

GREEN ROOFS FOR STORMWATER MANAGEMENT Virginia

Virginia Specific Stormwater Calculations and Details

Columbia Green Technologies provides AutoCAD details and stormwater calculations that are specifically designed with Virginia's stormwater regulations in mind. Through our technical support we strive to make designing and implementing a green roof in Virginia as easy as possible. Virginia specific details can be downloaded from <http://columbia-green.com/resources/regional-stormwater-information/> along with Stormwater Regulation Sheets for other areas of the country.

Policies and Regulations in Virginia

Virginia Stormwater Management Program (VSMP)

The VSMP establishes technical criteria and minimum standards for stormwater management in the Commonwealth. Developments that disturb over one acre of land are subject to regulation and permit fees.

New developments must maintain pre-development characteristics and rate of flow or runoff, or improve the pre-development conditions if stream erosion and flooding are present. The Treatment Volume (Tv) must be detained and released over 48 hours on site. The rainfall from a one-year 24-hour design storm must be detained for 24 hours. The peak flow rate from a site must be controlled to a level less than or equal to good forested conditions for a 1.5, 2, and 10-year 24-hour design storm.

For more information go to <http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx>

Green roof systems from Columbia Green are an effective way of limiting impervious area and detaining stormwater on site. Our green roofs can capture up to 70% of annual rainfall and with tray and layer based systems available we offer solutions to many different rooftop situations.

Runoff Reduction

VSMP regulations focus on maximizing Runoff Reduction (RR) and nutrient removal through the use of green infrastructure and reductions of impervious area.

Treatment Volume (Tv) determines how much water must be retained and treated to remove pollutants on site. The Tv provides treatment for approximately 90% of the average rainfall volume on a site.

$$Tv = \frac{P \times (Rv_i \times \%I + Rv_t \times \%T + Rv_f \times \%F) \times SA}{12}$$

Green Roofs have their own Tv equation to determine storage capacity. The green roof Tv can be compared to the Tv of the site as a whole to see if the green roof meets design criteria.

$$Tv = (RA \times D \times P) / 12$$

Tv = storage volume (cu. ft.)

RA = vegetated roof area (sq. ft.)

D = media depth (in.)

P = media porosity (usually 0.3, but consult manufacturer specs)

Tv = Runoff treatment volume in acre feet
P = Depth of rainfall (1") for "water quality" event
Rv_i = runoff coefficient for impervious cover
Rv_t = runoff coefficient for turf cover or disturbed soils
Rv_f = runoff coefficient for forest cover
%i = % of site in impervious cover
%t = % of site in turf cover
%f = % of site in forest cover
SA = total site area, in acres

Green roofs are a great way to meet Virginia's Treatment Volume requirements by reducing impervious area and retaining stormwater runoff. Columbia Green offers green roof products with between 3 and 12 inches of growing media that has a porosity of .35 to .65.

Local Green Roof Incentive Programs

The Commonwealth of Virginia passed a law in 2009 authorizing cities and counties to offer incentive programs for green roofs. These programs can contain tax incentives, permit fee reductions and streamlined approval processes.

For more information go to <http://law.lis.virginia.gov/vacode/title15.2/chapter9/section15.2-977/>

Arlington County offers a density bonus of up to .25 FAR or an additional height of up to three stories to developers who achieve LEED Silver or higher.

For more information go to <http://www.arlingtonvirginiausa.com/major-initiatives/green-building-initiative/>

About Columbia Green Technologies

At Columbia Green Technologies we offer a variety of comprehensive green roof solutions; from extensive to intensive green roofs, available with both tray based and layered systems. Designers appreciate the flexibility our systems offer and the technical support that accompanies any project we undertake. Building owners love the single-source 'Roof to Green Roof' warranty options provided through our roofing partners.



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Note: This summary has been prepared and compiled by Columbia Green Technologies for informational purposes only. The information contained herein is accurate to the best of our knowledge as of Spring/Summer 2014. Please consult the regulatory agency and/or a licensed engineer before using this information for the purposes of facility design or permitting.