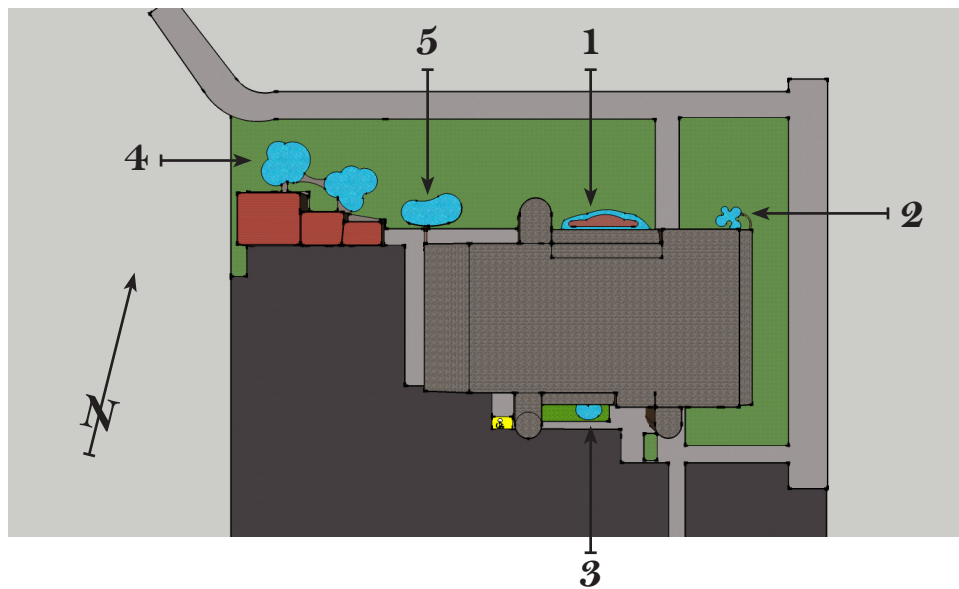


Study of Rain Gardens at Woonsocket Police Station

Hello, Woonsocket Police Department!

At the request of the Chief Carey, Riverzedge Arts' Green Design Lab has examined the outside of your building and located areas where rain gardens could be installed. We identified five areas that are generating runoff, and each is a potential location for a rain garden. Three would be very easy installations, one would be somewhat difficult and one would be very difficult.

The following proposal discusses each potential rain garden, listing factors making it easy or difficult. In the end we will recommend a course of action for your approval. All we need is your confirmation and we'll be ready to start in the spring.



Model shows approximate locations of potential rain gardens.

Overall Analysis

The majority of the Woonsocket Police Station features a flat roof that drains internally into the municipal stormwater system. Given the station's close proximity to the Blackstone River, this is almost certainly where the majority of the station's runoff goes. We consider this runoff to be inaccessible and did not include it in our study.

The main building includes four "shed" roofs, one on each side, that generate accessible runoff. Only one—over the vehicle service facility—uses a gutter and downspout system. The other three use a drip edge to shed water directly onto the ground. Finally, the large outbuilding also drains directly onto the ground.

About the Renderings

These renderings aim to show the relative shape and size of the proposed rain gardens. As such, we have not included images of plantings, as these made it more difficult to see shapes and compare sizes. Before proceeding, the Green Design Lab will provide Woonsocket Police Department with diagrams and images of intended plantings.

Opportunity 1: North Shed Roof

Drainage area: ~450 sq. ft.

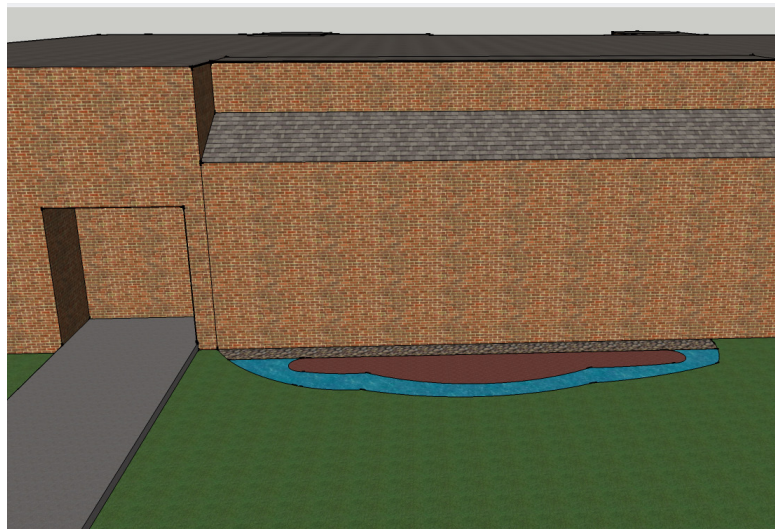
Rain garden size: 40' x 10'

(including channel and elevated feature)

Difficulty: very easy

This medium-sized rain garden features an interesting design that would channel runoff around a central raised area. The collection pool itself would be a slim half-oval about 18 inches deep in the center.

This area between the employees entrance and the northwest stair column rarely sees any use, so the large installation would not affect foot traffic or other uses.



With no gutter and downspout and a fairly large drop from the drip edge, falling water would strike the ground with considerable velocity, causing high levels of erosion. For this reason, we recommend digging a drainage trench and then filling it with gravel to absorb the water's impact before channeling it away from the building.



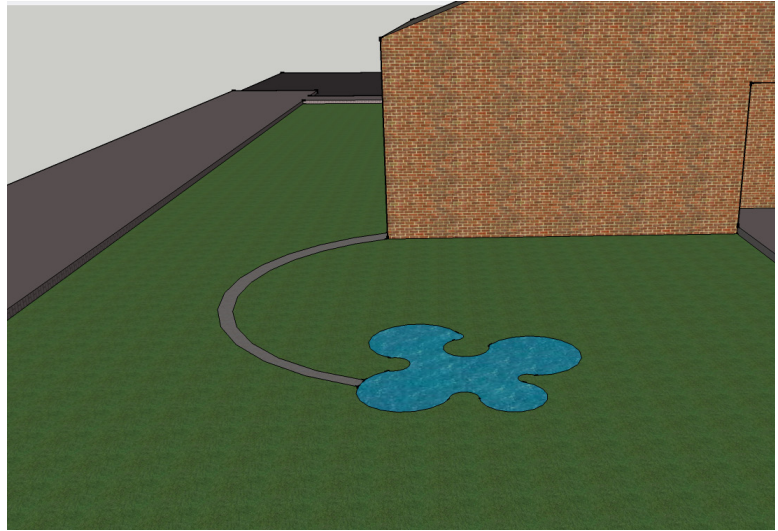
Opportunity 2: East Shed Roof

Drainage area: ~555 sq. ft.
Garden size: 10' x 10'
(irregular shape)
Difficulty: somewhat challenging

While this rain garden would manage runoff from the east roof, the garden itself would be located on the north side of the building. The east grounds fronting Veterans Parkway (Pond St.) are too narrow and too highly sloped to support a rain garden.

Making this runoff accessible to the rain garden would require installation of a gutter and downspout system emptying at the northeast corner of the building.

A short, curved, gravel-filled channel would then route the water into the rain garden. The drainage pool would use an irregular shape with several lobes of various depths up to approximately 12 inches.

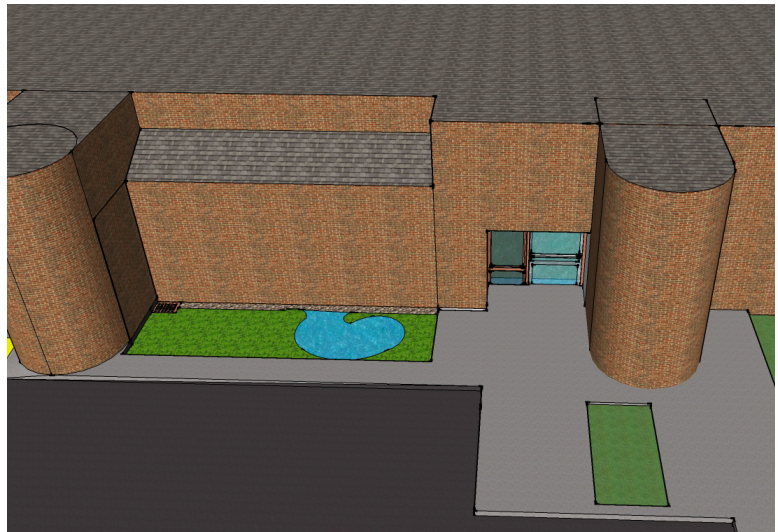


Opportunity 3: South Shed Roof

Drainage area: ~360 sq. ft.
Garden size: 6' x 6'
Difficulty: very easy

While the smallest and simplest of the potential rain gardens, this would serve as the flagship for the simple fact that it would be located directly beside the main public entrance to the station. This area already hosts a memorial garden, and we would need the approval and cooperation of the family in order to complete the installation.

This site also includes a large tree and large shrubs, limiting the size and location of a rain garden. Fortunately, this is the smallest of the drainage areas, so we should be able to create sufficient capacity to manage the runoff. Like the north shed roof, water leaving the roof's drip edge will strike the ground at high velocity. Again, we would install a gravel-filled trench to minimize erosion and channel the water into the collection pool.

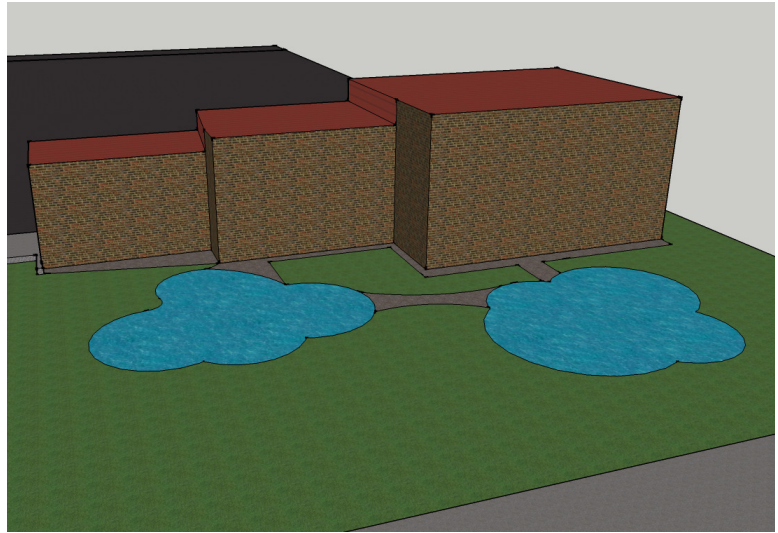


Opportunity 4: Outbuildings

Drainage area: ~800 sq. ft.
Garden size: 16 x 36
(2 large pools plus channels)
Difficulty: very easy

The largest rain garden would also be the least visible, sitting behind the outbuildings. With a large area that is otherwise unused, this garden would seek to capture as much runoff as possible. Pending confirmation during a rain event, we expect that we can capture runoff from the nearby footpath as well as a portion of the parking lot.

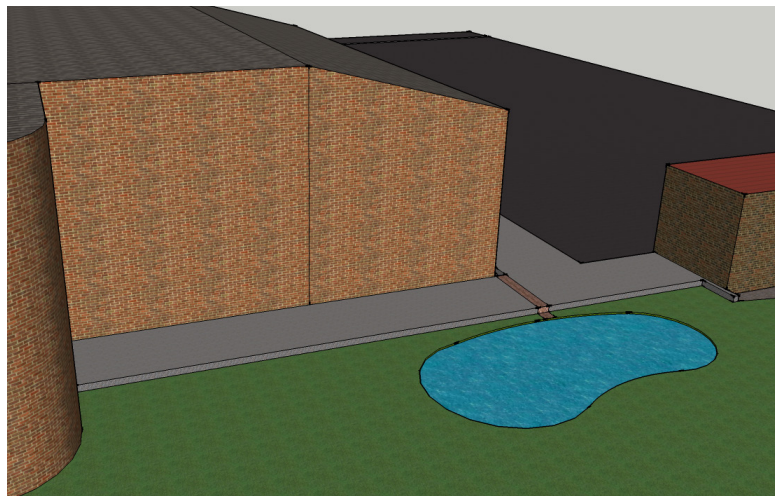
While the drip edges on this structure are not as high as those on the main building, we would install gravel-filled trenches to carry the water away from the building and into the collection pools.



Opportunity 5: West Shed Roof

Drainage area: ~1,200 sq. ft.
Garden size: 10' x 28'
Difficulty: very difficult

Even though a gutter and downspout system already captures runoff from this roof, getting that water into a rain garden may prove nearly impossible. A well-used concrete sidewalk separates the downspout from available grounds where a garden could be installed. The simplest solution would be to cut a narrow section of concrete across the sidewalk and replace it with a gravel-filled trench. However, this would likely create a slip hazard during winter conditions.



Because of the challenges involved and low probability of installation, our rendering shows a simple, bean-shaped rain garden for scale.



Recommended Action

We believe the best course of action is to begin with the north shed roof rain garden (Opportunity 1). It is among the easiest to execute, it does not need any further study or discussion or preparatory work to be installed, and it would have a relatively high visual impact for employees using the nearby entrance.

During the course of this work, we would use any rain event to study the runoff pattern around the outbuildings (Opportunity 4), refining that design with the data collected. As work neared completion, we could reach out to the family that tends the memorial garden to discuss the possibility of a rain garden for the south shed roof (Opportunity 3). This timing would let us use the first garden as an example.

Depending on the results of the outbuilding runoff pattern study and discussions with the memorial garden family, we could install one or both of those rain gardens.

Regarding the east shed roof (Opportunity 2), Woonsocket Police need to determine whether the cost associated with the installation of a gutter and downspout would be justified by the benefit generated by installing a rain garden to manage that runoff.

Finally, we do not see a realistic method to manage the runoff from the west shed roof (Opportunity 5) without incurring undue expense or creating risk of injury. Therefore, we recommend against pursuing this opportunity.

Next Steps

Upon notification that the Woonsocket Police Department chooses to proceed with installation of at least one rain garden, the Green Design Lab will develop a plan for planting and generate renderings of the selected rain garden in its final form. On approval, the Green Design Lab will create a timeline for installation and order materials.

Budget Goal: \$0, Maintenance Included

The Green Design Lab is aware of potential funding sources that could enable us to deliver one or more rain garden at no cost to Woonsocket Police Department. Also please note that any rain garden installed by the Green Design Lab includes three years of scheduled maintenance, once per season for a total of 12 sessions.



Other Considerations

Please consider the following when assessing this proposal. These questions and concerns are common among those first learning about rain gardens.

What exactly is a rain garden? Most rain gardens consist of a trench or swale designed to capture runoff from rainstorms. Their size is scaled to match the size of the drainage area, and most range from 6 to 24 inches deep. They should be densely planted to maximize absorption of collected water and minimize unwanted species.

How long does the water stay in the collection pool? Many factors affect how quickly the water in a rain garden infiltrates the surrounding land, but the short answer is: several hours at the most. Before installation, designers should test the absorption rate of the soil. Slow absorption would require a larger, shallower collection pool for a given drainage area.

Won't a rain garden breed mosquitos? No. Mosquitos require water to remain still for much longer than a rain garden holds water.

What happens if the rain garden overflows? A properly designed rain garden should provide ample capacity to process water from a heavy downpour. Only a truly extreme rain event should cause a rain garden to overflow. In such a case, the runoff would follow the same course that it would have if no rain garden had been installed.

Will my basement get wet? Rain gardens should be sited far enough away from structures that they would have almost no effect on the saturation of soil next to a foundation. If a basement does not get wet before installation of a rain garden, it should not get wet afterward. Conversely, a house with a basement that regularly floods might actually benefit from a large capacity rain garden sited as far as possible from the structure.

How much maintenance is involved? A well designed rain garden needs very little attention. If densely planted, they leave little room for weeds to grow. Designers favor hardy perennial plants that can withstand extreme conditions and tend to increase in size over the years.

