GREEN ROOFS:

FOR MORE DETAILED INFORMATION REGARDING GREEN ROOFS SEE LINKS BELOW:

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GREEN ROOFS

SITING AND DESIGN CONSIDERATIONS

Siting of Facility
Each rooftop should be considered unique. Retrofitting existing buildings or new construction should take the following into consideration: local climate conditions, roof slope, function of the roof (e.g. stormwater management, public access and/or habitat creation), size of the project, budget, degree of accessibility, structural loading and infrastructure located on top of the building.

Structural Loading
The load bearing capacity of a green roof’s underlying structural support is a major factor influencing the design. The load bearing capacity of a roof must consider: dead load – the total weight of materials including soil, plants, snow, ballast and any other roof materials and live load – people, including maintenance workers and any other activities that the roof will need to support.

Type of Green Roof
There are two main divisions of green roofs – extensive and intensive. Generally, extensive roofs are lighter, have less than 4 inches of planting medium, use drought tolerant vegetation and are able to handle a limited number of people for maintenance concerns. Intensive systems are heavier with a much deeper planting medium, allow for greater live loads and require a much higher structural capacity load.

Vegetation
Successful rooftop vegetation must be able to: rapidly stabilize soil, quickly repair itself from damage, absorb and transpire water despite extreme conditions of heat and cold, wind and drought. In general, as the planting medium’s depth increases, so does the list of viable plant species. Sedums and mosses have been successfully used in shallow depth areas, while native grasses and forbs may be used in deeper soils.

Growing Medium (Soil)
The growing medium must meet the selected plantings’ nutrient, water, oxygen and pH needs. However, the structural load capacity of the building often determines the depth and material of the medium, which ultimately determines the vegetation that can be supported. Most growing mediums are made up of approximately ¾ mineral material and ¼ organic material. Mineral materials can be natural - sand or gravel, artificial - perlite or vermiculite, or created from recycled building materials.

Filter Fabric
Filter fabric below the growing medium prevents soil particles and other debris from migrating to and clogging the layers below. The drainage layer is protected while aeration is provided for the growing medium. Non-woven, non-biodegradable fabrics typically come in rolls and must be overlapped and secured to one another.

Water Drainage and Storage
The drainage layer helps prevent leaks by moving excess water away from the waterproof layer. Roof drainage design must consider: stormwater management goals, roof slope and the depth and nature of the drainage material. There are 3 main types of drainage material including granular materials (coarse gravel, stone, expanded clay, etc.) that have a large proportion of open space when packed together, sponge-like porous mats that can absorb and hold water, and several different types of synthetic drainage modules. Most of the synthetic modules create a rigid platform to keep growing medium and vegetation from contacting the waterproofing. Several of the synthetic modules have small depressions to store excess water.

Root Barrier
A physical or chemical barrier is needed to protect organic based waterproofing (i.e. asphalt) that can be penetrated by roots and broken down by microorganisms. The most common root barrier is a high-density polyethylene (HDPE) membrane. Metal and plastic base plates and PVC rolls are also used. PVC can also serve as waterproofing itself and is available in recycled form. Root barriers and waterproofing must be raised above the planting medium at roof perimeters and at any projections that penetrate the roof vertically, (chimneys, vents, walls, etc.) in order to completely enclose the soil and vegetation.

High Quality Waterproofing
One of the most important aspects of an effective green roof is maintaining a waterproof seal. While there are several types of membranes that can make up the waterproof layer, built-up systems that use bituminous materials are the most common. Another system seals overlapping rolls of synthetic materials, such as poly(vinyl chloride) PVC, rubber (EPDM), hypolan (CSPE) or thermoplastic polyolifins, together in a single-ply membrane. Hot or cold liquid systems can be sprayed or painted onto the roofing deck to create a joint free seal. Overlying soils and vegetation can extend the life of these waterproofing systems by protecting them from damaging ultraviolet light and extreme temperature fluctuations.
Irrigation
Proper green roof design and plant selection should alleviate or limit irrigation needs to new vegetation establishment and/or prolonged periods of drought. Typical irrigation methods include: surface spray – hoses and sprinkler heads, drip and tube – subgrade tubes deliver water directly to the root zone, capillary – mats hold water under the root zone for plants to take up, and standing water – water is captured from large storms and held for future use.

Leak Detection System
Roof leaks are a hazard to any roofing system; however, locating damaged waterproofing under several layers of a green roof can prove to be very difficult and costly. Electric field vector mapping (EFVM) is a relatively inexpensive leak detection system that charges the planting medium with electricity and looks for grounds, where moisture contacts the metal or concrete roof deck. Modular systems that use trays can easily be removed to fix damaged waterproofing, but locating the source of the leak is still difficult without a leak detection system.
VENDORS

The design and construction of green roofs is simplified by the fact that there are a number of suppliers and manufacturers who have developed green roof systems. The development of these green roof systems are based upon the models developed in Germany over the second half of the twentieth century. While each green roof system contains the main components of a green roof there is some variability in the product options and layers. Selection of a system will have to be evaluated in light of the individual project and site constraints.

Note: This information is being provided for applicants seeking a Rice Creek Watershed District (RCWD) permit. This is not intended to be an endorsement of any of these green roof suppliers or manufacturers. If there are other suppliers or manufacturers located in this region that are not identified on this web-site link please contact the RCWD at nphillips@ricecreekwd.com.

**American Hydrotech, Inc.**
A recognized leader in the development, production and distribution of premium waterproofing and roofing products.
303 East Ohio Street
Chicago, Illinois 60611-3387
Phone: 1-800-877-6125
Fax: 1-312-661-0731
http://www.hydrotechusa.com/

**Green Tech**
A manufacturer of modular green roof systems.
1301 Macy Drive
Roswell, Georgia 30076
Phone: 1-630-264-4471
Fax: 1-312-661-0731
http://www.greentechitm.com/

**The Garland Company, Inc.**
Garland Canada Inc. manufactures a complete green roof system called GreenShield.
3800 East 91st Street
Cleveland, OH 44105
Phone: 216-641-7500
Toll Free: 800-321-9336
Fax: 216-641-0633
http://www.garlandco.com/greenshield.html

**Sarnafil**
A leading manufacturer of thermoplastic roofing and waterproofing membrane.
20W267 101st Street
Lemont, IL 60439
Phone: 1-630-739-9740
Toll Free: 1-800-532-5123
Fax: 1-630-739-9741
http://www.sarnafilus.com/

**American Wick Drain Corporation**
A manufacturer of modular green roof systems.
1209 Airport Road
Monroe, NC 28110
Phone: 704 238-9200
Toll Free: 800 242-WICK(9425)
Fax: 704 238-0220
http://www.americanwick.com/

**GreenGrid™ Roofing Systems**
A manufacturer of modular green roof systems.
Weston Solutions, Inc.
20 N. Wacker Drive
Chicago, IL 60606
Phone: (312) 424-3319
Fax: (312) 424-3330
http://www.greengridroofs.com/

**Barrett Roofs – “Green Roof Roofscapes”**
Barrett Company
33 Stonehouse Road
Millington, NJ 07946
Phone: (800) 647-0200
Fax: (908) 647-0100
http://www.barretroofs.com
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**Carlisle – “Rooftop Planting System”**
Carlisle Coatings & Waterproofing Incorporated
900 Hensley Lane
Wylie, TX 75098
*Phone: (800) 527-7092*
[http://www.carlisle-ccw.com](http://www.carlisle-ccw.com)

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