
(Low)*

# The Enviroscape Model

- Great for all ages
- Simple to use and conveys all the necessary concepts
- Easy to clean up
- The students can jump right in and make it rain



# Stormwater Management in Your Schoolyard Program

<http://water.rutgers.edu/Projects/SWMIYSchoolyard/SWMIYSchoolyard.html#K8>

# Sustainable Jersey for Schools

**Two Actions (10 points each):**

- **Green Infrastructure Assessment & Plan**
- **Green Infrastructure Installation**

# What's next?

- Many of the ICAs, RAPs, and Green Infrastructure Feasibility Studies have identified opportunities at schools
- Check if the school is registered in Sustainable Jersey for Schools:  
<http://www.sustainablejerseyschools.com/actions-certification/participating-districts-and-schools/>
- Reach out to the school and see if they are interested in green infrastructure planning or installing a practice