

**BEFORE THE BOARD OF ZONING ADJUSTMENT
OF THE DISTRICT OF COLUMBIA**

Application of 2951 Mills Avenue, Inc

BZA No. 18727

APPLICANT'S HEARING STATEMENT

March 11, 2014

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This Hearing Statement ("Statement") outlines the existing and proposed use of the property of application and the manner in which the application ("Application") complies with the specific tests and burden of proof for the variance sought in this application before the Board of Zoning Adjustment (BZA)

NATURE OF RELIEF SOUGHT

This is an application pursuant to 11 DCMR § 3103.2 for variance to allow the new construction of a single family detached dwelling on a lot not in compliance with minimum lot area requirements set forth under §401.3 in the underlying R-1-B zone district within which the subject property is located

SUMMARY OF APPLICATION

The applicant seeks the above area variance pursuant to 11 DCMR § 3103.2 under §401.3 to allow the construction of a new single family detached dwelling which will comply with all other provisions of the zoning regulations with respect to percentage of lot occupancy maximum allowed, minimum side yard and rear yard setback requirements, maximum height, green area ratio (GAR) and parking

BOARD OF ZONING ADJUSTMENT
District of Columbia
CASE NO. 18727
EXHIBIT NO. 24

Board of Zoning Adjustment
District of Columbia
CASE NO.18727
EXHIBIT NO.24

JURISDICTION OF THE BOARD

The application is properly before the BZA. The Board is authorized to grant the requested variances under § 8 of the Zoning Act, DC Official Code § 6-641.07 (g) (3) (2001), as further set forth in 11 DCMR § 3103.2.

PROPERTY LOCATION AND PROJECT DESCRIPTION

The property is located in the West Woodridge neighborhood in Ward 5, in the northeast quadrant of the District. The subject property is legally described as located in Square 4251 and as lot 0015, as recorded in the records of the Surveyor of the District of Columbia. The property address is 2840 Belair Place NE and is located within the R-1-B Zone District.

The subject property is vacant and unimproved. A corner lot by definition, the subject property abuts Belair Place at its east property line and Girard Place at its south, measuring 47 feet and 83 feet in lot width respectively.

The R-1-B zone district requires a minimum fifty feet (50 ft.) of lot width and five thousand square feet (5,000 ft²) of minimum lot area. The subject property complies with the required minimum width of lot, having eighty three feet (83 ft.) of frontage on Girard Place, but at approximately 3,898.65 square feet of lot area, falls short of the minimum 5,000 ft² required for the R-1-B zone district within which it is located.

The applicant proposes to construct a three story new single family detached dwelling featuring a basement and two floors above. The proposed building is designed to occupy percentage of lot occupancy less than the forty percent (40%) prescribed for similar structures as set forth under § 403.2 and will comply with all other applicable provisions of the zoning regulations, including the provision of the required parking space on an open concrete pad located at the rear, to be accessed via a proposed curb cut on Girard Street.

The property elevation slopes north south such that whereas all three floors are above grade, as viewed from the south elevation on Girard Place, approximately forty-five percent (45%) of the basement is below grade viewed from Belair Place, with resulting appearance of two and a half stories of structure, in compatibility with the prevailing character of existing buildings in the neighborhood.

STATEMENT OF COMPLIANCE WITH BURDEN OF PROOF

The Applicant, by preponderance of the materials submitted with this Application, facts to be presented in the course of the public hearing, and further evidence to be submitted fifteen days prior to the hearing date, will prove compliance with the three prong test necessary for the granting of the area variance sought, as outlined further below

The Board is authorized to grant an area variance where a property demonstrates three characteristic elements:

- 1 The subject property must demonstrate a unique physical characteristic of shape or size, exceptional narrowness or shallowness which existed as of the time of the original adoption of the Zoning Regulations, or that there exists exceptional topographical conditions or other extraordinary or exceptional situation or condition of property;
2. That the physical characteristic(s), or extraordinary or exceptional situation or condition of the property makes the strict application of the Zoning Regulations result in peculiar and exceptional practical difficulties to the owner of the property,
- 3 That the Board is able to grant the variance without substantial detriment to the public good and without substantial impairment of the intent, purpose, and integrity of the zone plan as embodied in the Zoning Regulations and Map

EXTRAORDINARY OR EXCEPTIONAL SITUATION OR CONDITION OF PROPERTY

The subject property is the only unimproved vacant lot in its square with a unique subdivision history

As of May 12, 1958, a significant portion – approximately 2,074 square feet - of what is now known as Lot 15 existed as Lot 10. Lot 10 formed one of sixteen (16) lots within a Square bounded by Hamlin Place to the north, Belair Place to the east, Girard Street to the south and Mills Avenue to the west.

All sixteen lots, except four (4) which formed through lots by definition by virtue of lot depth spanning the width of the square east-westerly and abutting both Belair Place and Mills Avenue, were configured as adjoining lots in a north-south fashion, facing Belair Place and Mills Avenue respectively and not a single lot within this square complied with the R-1-B zoning classification mapped upon the square as of that date.

Lot 10 was located at the southeast corner of the square, and as of May 12, 1958 the adjoining lot (Lot 9) to its west facing Mills Avenue already had an improvement or building (Former Parcel 155/40 was subdivided into lots 9 and 10 in February of 1926). Abutting Lot 10 to its north was a Lot 6, a vacant lot, which separated Lot 10 from another improved lot (Lot 5) further north.

In subdivision plat dated February 4, 1969, the Zoning Administrator approved a subdivision that effectively apportioned parts of Lot 6 amongst Lots 5 and 10, which improved upon the existing nonconforming aspects of both properties, Lot 5 by improving upon the existing nonconformity of side yard by extension of lot width by three feet (3ft.), and Lot 10 by both increasing the lot width from 25 feet (25 ft.) to forty seven feet (47 ft) where it abuts Belair Place and the existing lot area from 2,074 square feet to 3,898.65 feet under new Lots 14 and 15 respectively

The current Lot 15 therefore exercised the only reconfiguration option available to it based on the existing and prevailing condition of May 12, 1958, and in fact improved upon the nonconformity of lot area more severe than existed in the context of the zoning classification mapped upon it as of May 12, 1958.

The applicant therefore contends that this specific physical shape of the subject property, together with its unique subdivision history constitute an extraordinary or exceptional situation or condition of property, and forms the basis for compliance with the first burden of proof on uniqueness.

PECULIAR AND PRACTICAL DIFFICULTIES TO OWNER OF PROPERTY

The unique physical characteristic and subdivision history of the subject property result in peculiar and practical difficulties upon the owner, because the strict application of the Zoning Regulations with respect to the minimum lot area set forth in § 401.3 forecloses the improvement of the property without acquisition of additional land area in order to come into compliance for a matter of right development of his property

As aforementioned, the subject property is a corner located at the intersection of Belair Place and Girard Place, both dedicated public Right-Of-Ways (ROW), including the five feet (5 ft) Building Restriction Line (BRL) which encumbers the subject property on both Streets, thereby foreclosing expansion of the existing lot southward or eastward.

Lot 9 which adjoins the subject property to its west has an improvement or an existing building, but more importantly, the improvement or building on that lot existed as of May 12, 1958 and it was not in single ownership then nor is it now owned by the previous or current owner of Lot 15. Expansion of the subject lot westerly is also foreclosed, as it is northward since improvements existed on these two lots as of May 12, 1958 as well

The peculiar and practical difficulties upon the owner is as the direct result of the extraordinary situation of the subject property in that there is no further practical solution to increasing the lot size into conformity and without the relief sought, the property is consigned to remaining unimproved in the foreseeable future or in perpetuity.

SUBSTANTIAL DETRIMENT TO PUBLIC GOOD AND SUBSTANTIAL IMPAIRMENT OF INTENT, PURPOSE AND INTEGRITY OF THE ZONE PLAN

The applicant seeks to construct a new single family dwelling in a zone district that permits the proposed type of structure and use as a matter of right. Save for the noncompliance with the minimum lot area for which relief is sought, a condition which pre-dated the adoption of the Zoning Regulations, the proposed construction upon subject property does not seek any other relief and will comply with all other applicable provisions of the regulations.

The proposed construction will cause to be improved an otherwise vacant and unimproved lot. The proposed building is designed to be compatible with the prevailing massing and architecture of the neighborhood.

The applicant therefore submits that for all the foregoing reasons, the reliefs sought may be granted without substantial detriment to the public good, and without substantial impairment of the intent, purpose and integrity of the zone plan as embodied in the Zoning Regulations and Map.

WITNESS

1. Taiwo Demuren
2. Ramy S. Ali

CONCLUSION

At the Advisory Neighborhood Commission (ANC) meeting in which the applicant presented the proposed project on February 19th, 2014, neighbors expressed objection to the original building design as being modern and not compatible with the architecture character of the neighborhood and also expressed the concern that there probably was an underground stream, which would exacerbate neighborhood water runoff problems.

On March 1, 2014, the applicant presented a redesigned building which incorporated elements that the neighbors had expressed a desire to see sufficient to meet with the acceptance of the neighbors in the closes proximity of and within the Single Member District (SMD) in which the subject property is located.

In response to concerns about the possible existence of an underground stream and impact on water runoff, the applicant commissioned the services of the civil engineer of record for the project to investigate and proffer a solution for water runoff control measures

Although the civil engineer's investigation did not find any evidence of the existence of an underground stream and the project is not subject to the requirement for a storm water management system because earth disturbance activity is less than five thousand square feet (5,000 sf), the applicant will install a rain garden as a water runoff measure

The applicant therefore worked assiduously to achieve broad community buy-in to the proposed project by mitigation of community concerns

The Applicant submits that the instant application complies with all conditions for the granting of the requested area variance as outlined above and as shall be further documented, and respectfully requests that the application be granted.



BELLO BELLO & ASSOCIATES, LLC
Zoning, Land Use & Development Consultants

March 3, 2014

Lloyd Jordan, Esquire

Chairperson,

Board of Zoning Adjustment

441 4th Street, NW

Suite 210S

Washington DC 20001

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Motion to Waive 14-Day Deadline for Filing Final Submissions

Re: 2840 Belair Place NE. BZA No. 18727

The applicant respectfully requests that the Board grant the requested motion to waive the filing deadline set forth in § 3118.3 for the submission of additional statements, information, et cetera in the application of reference above for the good cause outlined below.

At the regularly scheduled meeting of the affected Advisory Neighborhood Commission (ANC), ANC 5C, of February 19, 2014, the applicant became aware of concerns of neighbors in close proximity to the subject property and members within SMD 5C07 pertaining to:

- (a) Compatibility of the of the architectural design and scale of the proposed building to the character of the neighborhood;
- (b) The possibility that an underground stream may exist beneath the subject property;
- (c) Concerns about impact on neighborhood water runoff issues which construction on subject property may exacerbate

ANC 5C decided to table a decision of whether to support the application to allow applicant's response to the concerns expressed by SMD 5C07 neighbors. The applicant thereafter coordinated with Mr. Treadway, the SMD 5C07, a separate meeting with immediate neighbors scheduled for Saturday, March 1st.

Ahead of the scheduled meeting and in direct response to specific neighbor concerns, the applicant embarked on the following.



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Zoning, Land Use & Development Consultants

- (a) Redesign the proposed building to accommodate and incorporate the design preferences that neighbors expressed in the ANC meeting of February 19th;
- (b) Commission the civil engineer of record to investigate whether or not an underground stream exists at subject site, and proffer a mitigating solution to neighborhood water runoff concerns

The applicant is glad to report that it obtained community approval of the redesign proposed and acceptance of the result of the civil engineer's report that although there is no evidence that an underground stream exists beneath subject property, a rain garden will be used as part of the landscape to mitigate water runoff concerns and impact, as a possible ANC resolution will attest or as the affected SMD Commissioner may be authorized to present in testimony

The applicant was therefore constrained from filing timely final submissions for the good public cause of seeking community buy-in from those neighbors more proximally impacted by the proposed project.

The Board is authorized to reduce the 14-day period of time prescribed as set forth under § 3110.3

Respectfully,

Toye Bello

March 3, 2014

Lloyd Jordan, Esq.

Chairperson

Board of Zoning Adjustments

441 4th Street NW Room 220 South

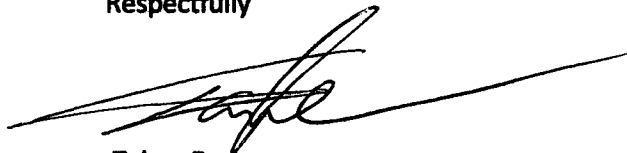
Washington, DC 20001

Re: 2840 Belair Place NE. BZA No. 18727

My name is Taiwo Demuren and I am the President of 57th Street Mews, Inc., owner of 2840 Belair Place NE.

This letter affirms or serves as testament that Toye Bello is authorized to act as the agent for the owner of the property of reference which is the subject an application for variance relief before the Board of Zoning Adjustment, as set forth in 11 DCMR, § 3113.4

Respectfully

A handwritten signature in black ink, appearing to read 'Taiwo Demuren', with a long horizontal flourish extending to the right.

Taiwo Demuren

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CAPITOL DEVELOPMENT DESIGN, INC.
ENGINEERS PLANNERS SURVEYORS

4600 Powder Mill Road, Suite 200, Beltsville, Maryland 20705 Tel (301) 937-3501 Fax (301) 937-3507

February 25, 2014

STORMWATER AND GROUNDWATER MANAGEMENT

57th Street Mews
3203 Short Ridge Lane
Mitchellville, MD 20721

Attn: Mr. Taiwo Demuren

Re: 2840 BELAIR PL, NE WASHINGTON DC. BZA No 18727

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I am the civil engineer of record for the referenced project and will be responsible for providing soil and sediment erosion control plans for the project at the construction permit phase. I am informed that there may be belief or assertion that a designated body of water or "underground stream" exists at subject site. Please be advised that a diligent search of public records available affirms that no bodies of water or an underground stream are designated on subject site. Notwithstanding, please find below my professional opinion on mitigating potential water runoff issues not only in the course of construction activity, but also at the developed condition in accordance with the applicable provisions of DCMR Title 21, the District of Columbia Water and Sanitation Regulations.

Physical Setting

The proposed project is located at 2840 Belair Place N.E., Washington, DC. It is further identified as occupying Lot # 0015 in Square # 4251. The proposed project site is bounded on the north and south by Hamlin Place N.E. and Girard Place, N.E. and on the east and west by Belair Place and Mills Avenue, N.E. The existing condition is a vacant lot covered with a few trees. No water bodies are designated on the site. The site is located in a fully developed area. The proposed project involves construction of three story residential building. The subject project consists cumulatively of approximately 3901 square feet of land area, of which 1560 will be disturbed.

Stormwater management

Topographically, the project site generally slopes towards the east. The runoff from the site is untreated and follows the topographical pattern of the site. Currently, there is no stormwater management facility at the site. Even though, the owner is not required to provide a stormwater management system, in order to improve the site environmental condition, the owner proposes to treat and control the runoff from the impervious area using a rain garden. At developed condition the runoff generated from the site will be controlled into a level lower than the existing condition.

Homeowners are catching on to rain gardens (landscape areas planted to wild flowers and other native vegetation to soak up rain water, mainly from the roof of a house or other building. The rain garden fills with a few inches of water after a storm and the water slowly filters into the ground rather than running off to a storm drain. Compared to a conventional patch of lawn, a rain garden allows about 30% more water to soak into the ground. As cities and suburbs grow and replace forests and agricultural land, increased stormwater runoff from impervious surfaces becomes a problem. Stormwater runoff from developed areas increases flooding; carries pollutants from streets, parking lots and even lawns into local streams and lakes; and leads to costly municipal improvements in stormwater treatment structures. By reducing stormwater runoff, rain gardens can be a valuable part of changing these trends. While an individual rain garden may seem like a small thing, collectively they produce substantial neighborhood and community environmental benefits. Rain gardens work for us in several ways:

1. Increasing the amount of water that filters into the ground, which recharges local and regional aquifers,
2. Helping protect communities from flooding and drainage problems;
3. Helping protect streams and lakes from pollutants carried by urban stormwater – lawn fertilizers and pesticides, oil and other fluids that leak from cars, and numerous harmful substances that wash off roofs and paved areas;
4. Enhancing the beauty of yards
5. Increasing the amount of water that filters into the ground, which recharges local and regional aquifers;
6. Helping protect communities from flooding and drainage problems;
7. Helping protect streams and lakes from pollutants carried by urban stormwater – lawn fertilizers and pesticides, oil and other fluids that leak from cars, and numerous harmful substances that wash off roofs and paved areas;
8. Enhancing the beauty of yards

Groundwater Management During Construction

As the proposed below grade construction is limited to about 60" (5 feet) below the existing grade, there will be no interaction between the foundation and the groundwater. Since groundwater was not encountered within the depths explored in the soil borings (12 feet below grade), dewatering of the excavation is not required during/after construction. However, if perched water table is identified during construction, the water is pumped and filtered through a filter bag and discharged into the existing sewer system, the owner will coordinate with DC WATER for discharging permit.

In conclusion, provided that the proposed stormwater management measures and foundation design are implemented, it is the opinion of the engineer that the proposed project will not anticipate any impact on surface water and groundwater.

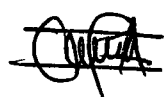
Please let me know if further clarification is required.

Sincerely,

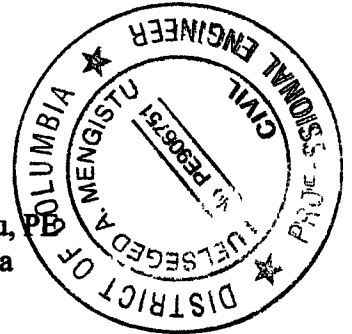
CAPITOL DEVELOPMENT DESIGN, INC.



Koré Tall, MSCE
Geotechnical Division Manager



Luelseged Mengistu, PE
District of Columbia



cc Mr. Lloyd Jordan, Esq , Chairperson
Board of Zoning Adjustment
441 4th Street, NW Suite 220S
Washington DC 20001

RAIN GARDENS

A how-to manual
for homeowners



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RAIN GARDENS

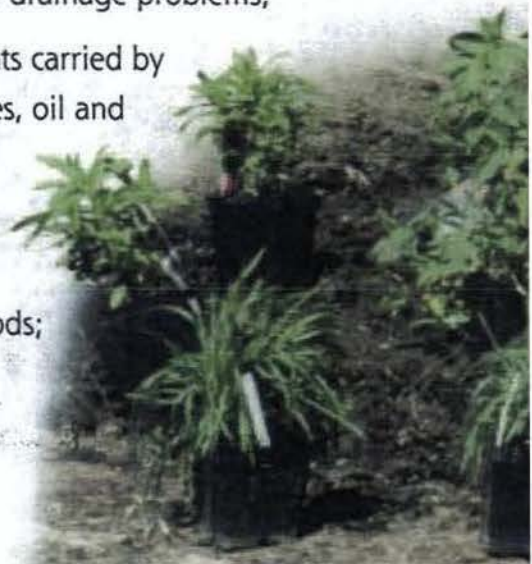
Your personal contribution to cleaner water

Homeowners in many parts of the country are catching on to rain gardens – landscaped areas planted to wild flowers and other native vegetation that soak up rain water, mainly from the roof of a house or other building. The rain garden fills with a few inches of water after a storm and the water slowly filters into the ground rather than running off to a storm drain. Compared to a conventional patch of lawn, a rain garden allows about 30% more water to soak into the ground.

Why are rain gardens important? As cities and suburbs grow and replace forests and agricultural land, increased stormwater runoff from impervious surfaces becomes a problem. Stormwater runoff from developed areas increases flooding; carries pollutants from streets, parking lots and even lawns into local streams and lakes; and leads to costly municipal improvements in stormwater treatment structures.

By reducing stormwater runoff, rain gardens can be a valuable part of changing these trends. While an individual rain garden may seem like a small thing, collectively they produce substantial neighborhood and community environmental benefits. Rain gardens work for us in several ways:

- ✦ Increasing the amount of water that filters into the ground, which recharges local and regional aquifers;
- ✦ Helping protect communities from flooding and drainage problems;
- ✦ Helping protect streams and lakes from pollutants carried by urban stormwater – lawn fertilizers and pesticides, oil and other fluids that leak from cars, and numerous harmful substances that wash off roofs and paved areas;
- ✦ Enhancing the beauty of yards and neighborhoods;
- ✦ Providing valuable habitat for birds, butterflies and many beneficial insects.



Who should use this manual?

This manual provides homeowners and landscape professionals with the information needed to design and build rain gardens on residential lots. Guidelines presented in this manual can also be used to treat roof runoff at commercial and institutional sites. However, the manual should not be used to design rain gardens for parking lots, busy streets and other heavily used paved areas where stormwater would require pretreatment before entering a rain garden.

Frequently asked questions

Does a rain garden form a pond?

No. The rain water will soak in so the rain garden is dry between rainfalls. (Note: some rain gardens can be designed to include a permanent pond, but that type of rain garden is not addressed in this publication).

Are they a breeding ground for mosquitoes?

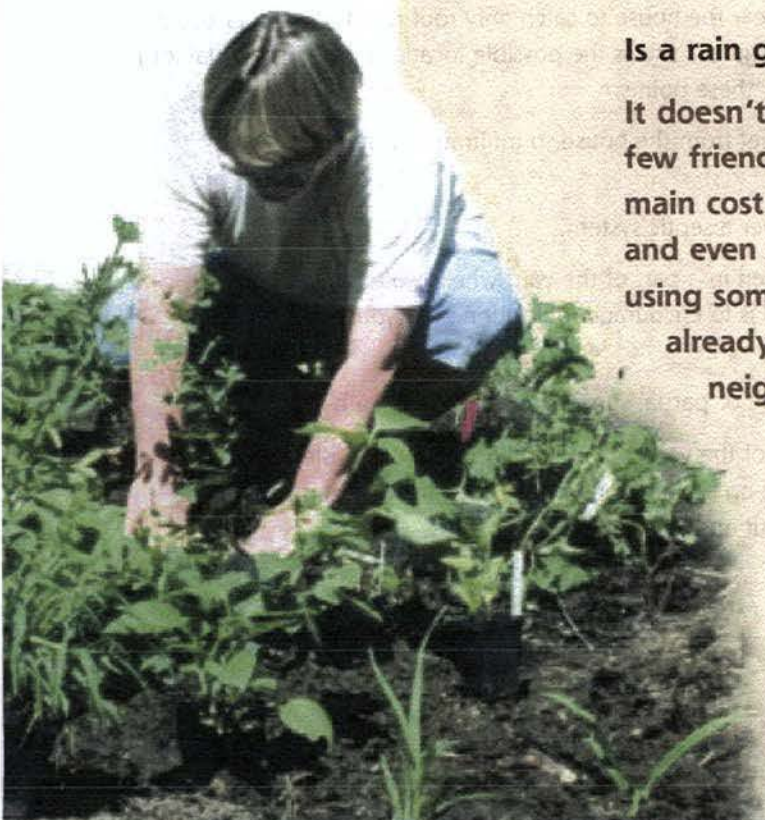
No. Mosquitoes need 7 to 12 days to lay and hatch eggs, and standing water in the rain garden will last for a few hours after most storms. Mosquitoes are more likely to lay eggs in bird baths, storm sewers, and lawns than in a sunny rain garden. Also rain gardens attract dragonflies, which eat mosquitoes!

Do they require a lot of maintenance?

Rain gardens can be maintained with little effort after the plants are established. Some weeding and watering will be needed in the first two years, and perhaps some thinning in later years as the plants mature.

Is a rain garden expensive?

It doesn't have to be. A family and a few friends can provide the labor. The main cost will be purchasing the plants, and even this cost can be minimized by using some native plants that might already exist in the yard or in a neighbor's yard.





Step 1 Sizing and Siting the Rain Garden

This section of the manual covers rain garden basics – where to put the rain garden, how big to make it, how deep to dig it, and what kind of soils and slope are best. Following the instructions in this section is the best way to ensure a successful rain garden project.

If you already know the size you want your rain garden to be, then skip ahead to the section about building the rain garden. However, take time read the pointers about location, and do find the slope of the lawn. If the location has a slope more than about 12%, it's best to pick a different location because of the effort it will take to create a level rain garden.



An extension of PVC pipe helps direct downspout water to this rain garden.

Where should the rain garden go?

Home rain gardens can be in one of two places – near the house to catch only roof runoff or farther out on the lawn to collect water from the lawn and roof. (Figure 1 shows the possible locations on a residential lot.) To help decide where to put a rain garden, consider these points:

- The rain garden should be at least 10 feet from the house so infiltrating water doesn't seep into the foundation.
- Do not place the rain garden directly over a septic system.
- It may be tempting to put the rain garden in a part of the yard where water already ponds. Don't! The goal of a rain garden is to encourage infiltration, and your yard's wet patches show where infiltration is slow.
- It is better to build the rain garden in full or partial sun, not directly under a big tree.
- Putting the rain garden in a flatter part of the yard will make digging much easier. For example, a rain garden 10 feet wide on a 10% slope must be 12 inches deep to be level, unless you import topsoil or use cut and fill.

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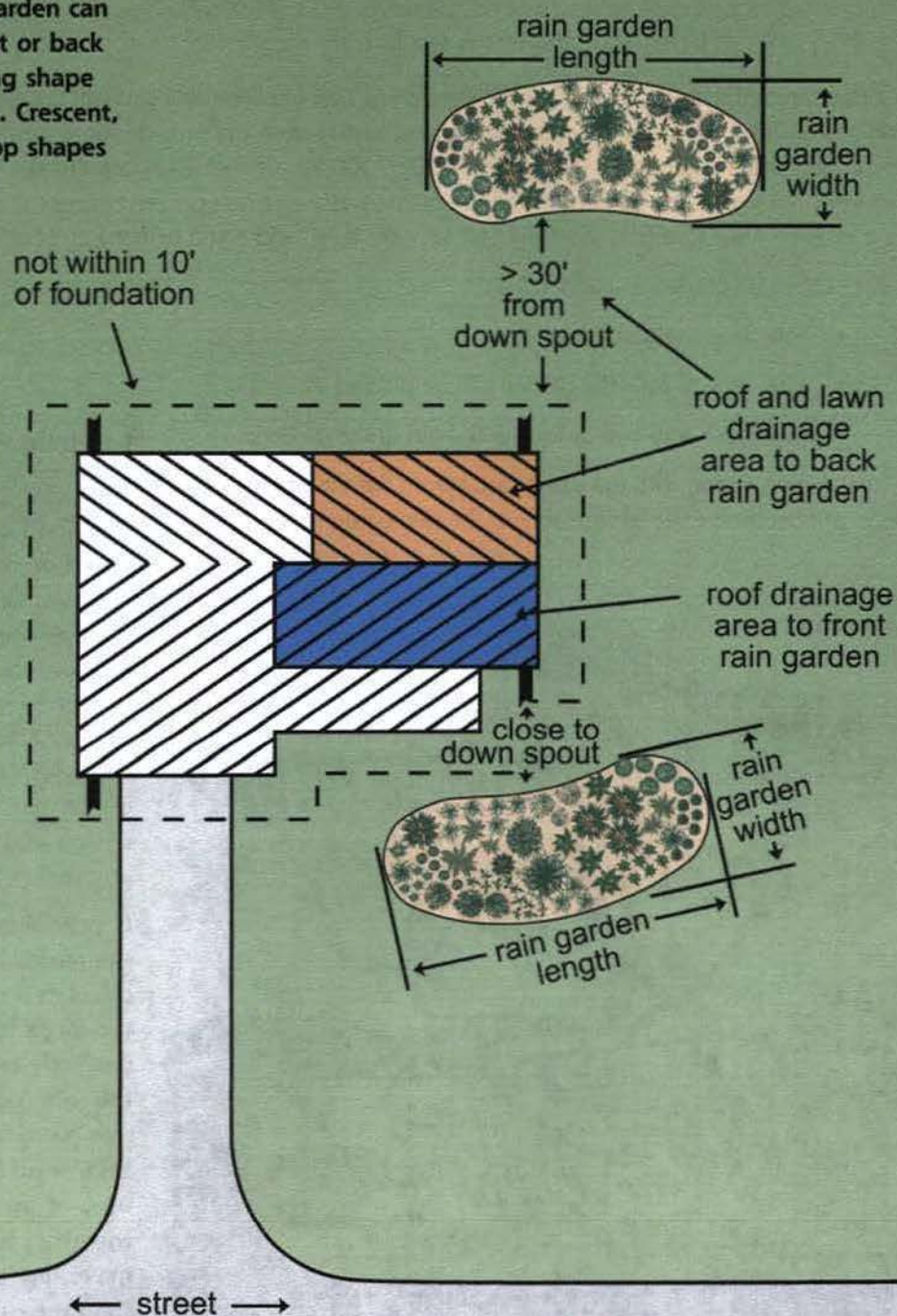


Consider your overall landscape

When considering placement of your rain garden, design with the end in mind. Carefully consider how the rain garden can be integrated into existing and future landscaping. Also, pay attention to views from inside the house as well as those

throughout the landscape. Determine how far or how close you want your rain garden to outdoor gathering spaces or other play areas. Why not locate it near a patio where you can take advantage of the colors and fragrances for hours on end!

Figure 1 A rain garden can be built in the front or back yard. Pick a pleasing shape for the rain garden. Crescent, kidney, and teardrop shapes seem to work well.



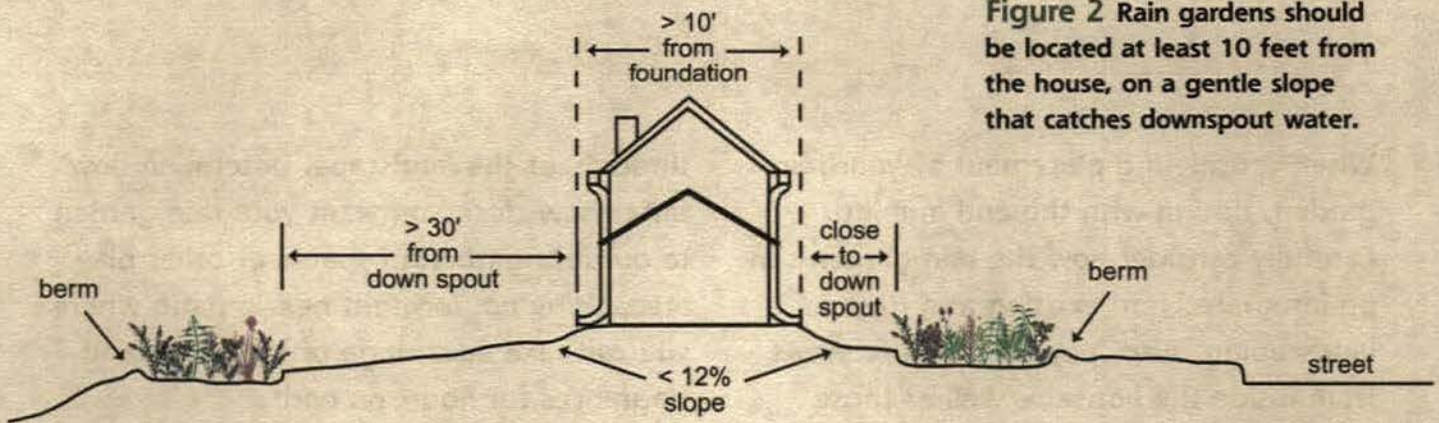


Figure 2 Rain gardens should be located at least 10 feet from the house, on a gentle slope that catches downspout water.

How big should the rain garden be?

The surface area of the rain garden can be almost any size, but time and cost will always be important considerations in sizing decisions. Any reasonably sized rain garden will provide some stormwater runoff control. A typical residential rain garden ranges from 100 to 300 square feet. Rain gardens can be smaller than 100 square feet, but very small gardens have little plant variety. If a rain garden is larger than 300 square feet it takes a lot more time to dig, is more difficult to make level, and could be hard on your budget.

The size of the rain garden will depend on

- how deep the garden will be,
- what type of soils the garden will be planted in, and
- how much roof and/or lawn will drain to the garden.

This information, along with the sizing factor from the tables on page 9, will determine the surface area of the rain garden.

Digging with a rented backhoe.



Guidelines are not rules...

The sizing guidelines described in this manual are based on a goal of controlling 100% of the runoff for the average rainfall year while keeping the size of the rain garden reasonable. Establishing a 100% runoff goal helps compensate for some of the errors that creep into the design and construction of any rain garden.

If you follow the guidelines in the manual and decide the calculated surface area is just too large for your goals, it is perfectly acceptable to make the rain garden smaller. The rain garden can be up to 30% smaller and still control almost 90% of the annual runoff. On the other hand, it is fine to make the rain garden bigger than the guidelines indicate.

How Deep Should the Rain Garden Be?

A typical rain garden is between four and eight inches deep. A rain garden more than eight inches deep might pond water too long, look like a hole in the ground, and present a tripping hazard for somebody stepping into it. A rain garden much less than four inches deep will need an excessive amount of surface area to provide enough water storage to infiltrate the larger storms.

No matter what the depth of the rain garden, the goal is to keep the garden level. Digging a very shallow rain garden on a steep lawn will require bringing in extra topsoil to bring the downslope part of the garden up to the same height as the up-slope part of the garden. As the slope gets steeper, it is easier to dig the rain garden a little deeper to make it level.

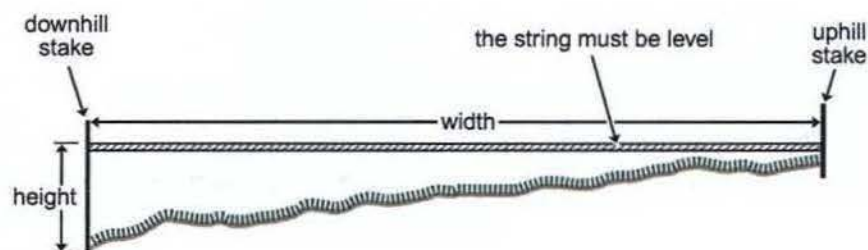


Figure 3 The string should be tied to the base of the uphill stake, then tied to the downhill stake at the same level.

The slope of the lawn should determine the depth of the rain garden. Find the slope of your lawn by following these steps. (Figure 3 shows how the stakes and string should look.)

1. Pound one stake in at the uphill end of your rain garden site and pound the other stake in at the downhill end. The stakes should be about 15 feet apart.
2. Tie a string to the bottom of the uphill stake and run the string to the downhill stake.
3. Using a string level or the carpenter's level, make the string horizontal and tie the string to the downhill stake at that height.
4. Measure the width (in inches) between the two stakes.
5. Now measure the height (in inches) on the downhill stake between the ground and string.
6. Divide the height by the width and multiply the result by 100 to find the lawn's percent slope. If the slope is more than 12%, it's best to find another site or talk to a professional landscaper.

Using the slope of the lawn, select the depth of the rain garden from the following options:

- 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.

✓ EXAMPLE

Todd measures the length of the string between the stakes; it is 180 inches long. The height is 9 inches. He divides the height by the width to find his lawn's percent slope.

$$\frac{\text{height}}{\text{width}} \times 100 = \% \text{ slope} \qquad \frac{9 \text{ inches}}{180 \text{ inches}} \times 100 = 5\% \text{ slope}$$

With a 5% slope, Todd should build a 6 inch deep rain garden.

What type of soils are on the rain garden site?

After choosing a rain garden depth, identify the lawn's soil type as sandy, silty, or clayey. Sandy soils have the fastest infiltration; clayey soils have the slowest. Since clayey soils take longer to absorb water, rain gardens in clayey soil must be bigger than rain gardens in sandy or silty soil. If the soil feels very gritty and coarse, you probably have sandy soil. If your soil is smooth but not sticky, you have silty soil. If it is very sticky and clumpy, you probably have clayey soil.

How big is the area draining to the rain garden?

The next step in choosing your rain garden size is to find the area that will drain to the rain garden. As the size of the drainage area increases so should the size of the rain garden. There is some guesswork in determining the size of a drainage area, especially if a large part of the lawn is up-slope from the proposed garden site. Use the suggestions below to estimate the drainage area without spending a lot of time.

Rain gardens less than 30 feet from the downspout

1. In this case, where the rain garden is close to the house, almost all water will come from the roof downspout. Walk around the house and estimate what percent of the roof feeds to that downspout. Many houses have four downspouts, each taking about 25% of the roof's runoff.
2. Next find your home's footprint, the area of the first floor. If you don't already know it, use a tape measure to find your house's length and width. Multiply the two together to find the approximate area of your roof.
3. Finally, multiply the roof area by the percent of the roof that feeds to the rain garden downspout. This is the roof drainage area.

Rain gardens more than 30 feet from the downspout

1. If there is a significant area of lawn uphill that will also drain to the rain garden, add this lawn area to the roof drainage area. First find the roof drainage area using the steps above for a rain garden less than 30' from the downspout.
2. Next find the area of the lawn that will drain to the rain garden. Stand where your rain garden will be and look up toward the house. Identify the part of the lawn sloping into the rain garden.
3. Measure the length and width of the uphill lawn, and multiply them to find the lawn area.
4. Add the lawn area to the roof drainage area to find the total drainage area.

► If the rain garden is far from the house, and you don't want a swale or downspout cutting across the lawn, run a PVC pipe underground from the downspout to the rain garden. In this case do calculations as for a rain garden less than 30 feet from the house.

✓ EXAMPLE

Todd's house is 60 feet by 40 feet, so the roof area is 2400 square feet. He estimates that the downspout collects water from 25% of the roof, so he multiplies 2400 by 0.25 to get a downspout drainage area of 600 square feet.

Roof Area: 60 ft by 40 ft = 2400 square ft.

Drainage Area: 2400 square ft. $\times$ 0.25 = 600 square ft.



Simple soil tests

Two small tests can ensure your soil can handle a rain garden:

- Dig a hole about 6 inches deep where the rain garden is to go and fill the hole with water. If the water takes more than 24 hours to soak in, the soil is not suitable for a rain garden.
- Take a handful of soil and dampen it with a few drops of water. After kneading the soil in your fingers, squeeze the soil into a ball. If it remains in a ball, then work the soil between your forefinger and thumb, squeezing it upward into a ribbon of uniform thickness. Allow the ribbon to emerge and extend over the forefinger until it breaks from its own weight. If the soil forms a ribbon more than an inch long before it breaks, and it also feels more smooth than gritty, the soil is not suitable for a rain garden.



The map is a starting point for assessing what type of soils you might find in your yard. However, the soil on a small plot of a yard can be very different from the soils indicated on the map. Use the simple soil test described here for a more accurate representation of the soils in the possible rain garden location. More information about sampling and testing lawn and garden soils can be obtained at county UW-Extension offices.

Using the Rain Garden Size Factors

Having estimated the drainage area, soil type, and depth for your rain garden, use Table 1 or Table 2 to determine the rain garden's surface area. Use Table 1 if the rain garden is less than 30 feet from the downspout, and use Table 2 if it is more than 30 feet from the downspout.

Table 1 Rain gardens less than 30 feet from downspout.

	3-5 in. deep	6-7 in. deep	8 in. deep
Sandy soil	0.19	0.15	0.08
Silty soil	0.34	0.25	0.16
Clayey soil	0.43	0.32	0.20

Table 2 Rain gardens more than 30 feet from downspout.

	Size Factor, for all depths
Sandy soil	0.03
Silty soil	0.06
Clayey soil	0.10

1. Find the size factor for the soil type and rain garden depth.
2. Multiply the size factor by the drainage area. This number is the recommended rain garden area.
3. If the recommended rain garden area is much more than 300 square feet, divide it into smaller rain gardens.

✓EXAMPLE

Todd's rain garden is less than 30 feet from the downspout, and his lawn has a 5% slope, so he will have a 6-inch deep rain garden. His lawn is silty, so Table 1 recommends a size factor of 0.25. He multiplies the downspout drainage area, 600 square feet, by 0.25 to find the recommended rain garden area, 150 square feet.

$$600 \text{ square ft. by } 0.25 = 150 \text{ square ft.}$$



Runoff flows into a new rain garden (shown before plants are fully grown).

How long and how wide should the rain garden be?

Before building the rain garden, think about how it will catch water. Runoff will flow out of a downspout and should spread evenly across the entire length of the rain garden. The rain garden must be as level as possible so water doesn't pool at one end and spill over before it has a chance to infiltrate.

The longer side of the rain garden should face upslope; that is, the length of the rain garden should be perpendicular to the slope and the downspout. This way the garden catches as much water as possible. However, the rain garden should still be wide enough for the water to spread evenly over the whole bottom and to provide the space to plant a variety of plants. A good rule of thumb is that the rain garden should be about twice as long (perpendicular to the slope) as it is wide.

When choosing the width of the garden, think about the slope of the lawn. Wide rain gardens and rain gardens on steep slopes will need to be dug very deep at one end in order to be level. If the rain garden is too wide, it may be necessary to bring in additional soil to fill up the downhill half. Experience shows that making a rain garden about 10 feet wide is a good compromise between the effect of slope and how deep the rain garden should be. A rain garden should have a maximum width of about 15 feet, especially for lawns with more than about an 8 percent slope.

To determine the length of the rain garden:

1. Pick the best rain garden width for your lawn and landscaping.
2. Divide the size of your rain garden by the width to find your rain garden's length.

✓ EXAMPLE

Todd wants a 10-foot wide rain garden, so he divides 150 by 10 to find the rain garden length, 15 feet.

$$\frac{\text{rain garden area}}{\text{width}} = \text{length} \quad \frac{150 \text{ ft}^2}{10 \text{ ft}} = 15 \text{ ft}$$

Choose a size that is best for your yard

Remember that these are only guidelines. The size of the rain garden also depends on how much money you want to spend, how much room you have in your yard, and how much runoff you want to control. Again, you can reduce the size of your rain garden by as much as 30% and still control almost 90% of the runoff. If the sizing table suggests that the rain garden be 200 square feet, but there is only enough room for a 140-square-foot rain garden, that's fine. A smaller rain garden will usually work to control most stormwater runoff, although some bigger storms might over-top the berm.



Step 2 Building the Rain Garden

Now that the size and place for the rain garden are set, it's time to get a shovel and start digging. Working alone, it will take about six hours to dig an average-size rain garden. If friends help it will go much faster, possibly only an hour or two.

Before you start digging, call
Digger's Hotline at 1-800-242-8511.

► If you are building the rain garden into an existing lawn, digging time can be reduced by killing the grass first. A chemical such as Round-Up can be used, but a more environmentally friendly approach is to place black plastic over the lawn until the grass dies. Also, the best time to build the rain garden is in the spring. It will be easier to dig, and the plants are more likely to thrive.



A note on tools

The following tools will help in building the rain garden. Some of the tools are optional.



• Tape measure

• Shovels

• Rakes



• Trowels

• Carpenter's level



• Wood stakes, at least 2 ft long

• String



• 2x4 board, at least 6 ft long (optional)

• Small backhoe with caterpillar treads (optional)

Leveling the rain garden

One way to check the level of the rain garden is to just "eyeball" it. To do it more accurately follow these steps:

- When the whole area has been dug out to about the right depth, lay the 2x4 board in the rain garden with the carpenter's level sitting on it. Find the spots that aren't flat. Fill in the low places and dig out the high places.
- Move the board to different places and different directions, filling and digging as necessary to make the surface level.
- When the rain garden is as level as you can get it, rake the soil smooth.



The perimeter of a rain garden is defined with string before digging.

Digging the rain garden

While digging the rain garden to the correct depth, heap the soil around the edge where the berm will be. (The berm is a low "wall" around three sides of the rain garden that holds the water in during a storm.) On a steeper lawn the lower part of the rain garden can be filled in with soil from the uphill half, and extra soil might need to be brought in for the berm.

Start by laying string around the perimeter of your rain garden. Remember that the berm will go outside the string. Next, put stakes along the uphill and downhill sides, lining them up so that each uphill stake has a stake directly downhill. Place one stake every 5 feet along the length of the rain garden.

Start at one end of the rain garden and tie a string to the uphill stake at ground level. Tie it to the stake directly downhill so that the string is level. Work in 5-foot-wide sections, with only one string at a time. Otherwise the strings will become an obstacle.

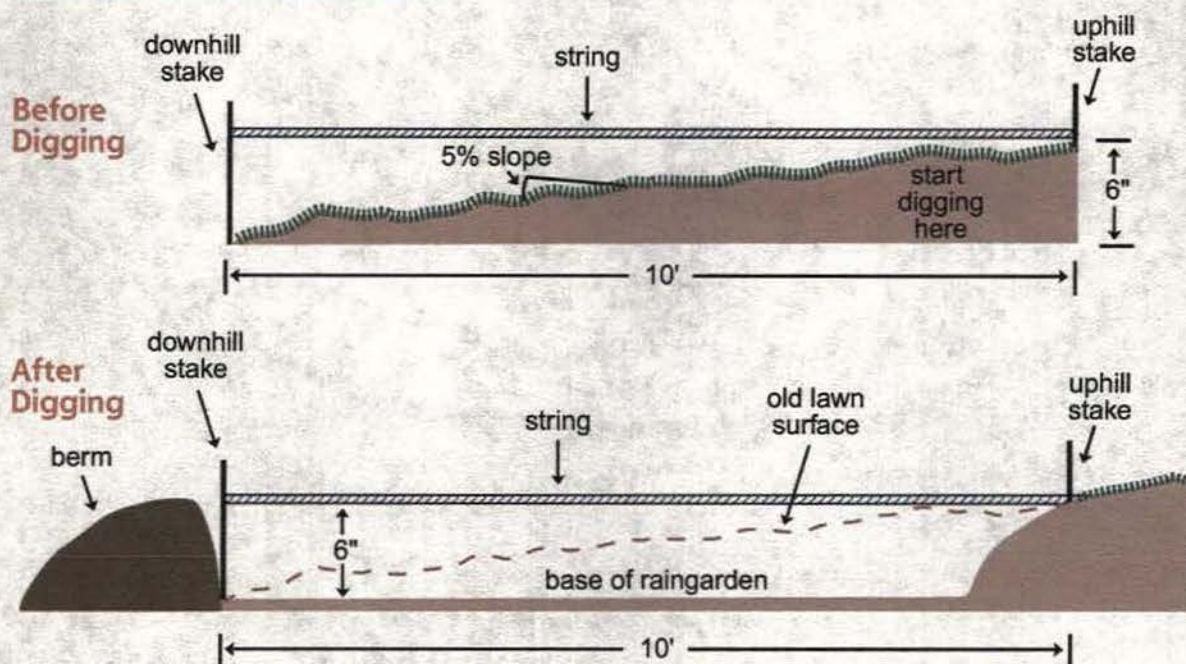
Start digging at the uphill side of the string. Measure down from the string and dig until you reach the depth you want the rain garden to be. If the rain garden will be four inches deep, then dig four inches down from the string. Figure 4 shows how.

If the lawn is almost flat, you will be digging at the same depth throughout the rain garden and using the soil for the berm. If the lawn is steeper, the high end of the rain garden will need to be dug out noticeably more than the low end, and some of the soil from the upper end can be used in the lower end to make the rain garden level. Continue digging and filling one section at a time across the length of your rain garden until it is as level as possible.

In any garden, compost will help the plants become established and now is the time to mix in compost if needed. Using a roto-tiller can make mixing much easier, but isn't necessary. If you do add compost, dig the rain garden a bit deeper. To add two inches of compost, dig the rain garden one to two inches deeper than planned.

Figure 4 Where to dig and where to put the soil you've dug.

a. Between 3% and 8% slope lawn



b. Greater than 8% slope lawn

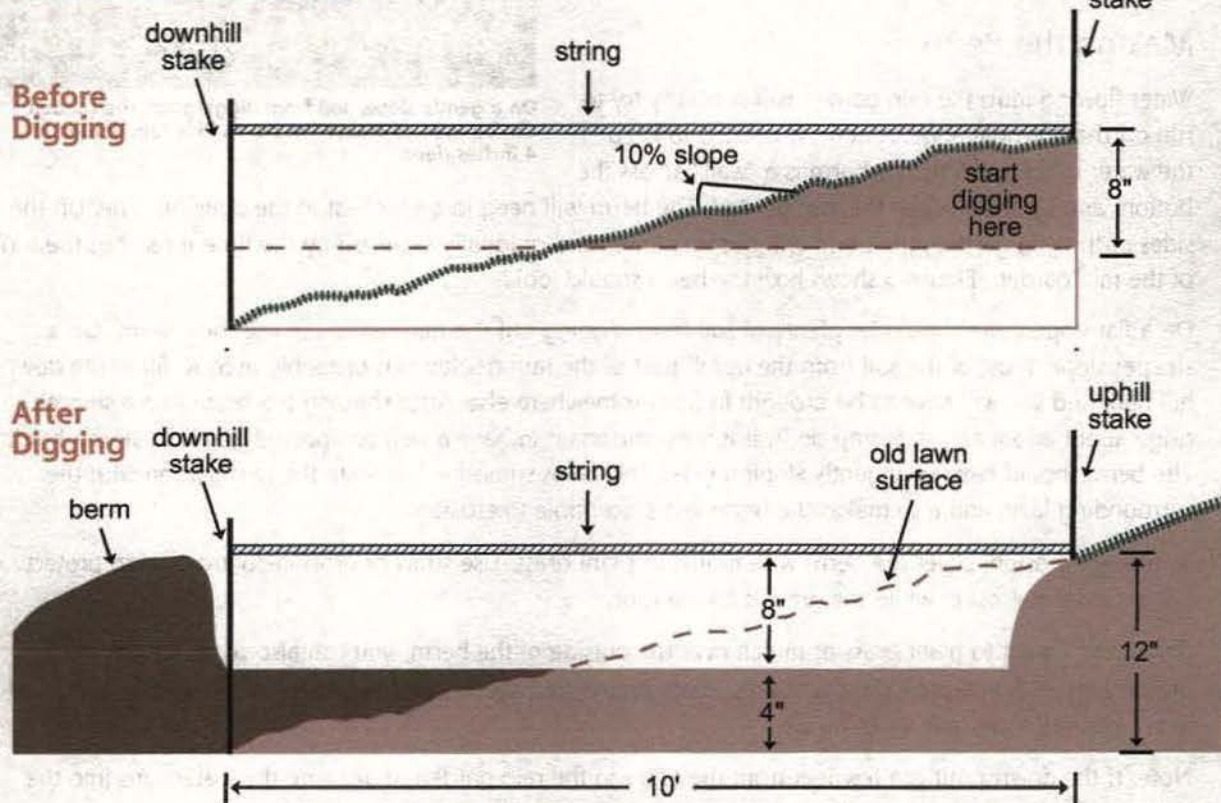




Figure 5 The top of the downhill part of the berm should come up to the same elevation as the entry to the rain garden at the uphill end.

Making the Berm

Water flowing into the rain garden will naturally try to run off the downhill edge. A berm is needed to keep the water in the garden. The berm is a "wall" across the bottom and up the sides of the rain garden. The berm will need to be highest at the downhill side. Up the sides of the rain garden, the berm will become lower and gradually taper off by the time it reaches the top of the rain garden. Figure 5 shows how the berm should look.

On a flat slope there should be plenty of soil from digging out the rain garden to use for a berm. On a steeper slope, most of the soil from the uphill part of the rain garden was probably used to fill in the downhill half, and soil will have to be brought in from somewhere else. After shaping the berm into a smooth ridge about a foot across, stomp on it. It is very important to have a well-compacted berm, so stomp hard. The berm should have very gently sloping sides; this helps smoothly integrate the rain garden with the surrounding lawn and also makes the berm less susceptible to erosion.

To prevent erosion, cover the berm with mulch or plant grass. Use straw or erosion-control mat to protect the berm from erosion while the grass is taking root.

If you don't want to plant grass or mulch over the outside of the berm, you can also plant dry-tolerant prairie species. Some potential berm species are prairie dropseed, little bluestem, prairie smoke, blue-eyed grass, prairie phlox, and shooting star.

Note: If the downspout is a few feet from the entry to the rain garden, make sure the water runs into the garden by either digging a shallow grass swale or attaching an extension to the downspout.



On a gentle slope, soil from digging out the garden can be used to create the berm. This rain garden is 4 inches deep.

Tips for designing an attractive rain garden

While rain gardens are a highly functional way to help protect water quality, they are also gardens and should be an attractive part of your yard and neighborhood. Think of the rain garden in the context of your home's overall landscape design. Here are a few tips:

When choosing native plants for the garden, it is important to consider the height of each plant, bloom time and color, and its overall texture. Use plants that bloom at different times to create a long flowering season. Mix heights, shapes, and textures to give the garden depth and dimension. This will keep the rain garden looking interesting even when few wildflowers are in bloom.

When laying plants out, randomly clump individual species in groups of 3 to 7 plants to provide a bolder statement of color. Make sure to repeat these individual groupings to create repetition and cohesion in a planting. This will provide a more traditional formal look to the planting.

Try incorporating a diverse mixture of sedges, rushes, and grasses with your flowering species (forbs). This creates necessary root competition that will allow plants to follow their normal growth patterns and not outgrow or out-compete other species. In natural areas, a diversity of plant types not only adds beauty but also create a thick underground root matrix that keeps the entire plant community in balance. In fact, 80% of the plant mass in native prairie communities is underground. Once the rain garden has matured and your sedges, rushes and grasses have established a deep, thick root system, there will be less change in species location from year to year, and weeds will naturally decline.

Finally, consider enhancing the rain garden by using local or existing stone, ornamental fences, trails, garden benches, or additional wildflower plantings. This will help give the new garden an intentional and cohesive look and provide a feeling of neatness that the neighbors will appreciate.





Step 3 Planting and Maintaining the Rain Garden

Planting the rain garden is the fun part! A number of planting designs and lists of suggested plants are included at the end of this publication. Use these for ideas, but don't be afraid to be creative – there's no single best way to plant a rain garden. Anyone who has ever done any gardening will have no problem planting a rain garden, but a few basic reminders are listed below.

Planting the rain garden

Select plants that have a well established root system. Usually one or two-year-old plants will have root systems that are beginning to circle or get matted. (Note: use only nursery-propagated plants; do not collect plants from the wild).

Make sure to have at least a rough plan for which plants will be planted where. Lay out the plants as planned one foot apart in a grid pattern, keeping them in containers if possible until they are actually planted to prevent drying out before they get in the ground.

Dig each hole twice as wide as the plant plug and deep enough to keep the crown of the young plant level with the existing grade (just as it was growing in the cell pack or container). Make sure the crown is level and then fill the hole and firmly tamp around the roots to avoid air pockets.

Apply double-shredded mulch evenly over the bed approximately two inches thick, but avoid burying the crowns of the new transplants. Mulching is usually not necessary after the second growing season unless the "mulched look" is desired.

Stick plant labels next to each individual grouping. This will help identify the young native plants from non-desirable species (weeds) as you weed the garden.

As a general rule plants need one inch of water per week. Water immediately after planting and continue to water twice a week (unless rain does the job) until the plugs are established. You should not have to water your rain garden once the plants are established. Plugs can be planted anytime during the growing season as long as they get adequate water.

Fire safety

Make sure burning is allowed in your locale. If so, be sure to notify the local fire department and obtain a burn permit if needed. It's also wise – not to mention neighborly – to make sure the neighbors know that you're burning and that all safety precautions are being taken. Basic fire precautions include:

- Make sure there is a fire-break (non-burnable area, such as turf-grass) at least 10-feet wide surrounding the area to be burned.
- Never burn on windy days.
- Never leave an actively burning fire unattended.
- Keep a garden hose handy in case fire strays where it is not wanted. Also have a metal leaf rake in hand to beat out flames that creep beyond the burn zone.



Maintaining the rain garden

Weeding will be needed the first couple of years. Remove by hand only those plants you are certain are weeds. Try to get out all the roots of the weedy plants. Weeds may not be a problem in the second season, depending on the variety and tenacity of weeds present. In the third year and beyond, the native grasses, sedges, rushes, and wildflowers will begin to mature and will out-compete the weeds. Weeding isolated patches might still be needed on occasion.

After each growing season, the stems and seedheads can be left for winter interest, wildlife cover and bird food. Once spring arrives and new growth is 4-6-inches tall, cut all tattered plants back. If the growth is really thick, hand-cut the largest plants and then use a string trimmer to mow the planting back to a height of six to eight inches. Dead plant material can also be removed with a string trimmer or weed whacker (scythe) and composted or disposed of as appropriate.

The best way to knock back weeds and stimulate native plant growth is to burn off the dead plant material in the rain garden. However, burning is banned in most municipalities. Another option is to mow the dead plant material. If the mowing deck of your lawn mower can be raised to a height of six inches or so, go ahead and simply mow your rain garden. Then, rake up and compost or properly dispose of the dead plant material.

If the mower deck won't raise that high, use a string trimmer or weed-eater to cut the stems at a height of 6-8 inches. On thicker stems, such as cup plant, goldenrods and some asters, a string trimmer may not be strong enough. For these, use hand clippers or pruning shears to cut the individual stems.

What does a rain garden cost?

The cost of a rain garden will vary depending on who does the work and where the plants come from. If you grow your own plants or borrow plants from neighbors there can be very little or no cost at all. If you do all the work but use purchased prairie plants, a rain garden will cost approximately \$3 to \$5 per square foot. If a landscaper does everything, it will cost approximately \$10 to \$12 per square foot.

It might seem easiest to sow native wildflower seed over the garden, but experience shows that seeding a rain garden has its problems. Protecting the seeds from wind, flooding, weeds, and garden pests is very difficult, and the rain garden will be mostly weeds for the first two years. Growing plugs from seed indoors or dividing a friend's plants is much better. If you grow plugs, start them about four months before moving them to the rain garden. When the roots have filled the pot and the plants are healthy, they may be planted in the rain garden.

Rain Garden Designs and Plant Lists

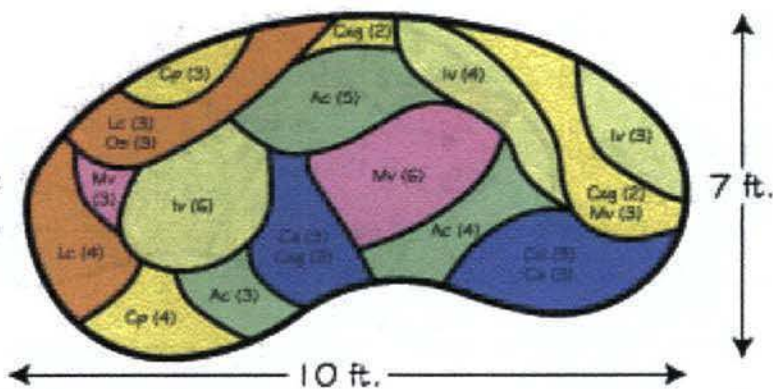
The following pages contain conceptual planting designs and plant lists for rain gardens with varying sun and soil conditions. Keep in mind that design possibilities for rain gardens are almost limitless. Many landscape nurseries, particularly those specializing in native plants and landscaping, can provide other ideas, designs and suggested plants.

The following eight designs and plant lists have been provided by Applied Ecological Services, Inc., Brodhead, WI.



**10 feet
wide;
full to
partial
shade
with clay
soils**

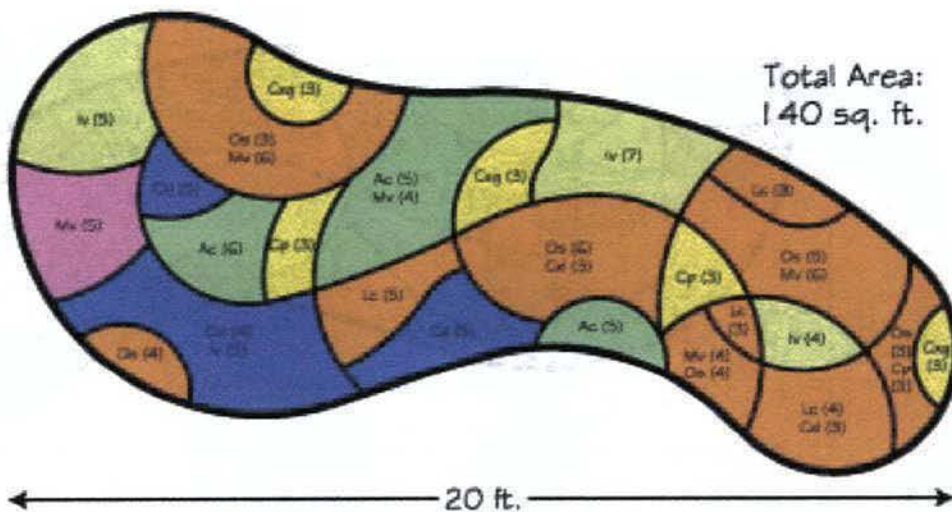
Total Area:
70 sq. ft.



Symbol	Species Name	Common Name	No. of Plants
Ac	<i>Acorus calamus</i>	Sweet flag	12
Ca	<i>Campanula americana</i>	Tall bellflower	6
Cp	<i>Caitha palustris</i>	Marsh marigold	7
Cag	<i>Carex Grayi</i>	Bur sedge	7
Cxl	<i>Carex lupulina</i>	Hop sedge	3
Iv	<i>Iris virginica-sinensis</i>	Wild blue flag iris	13
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	7
Mv	<i>Mertensia virginica</i>	Virginia bluebells	12
Os	<i>Onoclea sensibilis</i>	Sensitive fern	3
Total Plants Needed			70

**20 feet
wide;
full to
partial
shade
with clay
soils**

7 ft.

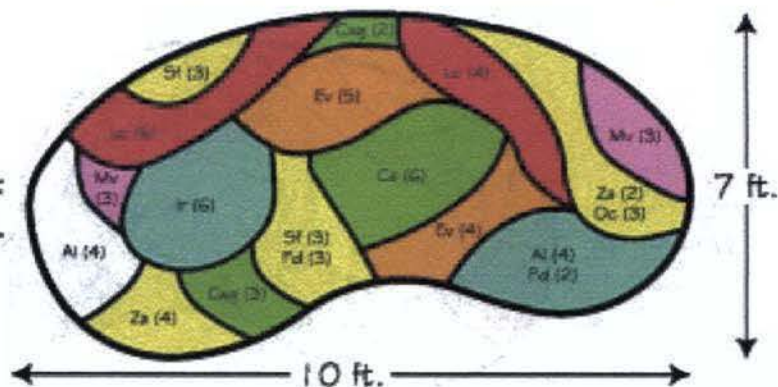


Total Area:
140 sq. ft.

Symbol	Species Name	Common Name	No. of Plants
Ac	<i>Acorus calamus</i>	Sweet flag	16
Cp	<i>Caltha palustris</i>	Marsh marigold	9
Ca	<i>Campanula americana</i>	Tall bellflower	5
Cxg	<i>Carex Grayi</i>	Bur sedge	9
Cxi	<i>Carex lupulina</i>	Hoop sedge	15
Iv	<i>Iris virginica-strevesii</i>	Wild blue flag iris	21
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	15
Mv	<i>Mertensia virginica</i>	Virginia bluebells	25
Os	<i>Onoclea sensibilis</i>	Sensitive fern	25
Total Plants Needed			140

10 feet
wide;
full to
partial
shade
with silty
& sandy
soils

Total Area:
70 sq. ft.

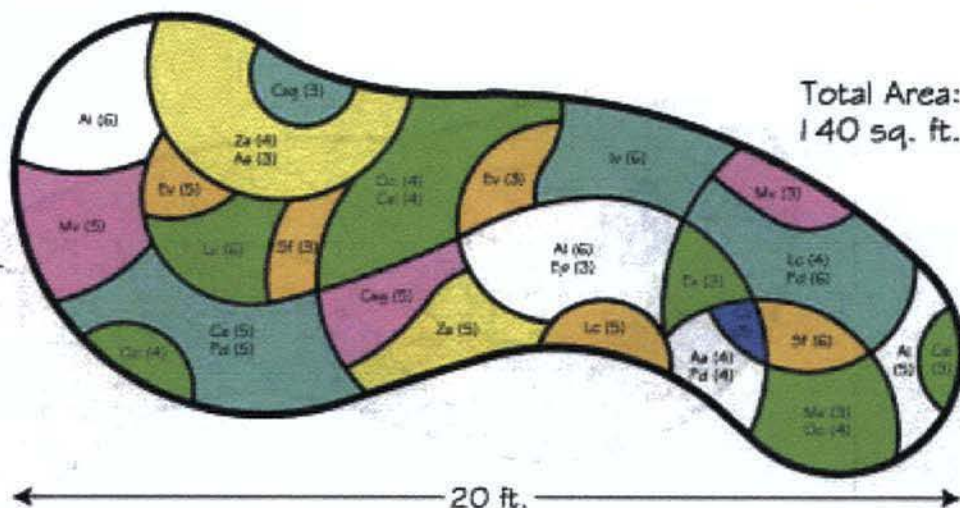


Symbol	Species Name	Common Name	No. of Plants
Al	<i>Aster lateriflorus</i>	Side-flowering aster	8
Ca	<i>Campanula americana</i>	Tall bellflower	6
Cxg	<i>Carex Grayi</i>	Bur sedge	5
Ev	<i>Elymus virginicus</i>	Virginia wild rye	9
Iv	<i>Irish virginica-shrevei</i>	Wild blue flag iris	6
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	10
Mv	<i>Mertensia virginica</i>	Virginia bluebells	6
Oc	<i>Osmunda claytoniana</i>	Interrupted fern	3
Pd	<i>Phlox divaricata</i>	Woodland phlox	5
Sf	<i>Solidago flexicaulis</i>	Zig zag goldenrod	6
Za	<i>Zizia aurea</i>	Golden Alexander	6

Total Plants Needed 70

20 feet
wide;
full to
partial
shade
with silty
& sandy
soils

7 ft.



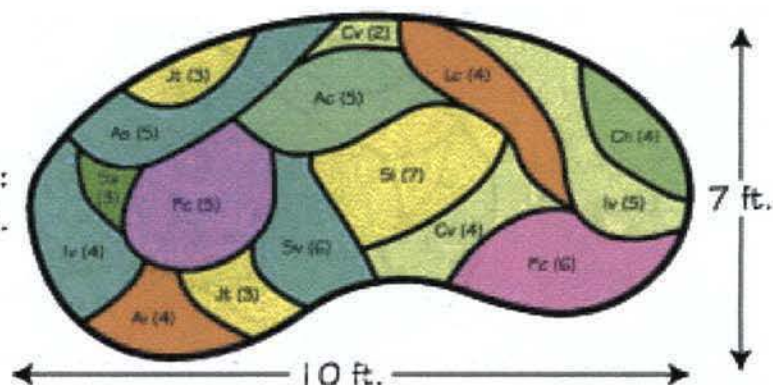
Total Area:
140 sq. ft.

Symbol	Species Name	Common Name	No. of Plants
Aa	<i>Anemone atrorubens</i>	Jack-in-the-pulpit	7
Al	<i>Aster lateriflorus</i>	Side-flowering aster	17
Ca	<i>Campanula americana</i>	Tall bellflower	8
Cxg	<i>Carex Grayi</i>	Bur sedge	8
Cxg	<i>Carex lupulina</i>	Hop sedge	7
Ev	<i>Elymus virginicus</i>	Virginia wild rye	11
Ep	<i>Eupatorium purpureum</i>	Purple Joe-Pye weed	3
Iv	<i>Irish virginica-shrevei</i>	Wild blue flag iris	6
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	15
Mv	<i>Mertensia virginica</i>	Virginia bluebells	11
Oc	<i>Osmunda claytoniana</i>	Interrupted fern	12
Pd	<i>Phlox divaricata</i>	Woodland phlox	15
Sf	<i>Solidago flexicaulis</i>	Zig zag goldenrod	9
Za	<i>Zizia aurea</i>	Golden Alexander	14

Total Plants Needed 143

10 feet
wide;
full to
partial
sun
with clay
soils

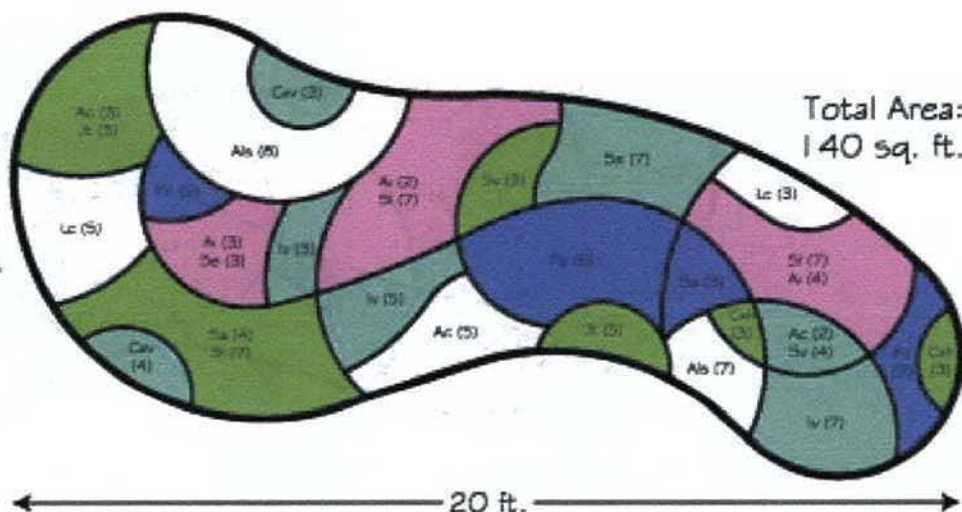
Total Area:
70 sq. ft.



Symbol	Species Name	Common Name	No. of Plants
Ac	<i>Acorus calamus</i>	Sweet flag	5
As	<i>Asclepias incarnata</i>	Swamp milkweed	4
Als	<i>Alisma subcordatum</i>	Water plantain	5
Cxh	<i>Carex hystrix</i>	Bottle brush sedge	4
Cxv	<i>Carex vulpinoidea</i>	Fox sedge	6
Iv	<i>Iris virginica-shrevei</i>	Wild blue flag iris	9
Jt	<i>Juncus torreyi</i>	Torrey's rush	6
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	4
Pc	<i>Pontederia cordata</i>	Pickering weed	11
Si	<i>Sagittaria latifolia</i>	Arrowhead	7
Sa	<i>Scirpus atrovirens</i>	Green bulrush	3
Sv	<i>Scirpus validus creber</i>	Soft-stemmed bulrush	6
Total Plants needed			70

20 feet
wide;
full to
partial
sun
with clay
soils

7 ft.

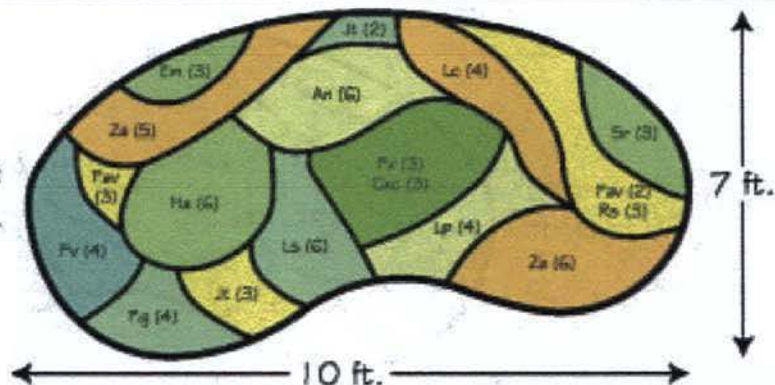


Total Area:
140 sq. ft.

Symbol	Species Name	Common Name	No. of Plants
Ac	<i>Acorus calamus</i>	Sweet flag	10
As	<i>Asclepias incarnata</i>	Swamp milkweed	9
Als	<i>Alisma subcordatum</i>	Water plantain	15
Cxh	<i>Carex hystrix</i>	Bottle brush sedge	6
Cxv	<i>Carex vulpinoidea</i>	Fox sedge	7
Iv	<i>Iris virginica-shrevei</i>	Wild blue flag iris	15
Jt	<i>Juncus torreyi</i>	Torrey's rush	8
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	8
Pc	<i>Pontederia cordata</i>	Pickering weed	21
Si	<i>Sagittaria latifolia</i>	Arrowhead	21
Sa	<i>Scirpus atrovirens</i>	Green bulrush	7
Sv	<i>Scirpus validus creber</i>	Soft-stemmed bulrush	7
Se	<i>Sparganium eurycarpum</i>	Common bur-reed	10
Total Plants needed			144

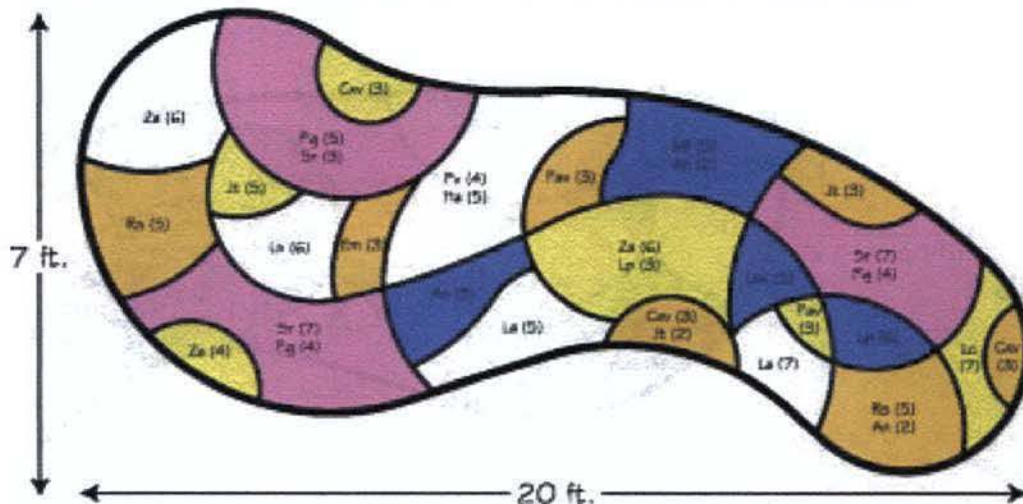
10 feet
wide;
full to
partial
sun with
silt and
sandy
soils

Total Area:
70 sq. ft.



Symbol	Species Name	Common Name	No. of Plants
An	<i>Aster novae-angliae</i>	New England Aster	6
Cxc	<i>Carex comosa</i>	Bottlebrush sedge	3
Ep	<i>Eupatorium maculatum</i>	Spotted Joe-Pye weed	3
Ha	<i>Helenium autumnale</i>	Sneezeweed	6
Jt	<i>Juncus torreyi</i>	Torrey's rush	5
Lp	<i>Liatris pycnostachya</i>	Gayfeather	4
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	4
Ls	<i>Lobelia siphitica</i>	Great blue lobelia	6
Pav	<i>Panicum virgatum</i>	Switch grass	5
Pg	<i>Phlox glaberrima</i>	Marsh phlox	4
Pv	<i>Pycnanthemum virginianum</i>	Mountain mint	7
Ra	<i>Rudbeckia subtomentosa</i>	Sweet coneflower	5
Sr	<i>Solidago Riddellii</i>	Riddell's goldenrod	3
Za	<i>Zizia aurea</i>	Golden Alexander	1
Total Plants needed			72

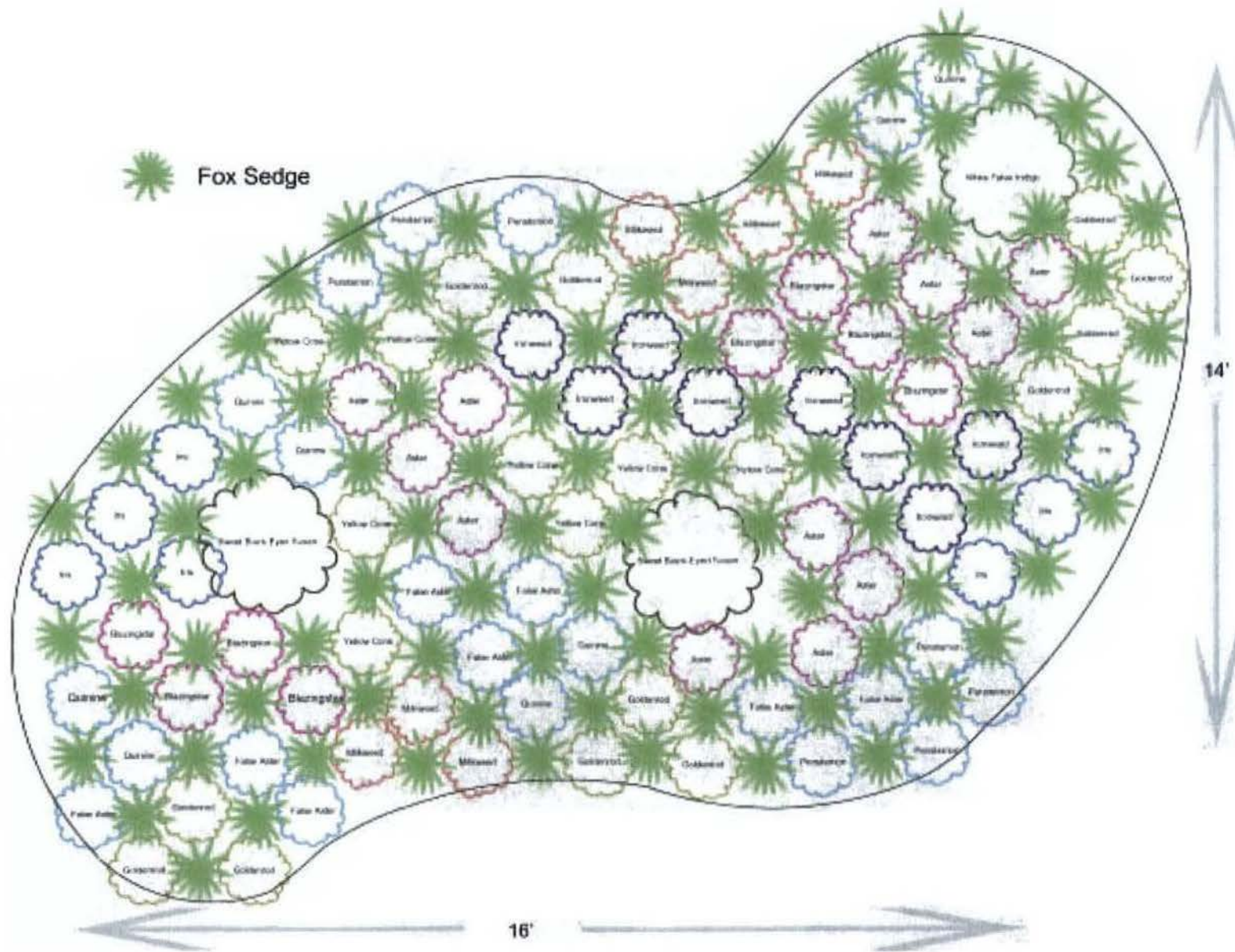
20 feet
wide;
full to
partial
sun with
silt and
sandy
soils



Symbol	Species Name	Common Name	No. of Plants
An	<i>Aster novae-angliae</i>	New England Aster	9
Cxc	<i>Carex vulpinoidea</i>	Fox sedge	9
Ep	<i>Eupatorium maculatum</i>	Spotted Joe-Pye weed	3
Ha	<i>Helenium autumnale</i>	Sneezeweed	5
Jt	<i>Juncus torreyi</i>	Torrey's rush	10
Lp	<i>Liatris pycnostachya</i>	Gayfeather	9
Lc	<i>Lobelia cardinalis</i>	Cardinal flower	7
Ls	<i>Lobelia siphitica</i>	Great blue lobelia	9
La	<i>Lythrum alatum</i>	Winged loosestrife	12
Mf	<i>Monarda fistulosa</i>	Wild Bergamot	5
Pav	<i>Panicum virgatum</i>	Switch grass	6
Pg	<i>Phlox glaberrima</i>	Marsh phlox	13
Pv	<i>Pycnanthemum virginianum</i>	Mountain mint	4
Ra	<i>Rudbeckia subtomentosa</i>	Sweet coneflower	10
Sr	<i>Solidago Riddellii</i>	Riddell's goldenrod	17
Za	<i>Zizia aurea</i>	Golden Alexander	16
Total Plants needed			144

The following three designs and plant lists have been provided by Prairie Nursery, Inc., Westfield, WI





RAIN GARDEN FOR CLAY SOILS AND FULL SUN

AREA: 192 Square Feet

Designed to thrive through conditions of periodic water infiltrations as well as dry periods

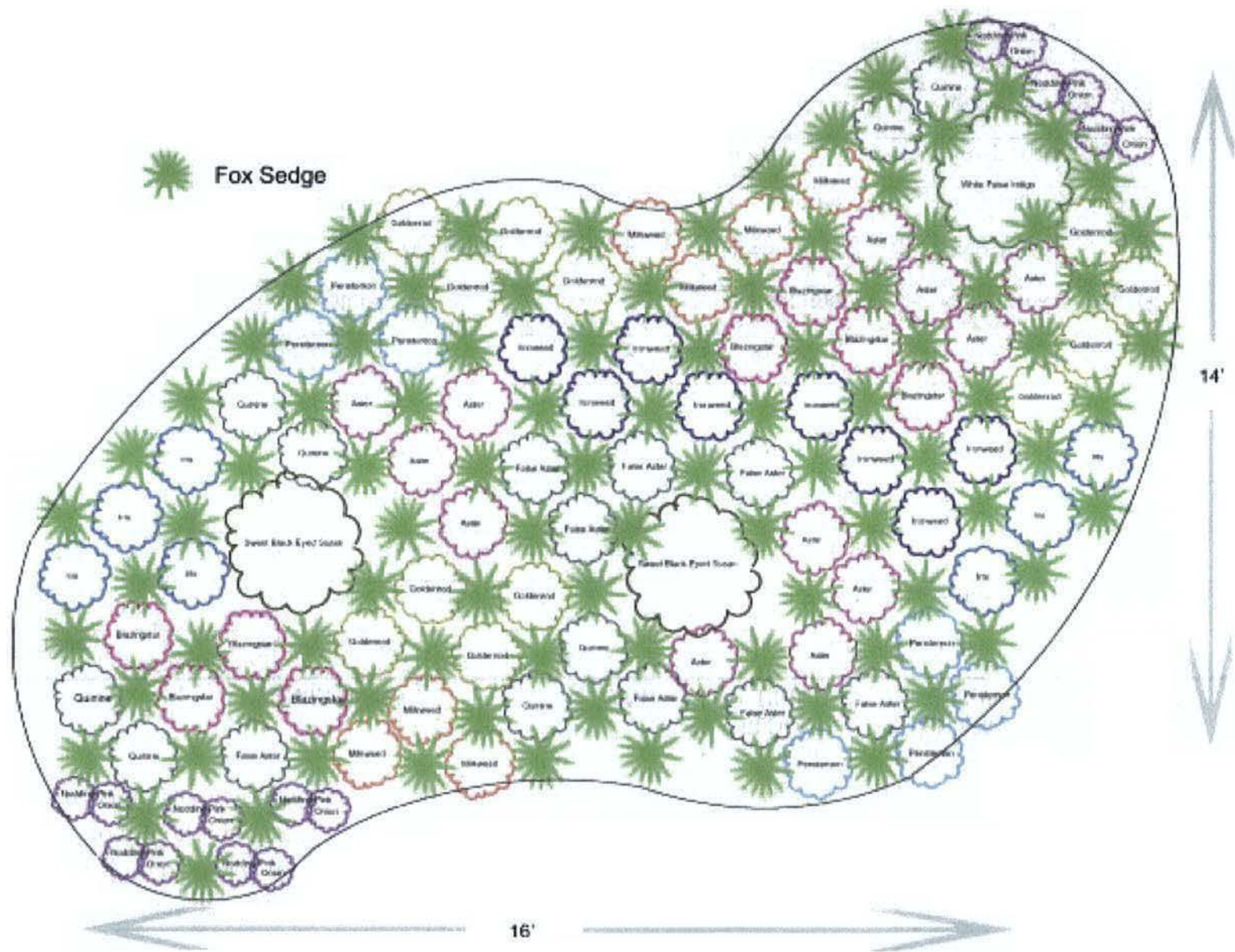
Designed to control 45% of annual runoff from an average sized rooftop (500 to 700 square feet)

Install at least 10' from your foundation, in-line with a down-spout and/or downslope to intercept the rooftop water

Depth of the garden designed to be 3.5" to 4" deep to hold about 200 gallons of water during periods of heavy rainfall

LATIN NAME	COMMON NAME	AMT	BLOOM TIME	BLOOM COLOR	HEIGHT	SPACING
<i>Asclepias incarnata</i>	Red Milkweed	7	early summer	red	3'-5'	1'
<i>Baptisia lactea</i>	White False Indigo	1	early summer	white	3'-5'	2'
<i>Iris versicolor</i>	Blue Flag Iris	7	early summer	blue	2'-3'	1'
<i>Penstemon digitalis</i>	Smooth Penstemon	7	early summer	white	2'-3'	1'
<i>Liatris pycnostachya</i>	Prairie Blazingstar	8	summer	pink	3'-5'	1'
<i>Parthenium integrifolium</i>	Wild Quinine	8	summer	white	3'-5'	1'
<i>Ratibida pinnata</i>	Yellow Coneflower	8	summer	yellow	3'-6'	1'
<i>Boltonia asteroides</i>	False Aster	8	late summer	white/pink	2'-4'	1'
<i>Rudbeckia subtomentosa</i>	Sweet Black-Eyed Susan	2	late summer	yellow	4'-6'	2'
<i>Vernonia fasciculata</i>	Ironweed	8	late summer	magenta	4'-6'	1'
<i>Aster novae-angliae</i>	New England Aster	12	fall	pink/purple	3'-6'	1'
<i>Solidago rigida</i>	Stiff Goldenrod	12	fall	yellow	3'-5'	1'
<i>Carex vulpinoidea</i>	Fox Sedge	96			1'-3'	1'

184 plants



RAIN GARDEN FOR LOAM TO SANDY/LOAM SOILS AND FULL SUN

AREA: 192 Square Feet

Designed to thrive through conditions of periodic water infiltrations as well as dry periods

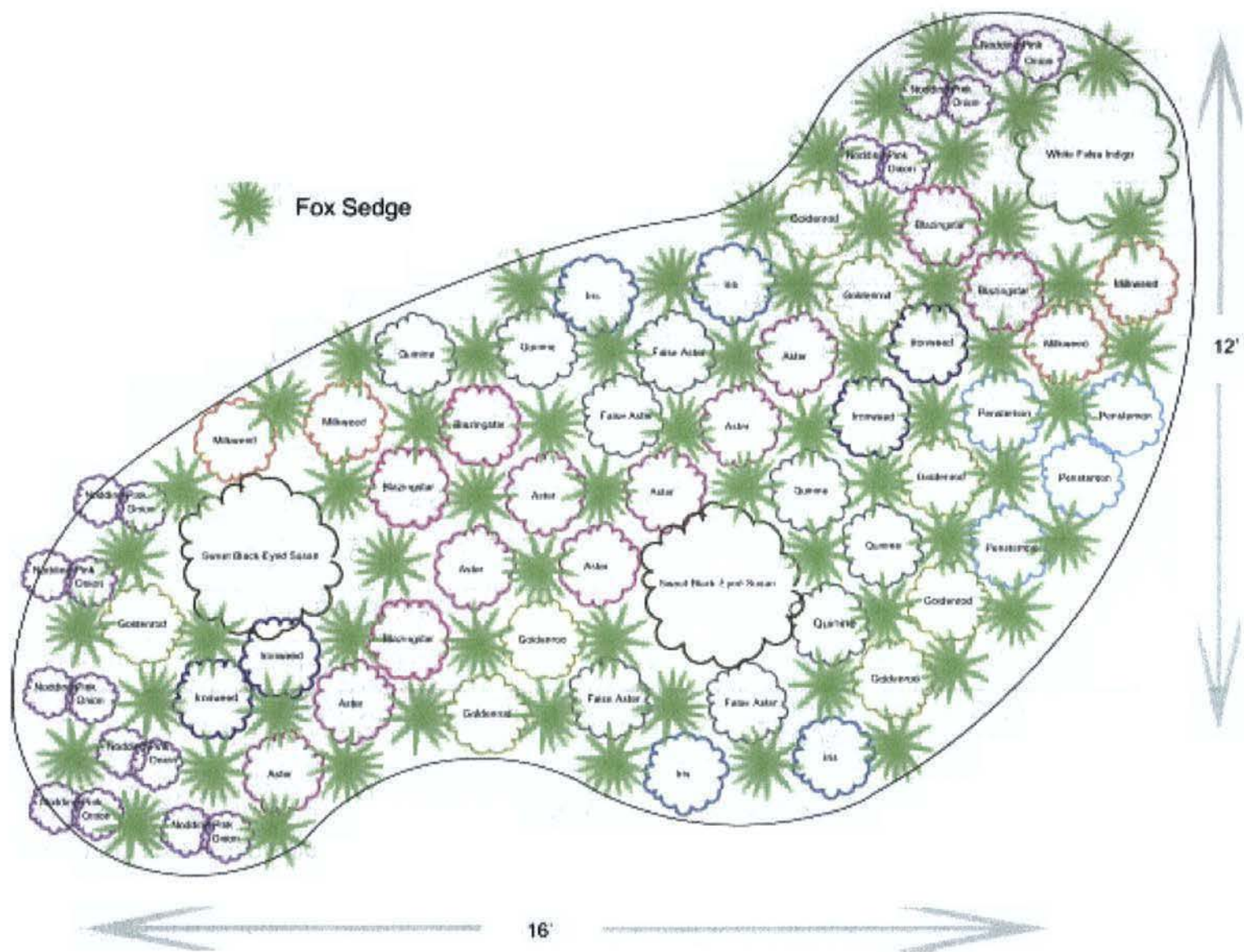
Designed to control 90% of annual runoff from an average sized rooftop (500 to 700 square feet)

Install at least 10' from your foundation, in-line with a down-spout and/or downslope to intercept the rooftop water

Depth of the garden designed to be 3.5" to 4" deep to hold about 400 gallons of water during periods of heavy rainfall

LATIN NAME	COMMON NAME	AMT	BLOOM TIME	BLOOM COLOR	HEIGHT	SPACING
<i>Asclepias incarnata</i>	Red Milkweed	7	early summer	red	3'-5'	1'
<i>Baptisia lactea</i>	White False Indigo	1	early summer	white	3'-5'	2'
<i>Iris versicolor</i>	Blue Flag Iris	7	early summer	blue	2'-3'	1'
<i>Penstemon digitalis</i>	Smooth Penstemon	7	early summer	white	2'-3'	1'
<i>Allium cernuum</i>	Nodding Pink Onion	16	summer	pink	1'-2'	6"
<i>Liatris pycnostachya</i>	Prairie Blazingstar	8	summer	pink	3'-5'	1'
<i>Parthenium integrifolium</i>	Wild Quinine	8	summer	white	3'-5'	1'
<i>Boltonia asteroides</i>	False Aster	8	late summer	white/pink	2'-4'	1'
<i>Rudbeckia subtomentosa</i>	Sweet Black-Eyed Susan	2	late summer	yellow	4'-6'	2'
<i>Vernonia fasciculata</i>	Ironweed	8	late summer	magenta	4'-6'	1'
<i>Aster novae-angliae</i>	New England Aster	12	fall	pink/purple	3'-6'	1'
<i>Solidago ohioensis</i>	Ohio Goldenrod	12	fall	yellow	3'-4'	1'
<i>Carex vulpinoidea</i>	Fox Sedge	96			1'-3'	1'

192 plants



RAIN GARDEN FOR SANDY SOILS AND FULL SUN

AREA: 128 Square Feet

Designed to thrive through conditions of periodic water infiltrations as well as dry periods

Designed to control 90% of annual runoff from an average sized rooftop (500 to 700 square feet)

Install at least 10' from your foundation, in-line with a down-spout and/or downslope to intercept the rooftop water

Depth of the garden designed to be 3.5" to 4" deep to hold about 400 gallons of water during periods of heavy rainfall

LATIN NAME	COMMON NAME	AMT	BLOOM TIME	BLOOM COLOR	HEIGHT	SPACING
<i>Asclepias incarnata</i>	Red Milkweed	4	early summer	red	3'-5'	1'
<i>Baptisia lactea</i>	White False Indigo	1	early summer	white	3'-5'	2'
<i>Iris versicolor</i>	Blue Flag Iris	4	early summer	blue	2'-3'	1'
<i>Penstemon digitalis</i>	Smooth Penstemon	4	early summer	white	2'-3'	1'
<i>Allium cernuum</i>	Nodding Pink Onion	18	summer	pink	1'-2'	6"
<i>Liatris pycnostachya</i>	Prairie Blazingstar	5	summer	pink	3'-5'	1'
<i>Parthenium integrifolium</i>	Wild Quinine	5	summer	white	3'-5'	1'
<i>Boltonia asteroides</i>	False Aster	4	late summer	white/pink	2'-4'	1'
<i>Rudbeckia subtomentosa</i>	Sweet Black-Eyed Susan	2	late summer	yellow	4'-6'	2'
<i>Vernonia fasciculata</i>	Ironweed	4	late summer	magenta	4'-6'	1'
<i>Aster novae-angliae</i>	New England Aster	8	fall	pink/purple	3'-6'	1'
<i>Solidago ohioensis</i>	Ohio Goldenrod	8	fall	yellow	3'-4'	1'
<i>Carex vulpinoidea</i>	Fox Sedge (sedge)	64			1'-3'	1'

128 plants

Special Rain Garden Locations



In addition to conventional lawns, there are other locations where rain gardens can be created. A rectangular-shaped rain garden (above) was located in a narrow sideyard between two homes. A new rain garden (below), now helps control runoff that would flow into a parking lot.



Rain garden designs and
plant lists provided by John
Gishnock, Applied Ecological
Services, Inc. (pages 19-22)
and Jennifer Baker, Prairie
Nursery Inc. (pages 24-29).



RAIN GARDENS

A how-to manual for homeowners



A frosted rain garden
in autumn.

This publication developed by Roger Bannerman, Wisconsin Department of Natural Resources and Ellen Considine, U.S. Geological Survey. Special thanks to John Gishnock, Applied Ecological Services, Inc., Jennifer Baker, Prairie Nursery Inc. and Joyce Powers, CRM Ecosystems Inc.

Photos by Roger Bannerman, Wisconsin Department of Natural Resources.

Layout design/production by Jeffrey Strobel, and editorial assistance by Bruce Webendorfer, University of Wisconsin–Extension Environmental Resources Center.

This publication is available from county UW-Extension offices, Cooperative Extension Publications, 1-877-947-7827 and from DNR Service Centers.

The publication can also be viewed and printed from pdf format on the web at clean-water.uwex.edu/pubs/raingarden

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Wisconsin Department of Natural Resources
DNR Publication PUB-WT-776 2003



University of Wisconsin–Extension
UWEX Publication GWQ037
1-06-03-5M-100-S

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FRONT PORCH
FACING BELAIR PL



PROPOSED CURB CUT OF GIRARD PL

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DISTRICT OF COLUMBIA GOVERNMENT
OFFICE OF THE SURVEYOR

Washington, D.C., November 5, 2013

Plat for Building Permit of: SQUARE 4251 LOT 15

Scale: 1 inch = 20 feet Recorded in Book 154 Page 129

Receipt No. 14-00779

Furnished to: TAIWO O. DEMUREN

Surveyor, D.C.

By: A.S.

I hereby certify that all existing improvements shown thereon, are completely dimensioned, and are correctly platted; that all proposed buildings or construction, or parts thereof, including covered porches, are correctly dimensioned and platted and agree with plans accompanying the application; that the foundation plans as shown hereon is drawn, and dimensioned accurately to the same scale as the property lines shown on this plat; and that by reason of the proposed improvements to be erected as shown hereon the size of any adjoining Lot or premises is not decreased to an area less than is required by the Zoning Regulations for light and ventilation; and it is further certified that all Lot divisions or combinations pending at the Office of Tax & Revenue are correctly depicted, and it is further certified and agreed that accessible parking area where required by the Zoning Regulations will be reserved in accordance with the Zoning Regulations, and that this area has been correctly drawn and dimensioned hereon. It is further agreed that the elevation of the accessible parking area with respect to the Highway Department approved curb and alley grade will not result in a rate of grade along centerline of driveway at any point on private property in excess of 20% for single-family dwellings or flats, or in excess of 12% at any point for other buildings. (The policy of the Highway Department permits a maximum driveway grade of 12% across the public parking and private restricted property.) Owner/Agent shall indemnify, defend, and hold the District, its officers, employees and agents harmless from and against any and all losses, costs, claims, damages, liabilities, and causes of action (including reasonable attorneys' fees and court costs) arising out of death of or injury to any person or damage to any property occurring on or adjacent to the Property and directly or indirectly caused by any acts done thereon or any acts or omissions of Owner/Agent; provided however, that the foregoing indemnity shall not apply to any losses, costs, claims, damages, liabilities, and causes of action due solely to the gross negligence or willful misconduct of District or its officers, employees or agents.

Date: _____

(Signature of owner or his authorized agent)

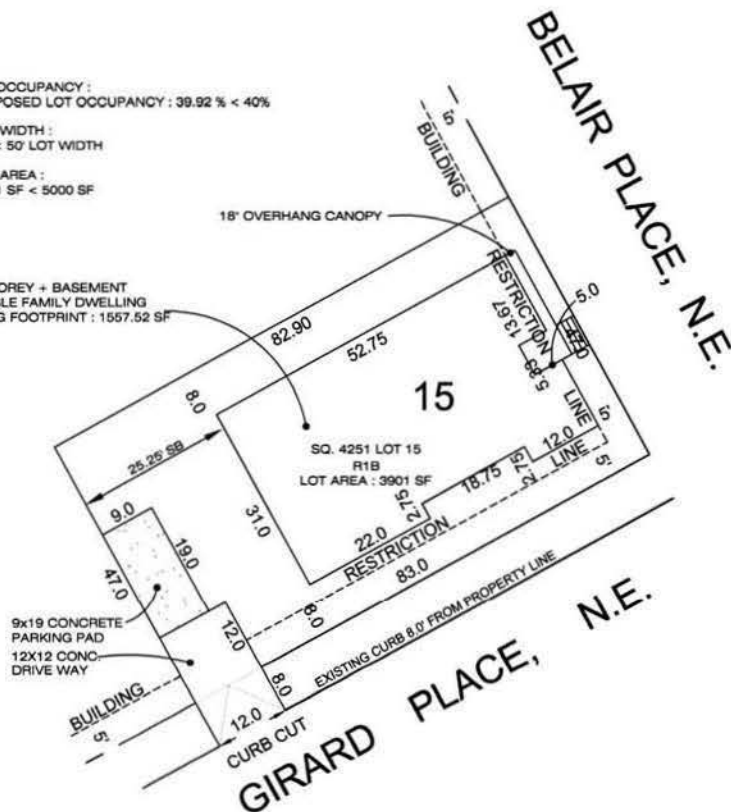
NOTE: Data shown for Assessment and Taxation Lots or Parcels are in accordance with the records of the Department of Finance and Revenue, Assessment Administration, and do not necessarily agree with deed description.

LOT OCCUPANCY :
PROPOSED LOT OCCUPANCY : 39.92 % < 40%

LOT WIDTH :
47' < 50' LOT WIDTH

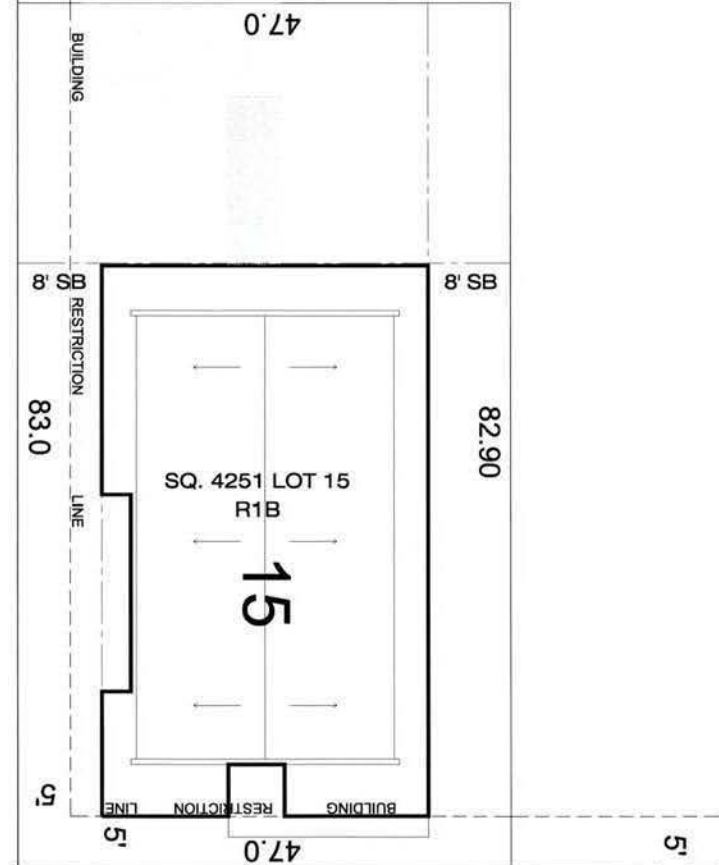
LOT AREA :
3901 SF < 5000 SF

2 STOREY + BASEMENT
SINGLE FAMILY DWELLING
BLDG FOOTPRINT : 1557.52 SF



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47' < 50' LOT WIDTH
3901 SF < 5000 SF
3901 SF X 0.4 = 1560 SF



BELAIR PLACE, N.E.

1 BUILDING FOOTPRINT
SCALE: 3/16" = 1'-0"

GIRARD PLACE, N.E.

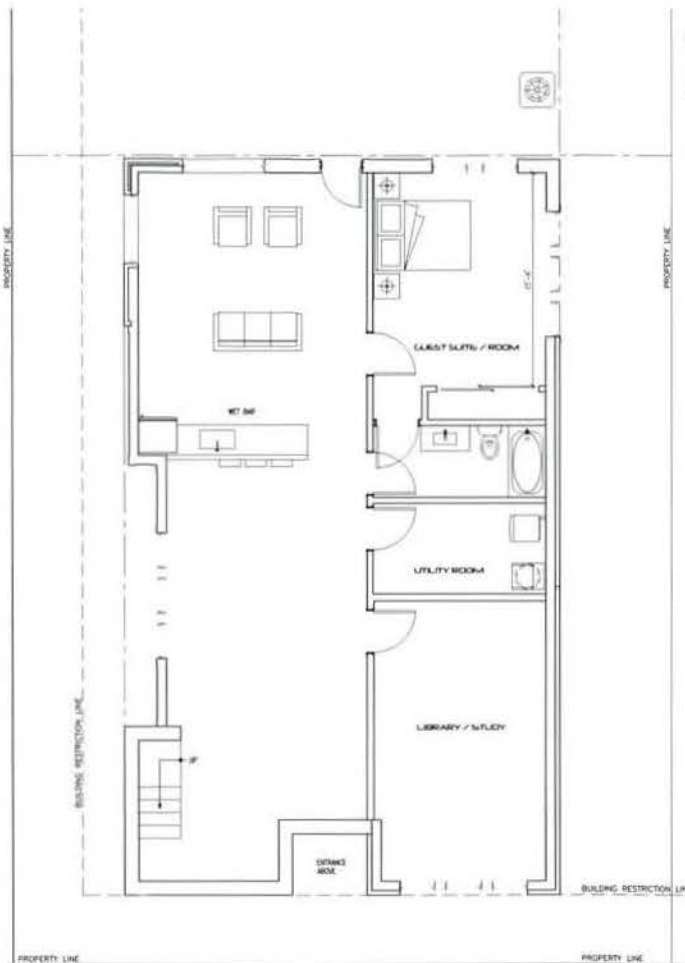
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2 FIRST FLOOR PLAN - ELEV 10.00'
SCALE: 1/4" = 1'-0"

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CIRARD PLACE, NE

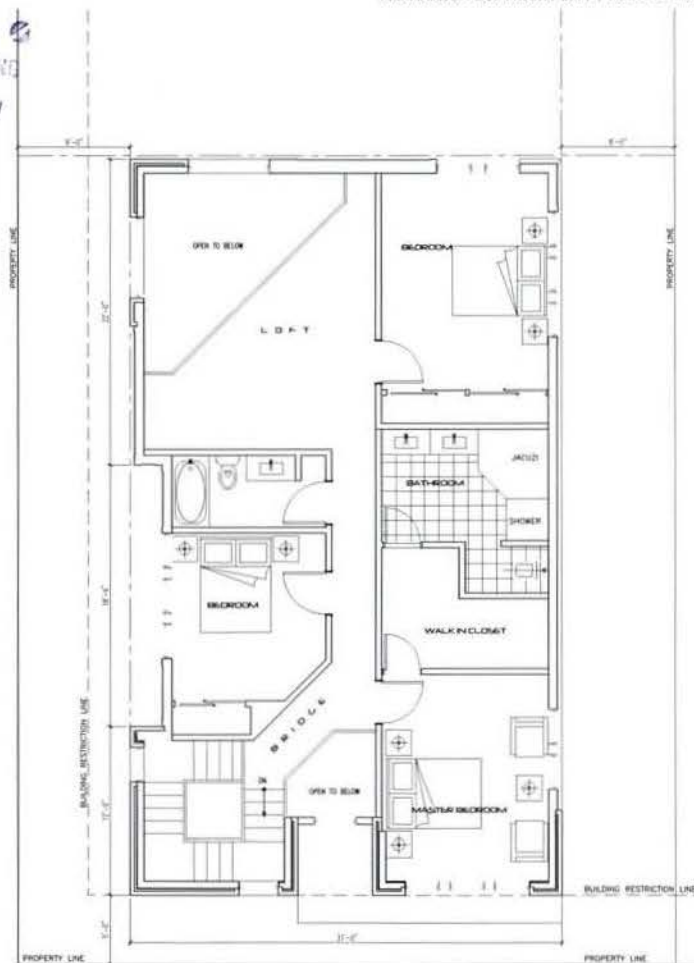


BELAIR PLACE, NE

2 BASEMENT FLOOR PLAN - ELEV -10.00'
SCALE: 1/4" = 1'-0"

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CIRARD PLACE, NE



BELAIR PLACE, NE

1 SECOND FLOOR PLAN - ELEV 20.00'
SCALE: 1/4" = 1'-0"

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2 FRONT ELEVATION - FACING BELAIR PLACE NE
SCALE: 1/4" = 1'-0"

1 REAR ELEVATION - FACING BACKYARD
SCALE: 1/4" = 1'-0"

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RAM DESIGN LLC ARCHITECTURE | SPACE PLANNING | MASTER PLANNING | 905 6TH ST. SW #904 WASHINGTON D.C. 20024 | 703.405.9976 , 202.618.0476 | RAMDESIGNGROUP@GMAIL.COM

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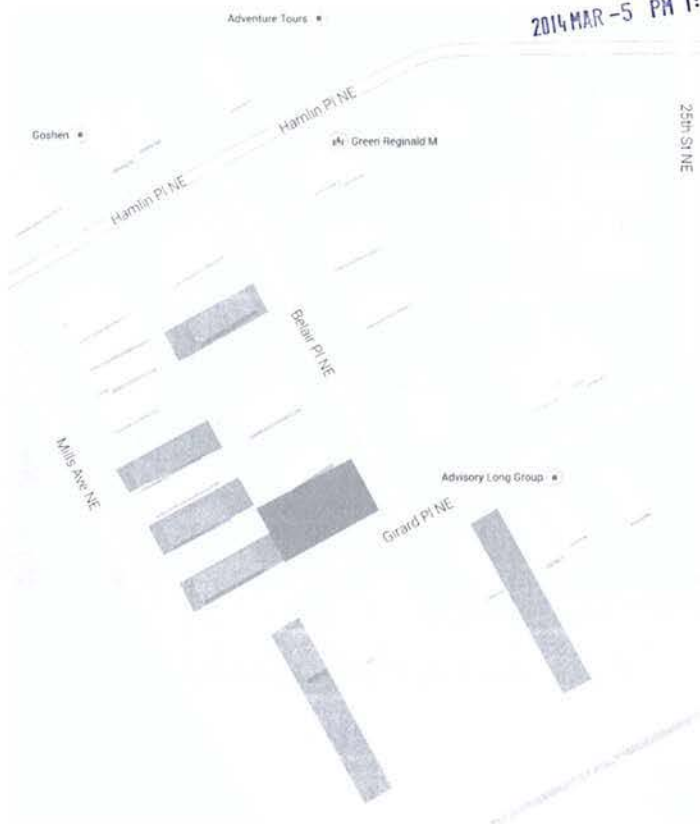
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1 SITE PLAN / SECTION
SCALE: 1/4" = 1'-0"

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NEIGHBORING HOMES WITHIN OR EXCEEDS SUBJECT PROPOERTY FOOTPRINT. HEIGHT OR WIDTH

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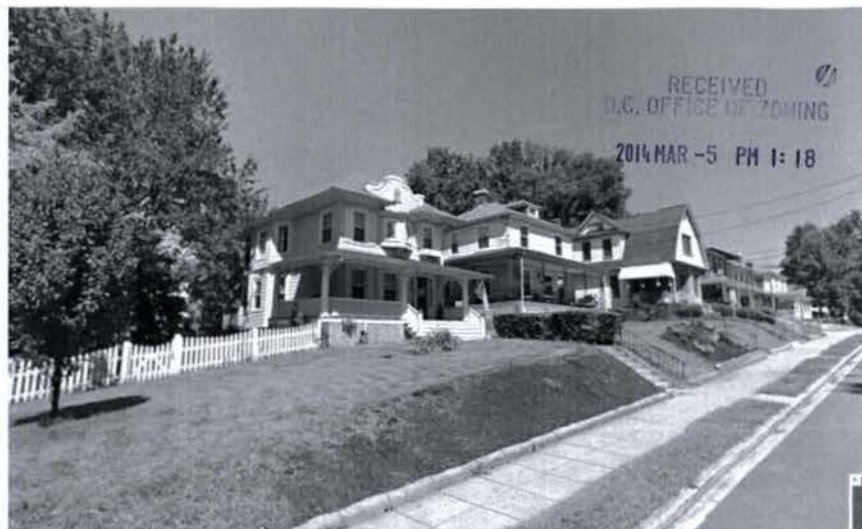
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