

# Stormwater Utility Fee Credit Manual



## Single Family Residential Properties



City of Roanoke, Virginia  
Department of Planning, Building, and  
Development  
215 Church Avenue, S.W., Noel C. Taylor  
Municipal Building, Room 166  
Roanoke, VA 24011

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## GLOSSARY

**Adequate Channel:** A ditch, pipe, or other stormwater conveyance that is properly sized and constructed to prevent flooding and erosion in the channel and on adjacent properties.

**BMP or “Best Management Practice”:** A control measure, activity, or facility that prevents or reduces the transport of pollutants, controls stormwater volume or rate or otherwise limits adverse impacts to the storm drainage system and receiving waters.

**Erosion:** The process of water or wind moving soil and depositing it elsewhere. Erosion is increased when vegetation is removed or an area is denuded.

**Groundwater:** Water held in soil pore spaces below ground. Groundwater can eventually flow to a drinking water well or area waterways.

**Impervious Surface:** Surfaces that do not allow water to be absorbed. Impervious surfaces include paved areas, structures, bridges, decks, and gravel. \*Note: The [Virginia Stormwater Management Handbook](#) defines gravel as impervious because once it is installed it is compacted and impedes the flow of water into the ground.

**Infiltration:** The process by which water on the ground surface is absorbed into the soil.

**Non-Single Family Residential Property:** Any property that is not a single family residential property. Types of non-single family residential or other properties include commercial, industrial, multi-family residential, and institutional properties to name a few. \*Note: Properties applying for credits for a regional BMP that serves multiple properties (single family residential or otherwise) will need to follow the rules listed in the [Commercial, Industrial, Institutional, and Multifamily Residential Properties \(Non-Single Family Residential or Other Properties\) Credit Manual](#).

**Pervious Surface:** A surface composed of material that allows water to be absorbed into the ground, reducing runoff and filtering pollutants.

**Regional BMP:** BMP that accepts and treats runoff from multiple separate properties. Regional BMPs are often owned by a Property Association or other entity responsible for regular maintenance and inspections.

**Runoff:** Precipitation that does not absorb into the ground but flows down-slope along the surface. Runoff volume, flow rate, and pollutant load increases with impervious areas.

**Sediment:** Soil and rock that is moved and deposited by water. Sediment is usually suspended in water until flow rates decrease enough that it can settle out.

**Sheet Flow:** An overland flow of water in the form of a thin, continuous film rather than concentrated into channels.

**Single Family Residential Property:** Property on which a dwelling exists which is occupied exclusively by one family for noncommercial purposes. Duplexes are included as a single family residential property for the purposes of this credit manual.

**Stormwater:** Water that originates during precipitation events. Stormwater that does not absorb into the ground becomes runoff which flows to the storm drainage system and then on to creeks and rivers.

**Stormwater Ideabook:** Guidance document prepared by the City of Roanoke to inform and encourage homeowners to implement BMPs on single family residential properties. This guide is not in full compliance with the Virginia BMP Clearinghouse and is not a design tool for projects on non-single family residential properties.

**Water Quality:** Refers to the chemical, physical, and/or biological characteristics of water.

**Water Quantity:** Refers to the flow rate or volume of runoff from a property.

Note: The definitions of terms that appear above are to facilitate your review of this Manual. Please note that these terms may also be defined by applicable laws, ordinances, rules, or regulations and are controlled by those definitions. For completed definitions of these terms under applicable laws, ordinances, rules, or regulations, please consult: The [City of Roanoke Stormwater Management Ordinance](#), the [City of Roanoke Stormwater Design Manual](#), the [City of Roanoke Stormwater Ideabook](#), and the [Virginia Stormwater Management Handbook](#).

## I. INTRODUCTION

The City of Roanoke has 13 major rivers and streams within its boundaries and seven of these are listed as impaired for water quality by the Virginia Department of Environmental Quality (DEQ). Investment needs to be made in capital improvements, system maintenance, and regulatory compliance to ensure that environmental standards are met and our valuable natural resources are protected.

Our stormwater system is aging with much of it having exceeded its useful design life of 50 years, and it has seen little investment in decades. At the same time, our impervious surface areas (paved driveways, rooftops, access roads) have increased many-fold as our city has developed into a regional center for commerce, healthcare, retail, entertainment and the arts. The City has a current backlog consisting of hundreds of stormwater projects



Trash and debris in a City storm drain.

estimated to cost tens of millions of dollars, which need to be implemented to effectively minimize flooding and control pollutants before they enter our local waterways. Combine these capital infrastructure demands with the need to provide on-going maintenance of hundreds of miles of existing stormwater pipes and the requirement to meet increasing Federal Clean Water Act stormwater permit requirements, and the City faces a significant financial challenge.



Storm drain surcharging after large storm.

City leaders recognize that stormwater management solutions range from individual citizen and business participation to large-scale stormwater projects, but any real solution will require an on-going dedicated level of funding and focused effort. To that end, in 2013, the City Council approved the

implementation of a Stormwater Utility Fee to fund the City's public stormwater management program. In May 2014, the City Council adopted the Stormwater Utility Fee Schedule.

## II. STORMWATER UTILITY FEE

Stormwater runoff is proportional to the amount of impervious surface on developed property. When a wooded or grassy area is paved or replaced with impervious material, the result is less infiltration of stormwater. Hardened or impervious surfaces such as driveways, parking lots, streets and rooftops do not allow rainfall to soak into the soil, so more of the rainfall becomes stormwater runoff and increases the demand on the system. This stormwater runoff also accumulates pollutants such as oil and grease, chemicals, nutrients, metals, and bacteria as it travels across land and discharges into our rivers and streams. Both the quantity and the quality of runoff need to be managed before discharge into local rivers and streams.

Therefore the amount of the stormwater fee is based on the amount of impervious area on each developed property in the City. The City used aerial photography and Geographic Information System (GIS) technology to identify and measure the impervious area on all developed properties in the City. The green hatched areas in the photograph below demonstrate the capture of impervious features which include rooftops, driveways, and walkways.



For billing purposes, the fee is based on each 500 square feet of impervious area identified, rounded to the nearest whole number. So for the two examples shown above, the fee for the property on the left would be based on 5 billing units (2,477 square feet divided by 500 square feet or 4.95) and the property on the right, which has almost 800 square feet less, would be based on 3 billing units (1680 square feet divided by 500 square feet or 3.3).

The monthly fee per billing unit will be phased in over three years as shown in the list below:

2014: \$0.30/Billing Unit/Month

2015: \$0.60/Billing Unit/Month

2016: \$0.90/Billing Unit/Month

The monthly fee for the two properties shown above will therefore be:

Year	Left Property Monthly Utility Fee	Right Property Monthly Utility Fee
2014	\$1.50	\$0.90
2015	\$3.00	\$1.80
2016	\$4.50	\$2.70

All developed properties, including City owned properties and properties owned by tax-exempt organizations, are subject to the fee unless such properties are expressly exempt from the fee under State Code or under the [Stormwater Utility Ordinance](#).

The fee will go into effect in July 2014 and be billed using the City’s real estate tax billing system. Any parcel owner may request a fee adjustment in accordance with [§ 11.5-9 of the Code of the City of Roanoke](#) within 30 days of receiving the bill.

### III. HOW DO I EARN A CREDIT?

The City Council acknowledged when establishing the Stormwater Utility that certain on-site stormwater management activities can reduce the impact on the public system by treating or reducing the stormwater runoff from a developed property. In order to recognize the positive impact these on-site activities can

have, single family residences that install, implement, and maintain stormwater best management practices (BMPs) that improve water quality or reduce runoff can qualify to receive a reduction in their stormwater fee. A BMP is an activity, measure or facility that prevents or reduces the transport of pollutants, controls stormwater volume or rate or otherwise limits the impacts to the storm drainage system. These measures can include on-site practices such as bioretention, vegetated swales, constructed wetlands, rain gardens and detention ponds that manage stormwater at its source.

The stormwater credit will be based on the reduction of stormwater volume and pollutants flowing from a property and can be obtained through the installation and continuing use, operation and maintenance of the BMP which is not owned or maintained by the City. The credit amount will be determined based on the type of BMP and its continued use and maintenance.

In cases where a property is served by a BMP owned by a separate entity or a Homeowners Association, the property owner may receive credit for the BMP if they provide documentation showing they share in the maintenance obligation and costs of the BMP. Please refer to the [City of Roanoke, Virginia Utility Fee Credit Manual for Commercial, Industrial, Institutional, and Multifamily Residential properties](#) for information regarding credits, applications, and requirements for these types of credit requests.

#### **IV. WHAT BMPs ARE APPROVED FOR CREDIT?**

The Level 1 and Level 2 BMPs described in the following section have all been approved for a credit to the stormwater utility fee. Selecting more than one BMP is encouraged; however, the maximum credit allowed per parcel is fifty percent (50%). Credits will not be increased for BMPs that were voluntarily installed or that accept stormwater from other properties.

For additional information on design, installation, and maintenance requirements of each of these BMPs, please refer to the [City of Roanoke Stormwater Ideabook](#) and other resources listed at the end of this manual.

The City of Roanoke also encourages the use of new and innovative stormwater management designs. The City may issue 10% credits for other BMPs not listed in this manual if the homeowner can show that the practice treats stormwater for priority pollutants including bacteria, sediment, PCBs (Poly-Chlorinated Biphenyls ), Phosphorous, or Nitrogen.

### A. Level 1 BMPs: 10% Credit

BMPs in the following list are considered “Level 1 BMPs” and will earn homeowners a 10% credit on their utility fee. These BMPs must be installed and maintained in accordance with the recommendations listed in the City of Roanoke Stormwater Ideabook.

#### Rain Barrels

A rain barrel collects and stores rainwater from roof drains that would otherwise flow to storm drains and streams. Once the rainwater is collected, it can be used to water lawns, gardens, trees, and for other non-irrigation purposes like washing your car. This collection and re-use of rainwater reduces the amount of runoff and pollutants that flow directly to the City storm drain system and eventually to our waterways.

A rain barrel is usually made of a clean, plastic 55 gallon drum with a spigot located at the bottom and an overflow mechanism to direct excess water to an appropriate area away from neighbors, sidewalks, steep slopes, and retaining walls. All rain barrel openings to the air are screened to keep insects and debris out.

#### Vegetated Filter Strip

A Vegetated Filter Strip is a vegetated buffer area that treats sheet flow from adjacent impervious surfaces by slowing down stormwater runoff and filtering out pollutants. Vegetated Filter Strips are normally composed of turfgrasses, meadow grasses, trees, and other native vegetation. Filter strips should have a relatively low slope to encourage sheet flow across the filter strip. Although these areas must be well vegetated to be effective, property owners are required to keep grass routinely maintained as specified in the Code of the City of Roanoke.

#### Grass Channel

A Grass Channel or grass swale refers to a shallow, vegetated ditch used to direct water from impervious areas to an adequate channel. Grass Channels filter and slow down runoff making it a better practice than pipes and concrete gutters for conveying stormwater runoff to storm drain



Grass channel that directs stormwater to the storm drain system. Rock check dams slow stormwater and allow for additional infiltration.

systems and creeks. When deciding if a grass channel is a good solution for stormwater treatment on your property, it is important to verify the practice is at least 10 feet down slope of your foundation and that it flows to a stabilized outlet and not toward a neighbor's property.

### **Roof Drain Disconnection**

This BMP works by eliminating any direct connections between roof drains or downspouts and the storm drain system, ditches, or waterways. Instead, roof drains are routed to discharge at ground level onto flat or gently sloped vegetated areas where infiltration can occur. To avoid any potential damage to building foundations, the altered discharge point(s) should not be closer than 5 feet from any building.

### **Lawn Maintenance BMPs**

Proper lawn maintenance can significantly improve water quality and decrease runoff from urban lawns. A few examples of ways you can improve water quality by altering your normal lawn maintenance routine include limiting fertilizer use, seeding bare areas to prevent erosion, adding soil compost amendments to improve infiltration, and picking up pet waste regularly to prevent bacteria from entering the storm drain system. To qualify for a stormwater utility fee credit, the property owner must commit to at least three of the following:

1. Grow turfgrasses adapted to the Roanoke climate.
2. Use less fertilizer.
3. Leave lawn clippings on the lawn after mowing.
4. Avoid fertilizing within 20 feet of a stream or ditch.
5. Reseed bare areas to prevent future erosion.
6. Mow grass at 3" or taller to reduce runoff.
7. Keep grass clippings and fertilizers off impervious surfaces.
8. Don't irrigate too much.
9. Till soils and amend with compost to increase infiltration.
10. Pick up pet waste regularly and dispose of appropriately.

Further information on how to implement each practice is available in the [City of Roanoke Stormwater Ideabook](#).

### **Trees**

Although most homeowners are well aware of the value of planting trees with respect to aesthetics, property values, and decreased energy costs, many do not know that planting and preserving trees can also improve water quality.

Trees intercept large amounts of rain on their surface areas (leaves, branches, and trunks) and slow down stormwater runoff on the ground. The root systems also help increase infiltration. To qualify for a stormwater utility fee credit by adding trees to your property or preserving existing trees, the homeowner must be sure to address the following:

1. Plant or preserve trees included in Table 642-1 of the City of Roanoke Zoning Ordinance and listed in the table in Appendix A.
2. A minimum tree canopy coverage of 20% is required to receive credit.
3. Trees should be placed a minimum of 10 feet from any above ground and underground utilities and structures. . Remember to call Miss Utility by dialing 811 a minimum of 3 days before starting your project to request utilities be marked. Care should also be taken in close proximity to septic drain fields
4. Trees located within the City Right of Way do not qualify for a utility fee credit.
5. Existing tree canopy on wooded lots may be determined by review of aerial photography.
6. Trees must be planted and preserved properly and in good, healthy condition to continue to receive credit.

### **Waste and Refuse Management:**

Improper waste and refuse containment and the exposure of wastes to the weather, can lead to the pollution of stormwater. For those who go the extra mile to prevent that from happening, you are eligible for a credit if your usual and customary waste management practices ensure that all wastes and refuse, including recyclables, are fully contained and stored within a roofed structure so as not to expose them to rain or other precipitation.



Trash can enclosure photograph from [www.homedepot.com](http://www.homedepot.com)

### **Traditional Septic & Alternative Onsite Sewage System Maintenance:**

A properly maintained and functioning private sanitary sewage system reduces the risk of bacterial contamination of our waters, and otherwise controls the

related threats to public health. Such systems include a standard septic tank and drain field, but may also include other engineered onsite wastewater management systems approved for use by the VA Department of Health and otherwise compliant with the applicable state and federal regulations.

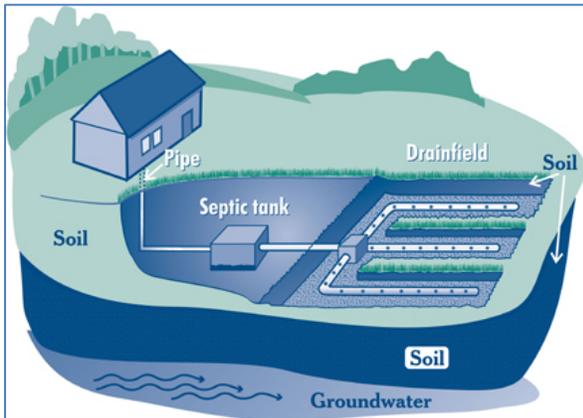


Diagram of a typical residential septic system. Graphic available at [www.epa.gov](http://www.epa.gov)

To qualify for this credit a homeowner shall provide documentation from a licensed or permitted septic service professional attesting that:

1. Your traditional septic or alternative sanitary sewage system has been inspected and is functioning properly and;
2. Your septic tank, or other sewage solids tank, has been pumped at the appropriate interval based on your household water use, but NOT LESS THAN ONCE EVERY 5 YEARS (typically every 3-5 years).
3. Suitable documentation must include the date of service, letterhead receipt clearly displaying the name and contact information of the permitted septic service company who has serviced your system, and the service professional's signature verifying that a system inspection and solids pump out was performed, and that the system was found to be in a satisfactory operating condition

NOTE: for all alternative onsite sewage systems (not a standard septic tank and drainfield), the service professional signing your documentation must also affix proof that they are certified in the State of VA as a Licensed Onsite Sewage System Professional.

### **B. Level 2 BMPs: 25% Credit**

BMPs in the following list are considered "Level 2 BMPs" because they are more complicated to install and provide greater water quantity and quality benefits than the Level 1 BMPs. Therefore, homeowners that install and maintain Level 2 BMPs are issued a 25% credit on their monthly stormwater utility fee. These BMPs must be installed and maintained accordance with the recommendations listed in the [City of Roanoke Stormwater Ideabook](#).



Pervious pavers in the City of Roanoke

## Pervious Pavements

Traditional paving materials allow stormwater to runoff rapidly. Pervious Pavements, however, are alternatives to conventional paving materials that allow for infiltration of stormwater into the soil below while still proving a rugged and durable high traffic surface. Pervious

Pavements include paving blocks, grid pavers, pervious concrete, and pervious asphalt and often include a stone reservoir under the pavement material to allow for water storage. Gravel driveways are not considered pervious and are not eligible for a credit.

## Rain Gardens

A Rain Garden is a landscaped depression designed to capture and cleanse stormwater runoff. The plants and soil in the rain garden work together to reduce runoff and remove pollutants before the stormwater discharges from the rain garden or infiltrates into the underlying soils. Rain Gardens can be attractive landscaping features when designed and maintained properly.



Single Family Residential rain garden. Photo courtesy of Gay and Neel, Inc. .

## Infiltration Practices

Infiltration Practices are typically trenches or a pit filled with specially selected and installed gravel and/or other porous media that stores stormwater in the spaces between the rocks and then allows that stored water to slowly infiltrate into the surrounding soils. Roanoke area soils are very high in clay, making it difficult and sometimes impossible to infiltrate water. In these circumstances, the infiltration practice will sometimes include a perforated drain installed at the bottom of the pit that will slowly collect the stored water and direct it to a storm drain system or creek.



Underground cistern at Fire Station #3.

## Cisterns

Cisterns are different from Rain Barrels in that they are designed to hold much larger quantities of water for re-use on the property. Cisterns reduce the amount of runoff and pollutants that flow directly to the City storm drain system and then to our waterways. Cisterns can be installed aboveground, underground, or elevated depending on the needs and constraints of your

lot. Water collected in cisterns can be used for indoor and outdoor non-potable uses including irrigation, washing cars, flushing toilets, and laundry.

## Green Roofs

A Green Roof, also known as living roof or vegetated roof cover, is a thin layer of living plants in a lightweight engineered soil medium on a roof. Precipitation is taken up by green roof plants and transpired into the air. As a result, Green Roofs direct less runoff to undersized storm drains and impaired creeks than traditional rooftops. The soil and vegetation layers also help to insulate the building and when properly maintained, can significantly increase the functional lifespan of the roof.



Green roof at City Municipal Building.

## V. HOW DO I APPLY FOR CREDIT?

Prior to receiving a credit, the property owner must submit a completed Single Family Residential Stormwater Utility Fee Credit Application, included in this manual, to the City of Roanoke Department of Planning, Building, and Development located at 215 Church Avenue, S.W., Noel C. Taylor Municipal Building, Room 170, Roanoke, VA 24011

There is no fee for a credit application. Once a complete application is submitted and approved, the credit will go into effect the calendar year after

approval of the application. A certification statement is included on the application which says the owner is promising to implement and maintain the BMP(s) in accordance with the [City of Roanoke Stormwater Ideabook and Design Manual](#).

If an application is denied, the applicant can appeal the decision to the Director of the Department of Planning, Building, and Development in writing within 30 days of the denial. The Director shall make a determination within thirty (30) days of receipt of an appeal and notify the Applicant in writing. If the Applicant is not satisfied with the response of the Director, a written appeal can be submitted to the City Manager who shall offer a final decision to the Applicant within 30 days of receipt of the written appeal.

The City may routinely inspect BMPs to verify all operation and maintenance is in compliance with City Standards. The credit will be revoked if violations are observed.

## VI. MAINTENANCE REQUIREMENTS

In order for an applicant to continue to receive a stormwater credit, each BMP installed must be maintained to ensure continued function. The applicant is responsible for having all ongoing maintenance work completed to keep the facilities functional. The City may revoke the credit if an inspection determines it is no longer properly maintained or functioning as designed. This revocation will be effective thirty (30) days after the owner is notified in writing of the deficiencies and if the problems are not resolved

## VII. RESTRICTIONS ON CREDITS

**Transfer of Credit:** The stormwater credit applies only to the applicant. Credits do not transfer if ownership changes. A new application must be submitted for new account holders to receive the credit.

**Off-Site BMP Credit:** In circumstances where an applicant is attempting to claim credit for a BMP owned by a separate entity, proof that the Applicant shares in the maintenance obligations and costs of the BMP will need to be submitted in order for credit to be applied.

**Local Community Requirements:** The BMP must meet all applicable City of

Roanoke building, planning, and other Code of the City of Roanoke requirements.

**Right to Inspect.** The City may inspect the BMP at any time during the year. If the BMP is not functioning as approved or has not been maintained, the City may revoke the stormwater credit until the property owner proves that all maintenance work has been performed to return the BMP to a fully functional condition.

*See the Code of the City of Roanoke, [Chapter 11.5 Stormwater Utility](#) for more details on the stormwater utility fee and credit program.*

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*By the authority granted to me by City of Roanoke Code Section 11.5-1, I hereby approve and adopt this Stormwater Utility Fee Credit Manual: Single Family Residential Properties) (February 1, 2014 Version), which shall be effective July 1, 2014.*

*This 3<sup>rd</sup> day of February, 2014.*



Christopher P. Morrill  
City Manager  
City of Roanoke

**APPENDIX A: CITY OF ROANOKE SINGLE FAMILY RESIDENTIAL CREDIT APPLICATION FORM**

# Application For Stormwater Utility Credit for a Single Family Residence



Date  Credit Application No.

## Planning Building & Development

215 Church Ave., SW, Room 170

Roanoke, VA 24011

Phone: (540) 853-1090 Fax: 853-1594

[www.roanokeva.gov](http://www.roanokeva.gov)

NOTE: The City Council has authorized the City Manager to receive applications for stormwater utility fee credits prior to the effective date of the stormwater utility of July 1, 2014. Interested persons who make applications pursuant to these forms, please note that these forms may be modified in the future. Any such modification will be posted to the public.

**Complete Form & Click Here To Print**

### Parcel Information:

Tax Map Number

Parcel Address  City  State  Zip Code

### Owner Information:

Owner Name

Owner Address  City  State  Zip Code

Phone Number  email

### Type of BMP (check all that apply):

Please note the maximum credit possible per parcel is 50%.

#### Category: Level 1 (10% Credit per BMP)

<input type="radio"/> Rain Barrel	<input type="radio"/> Roof Drain Disconnection	<input type="radio"/> Waste and Refuse Management
<input type="radio"/> Vegetated Filter Strip *	<input type="radio"/> Sewage System Maintenance	<input type="radio"/> Grass Channel *
<input type="radio"/> Lawn Maintenance (list three practices to be implemented)	<input type="radio"/> Trees* (list percent of canopy provided)	
Practice 1 <input type="text"/>	Preserving Existing <input type="text"/>	
Practice 2 <input type="text"/>	Establishing New <input type="text"/>	
Practice 3 <input type="text"/>		

#### Category: Level 2 (25% Credit per BMP)

<input type="radio"/> Pervious Pavement *	<input type="radio"/> Cistern *	<input type="radio"/> Infiltration Practice *
<input type="radio"/> Rain Garden *	<input type="radio"/> Green Roof *	

\* Denotes that a site plan is required with the application.

I hereby affirm to the City of Roanoke that the BMPs as identified above has been installed or implemented on the property in conformance with the Stormwater Utility Fee Credit Manual for Single Family Residential Properties and the Roanoke Stormwater Ideabook. I further acknowledge that maintenance and implementation will be performed in accordance with the Roanoke Stormwater Ideabook. It is understood that lack of maintenance or proper installation will result in a revocation of the credit applied to the property.

Print Name  Signature

## APPENDIX B: CITY OF ROANOKE APPROVED TREE LIST

**Table 642-1. Trees: Approved Plant List, Minimum Size at Planting, 20-Year Canopy, and Suitability**

Common Name	Botanical Name	Minimum Height at Planting	Minimum Caliper at Planting	Canopy at 20 Years (sq. ft.)
<i>Evergreen Trees</i>				
Cedar, Deodar	Cedrus deodara	5'		177
Cedar, Eastern Red	Juniperus virginiana	5'		38
Cypress, Leyland	X Cupressocyparis leylandii	5'		113
Holly, American	Ilex opaca	5'		38
Magnolia, Southern	Magnolia grandiflora	5'		177
Pine, Eastern White	Pinus strobus	5'		177
Spruce, Colorado Blue	Picea pungens	5'		113
Spruce, Norway	Picea abies	5'		177
Spruce, White	Picea glauca	5'		113
<i>Large Deciduous Trees</i>				
Beech, American	Fagus grandifolia		2"	177
Beech, Copper	Fagus sylvatica cuprea		2"	177
Birch, River	Betula nigra		2"	254
Black Gum/Tupelo	Nyssa sylvatica		2"	177
Elm, Lacebark	Ulmus parvifolia		2"	254
Ginkgo (Male Variety Only)	Ginkgo biloba (Male Variety Only)		2"	133
Honey Locust, "Shademaster"	Gleditsia triacanthos, "Shademaster"		2"	314
Japanese Pagoda tree	Sophora japonica		2"	254
Japanese Zelkova	Zelkova serrata		2"	177

Linden, American	Tilia Americana		2"	314
Linden, Little Leaf	Tilia cordata		2"	177
London Planetree	Platanus acerfolia		2"	380
Maple, Red	Acer rubrum		2"	314
Maple, Sugar	Acer saccharum		2"	314
Oak, Chestnut	Quercus prinus		2"	254
Oak, Northern Red	Quercus rubra		2"	254
Oak, Pin	Quercus palustris		2"	254
Oak, White	Quercus alba		2"	254
Oak, Willow	Quercus phellos		2"	254
Redwood, Dawn	Metasequoia glyptostroboides		2"	177
Tuliptree	Liriodendron tulipifera		2"	254
<i>Small Deciduous Trees</i>				
Cherry, Comelian	Cornus mas	5'		113
Cherry, Kwanzan Flowering	Prunus serrulata 'Kwanzan'		2"	177
Cherry, Yoshino	Prunus yeodensis		2"	177
Dogwood, Flowering	Cornus florida	5'		177
Dogwood, Kouza	Comus kouza	5'		177
Goldenraintree	Koelreuteria paniculata		2"	177
Hawthorn, Washington	Crataegus phaenopyrum	5'		113
Hophombeam, American	Ostrya virginiana		2"	201
Hombeam, American	Carpinus caroliniana		2"	177
Maple, Amur	Acer ginnala		2"	113
Maple, Hedge	Acer campestre		2"	177
Maple, Japanese	Acer palmatum	5'		177
Maple, Trident	Acer buergerianum		2"	177
Myrtle, Crape	Lagerstroemia indica	5'		113
Redbud, Eastern	Cercis Canadensis	5'		177
Serviceberry	Amelanchier arborea	5'		201
Sourwood	Oxydendrum arboreum	5'		113

White Fringetree	Chionanthus virginicus	5'		113
Source for Tree Canopy Coverage at 20 Years: Virginia Nursery & Landscape Association, Inc.				
* P C B =	Suitability = Parking = Tree Buffer Yards	Key Areas Canopy	for or for	Table Street Yard Overall Trees Site

## APPENDIX C: ADDITIONAL RESOURCES

CITY OF ROANOKE STORMWATER IDEABOOK FOR HOMEOWNERS:  
<http://www.roanokeva.gov/85256A8D0062AF37/CurrentBaseLink/N29ALPE9085SSIAEN>

DEPARTMENT OF CONSERVATION AND RECREATION (DCR) MAINTENANCE CALENDAR FOR COOL AND WARM SEASON TURFGRASSES IN VIRGINIA:  
[http://www.pubs.ext.vt.edu/430/430-523/430-523\\_pdf.pdf](http://www.pubs.ext.vt.edu/430/430-523/430-523_pdf.pdf) AND  
[http://www.pubs.ext.vt.edu/430/430-522/430-522\\_pdf.pdf](http://www.pubs.ext.vt.edu/430/430-522/430-522_pdf.pdf)

DCR TIPS ON KEEPING YOUR LAWN GREEN AND VIRGINIA'S WATERS CLEAN:  
[http://www.dcr.virginia.gov/water\\_quality/documents/tipsstate.pdf](http://www.dcr.virginia.gov/water_quality/documents/tipsstate.pdf)

VIRGINIA BMP CLEARINGHOUSE: <http://vwrrc.vt.edu/swc/>

ALLIANCE FOR THE CHESAPEAKE BAY: <http://stormwater.allianceforthebay.org/>

VIRGINIA COOPERATIVE EXTENSION SERVICE VEGETATION PUBLICATIONS:  
<http://www.pubs.ext.vt.edu/category/trees-shrubs-groundcovers.html>

INTERNATIONAL SOCIETY OF ARBORICULTURE'S TREES ARE GOOD WEBSITE:  
<http://www.treesaregood.org/>

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VDEQ):  
<http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx>

VIRGINIA DEPARTMENT OF FORESTRY: <http://www.dof.virginia.gov/>

ENVIRONMENTAL PROTECTION AGENCY (EPA): <http://www.epa.gov/>