



FULLY GROWN
INVISIBLE-MODULAR
GREEN ROOF SYSTEM

LiveRoof Maintenance Protocol

I. DOCUMENTATION

Record all green roof maintenance events. By keeping records, you will learn the particular nuances of caring for your LiveRoof®.

Name of Person	Date	Activity	Observations
		* If fertilizer, type and amount applied per 1000 sf.	
		* If soil test, what lab?	
		* If irrigation, duration and volume?	
		Time needed to pull weeds and clean drains.	

II. FOOT TRAFFIC ADVISORY

Most LiveRoof applications are planted with succulent plants. And, it is ok for one person to walk on such plants a couple of times each week without causing permanent harm. However, one must avoid walking in a single path or standing in one place and trampling the plants. If a wall, window or parapet requires service, the surrounding plants may be covered with plywood or closed cell foam for a few hours (for protection from foot traffic), provided the foliage is not wet and the conditions are not too hot or sunny. It is especially important to avoid repetitive foot traffic when plants are wet, frozen or under drought stress.

III. FERTILITY MANAGEMENT

SOIL TESTING AND FERTILIZATION

Between April 1 to 15 of each year, administer an annual soil test for pH and fertility levels. pH should be maintained in the range of 6.5 to 8.0. Since LiveRoof® engineered soil is buffered against acid rain, changes in pH should be small and gradual, and amendments should seldom be required. In the event that the pH is outside of the 6.5 to 8.0 range, the soil testing lab should be consulted for the appropriate amendment. Fertility will ideally fall into the normal fertility range using a typical field soil fertility test as provided by A & L Labs. Be sure to properly follow test protocol.

A & L Labs
1311 Woodland Ave., Suite 1
Modesto, CA 95351
209-529-4080, al-labs-west.com

Another fine testing facility with green roof specific test capability is Penn State University. Their contact information is as follows:

(814) 863-0841

Fax (814) 863-4540

Agricultural Analytical Services Laboratory

The Pennsylvania State University

University Park, PA 16802

If fertility falls below the normal range, LiveRoof recommends a single springtime application of high quality slow or controlled release granular “turf” or fairway grade fertilizer. Such fertilizers are typically marked “Slow Release” or “Controlled Release”. It is essential that you NOT USE any fertilizer that contains herbicide. Most acceptable fertilizers will have a formulation of approximately 18-6-12 (indicating the percentages of Nitrogen, Potassium and Phosphorus). In all cases, the labeled directions for application rates should not be exceeded. Runoff potential, however, does exist on every green roof, and in all cases should be evaluated by the applicator in accord with the site specifics. The greater the runoff sensitivity, the lower the application rates. All applications of fertilizer are the sole responsibility of the applicator.

Late Season Fertilizer Advisory: Do not fertilize during the late summer or fall as it may stimulate tender growth and compromise the winter hardiness of your plantings.

IV. IRRIGATION

WATERING

For the LiveRoof® Standard System, normally in northern North America, regular irrigation will not be needed to keep your LiveRoof® alive, however, protracted hot dry weather can result in plant thinning or death. In warmer climates, depending upon rainfall and exposure, regular irrigation will probably be required. Accordingly, LiveRoof® recommends irrigation (in a manner practical and efficient for the scale of the installation) as a “temporary” management tool under the following conditions:

PROLONGED HOT DRY WEATHER, in the northern temperate zone (Seattle, Chicago, Toronto, Boston, New York), is generally defined as a period of 75 degree weather, with less than 1 inch of rainfall, that persists for four weeks or longer. This “ballpark” time period will likely be less if the temperatures are hotter, the climate warmer, on sloping rooftops, or roofs exposed to strong winds or reflected sunlight. Such conditions can dry out the green roof substrate and cause the plants to go dormant or in extreme cases to dry up and die. Even dormant plants tend to shrink to a smaller size and expose soil, which can predispose the system to weed encroachment.

When hot dry weather persists for more than 4 weeks, irrigation is to be applied, temporarily, to re-wet the soil to the point of runoff. This will keep plants from going dormant, cover the soil effectively, optimize plant appearance, and keep the evaporative cooling effect of the green roof working. Please note that this is a “ballpark” time period and will vary with weather, plants and roof design.

For the LiveRoof® Lite System, this period is shortened to 2 or 3 weeks in the northern part of the temperate zone. This also is a “ballpark” figure and will be less if the temperatures are hotter, the climate warmer, the roof sloping, or if exposed to strong winds or reflected light.

For the LiveRoof® Deep System, irrigation requirements will depend upon the plant material and climate. Normally, because herbaceous plants such as perennials and grasses are used, there will be a need for regular irrigation during the growing season. An installed irrigation system is strongly recommended, regardless of climate.

Note: There are no absolutes when it comes to irrigation. Check the plants for wilting, especially in the morning. If the plants show signs of wilting in the morning, then it's time to irrigate.

Thoroughly irrigating, as indicated above, can pay off significantly. The cost of irrigation is minimal, compared to the energy savings from evaporative cooling, and the superior overall plant quality of the green roof.

In areas of reflected light, such as next to south-facing parapets, windows or walls, more frequent irrigation should be applied to keep the soil from becoming excessively dry.

DO NOT WATER PERIOD: For the northern temperate zone, LiveRoof recommends that you do not water (irrigate) during the fall season, unless the plantings become very dry due to prolonged wind and drought. In all but the most windswept climates, there is typically sufficient precipitation during fall, and adding excessive additional water may compromise winter hardiness. Likewise, in all but the most dry/arid climates, wintertime irrigation is not recommended.

V. INSPECTIONS AND PLANT CARE PROTOCOL

Conduct the following EVERY 2 WEEKS (2X per month) during the entire spring-through-fall growing season. In warm climates, conduct this maintenance protocol year round.

A. WEED CONTROL

Weed control, by hand weeding, is to be conducted during the twice-monthly inspection. The process is simple. Just pull any and all weeds no matter how small, and never allow any weed to flower, set seed, and complete its life cycle. **The benefit of this regimen is that each inspection/weeding event requires very little time.** This regimen should be conducted from spring through fall in areas where the roof becomes frozen and snow covered in winter. In warmer climates, it should be continued year round.

The inspector/weeder may adjust this interval in accord with seasonal variations in weed growth, but at no time should the interval exceed two weeks or be long enough to allow for any weed to flower and set seed.

It is especially important that no woody plant ever be allowed to establish in a green roof system. Woody plants have extensive root systems that can damage roofing membranes.

Herbicides, whether preemergent or post emergent, are not recommended. Herbicides are not healthy for the environment and can contaminate runoff water. The need for preemergent herbicides is a sign of weeding too infrequently.

B. DISPLACED SOIL

Nesting birds can potentially displace soil. Any displaced soil, should immediately be replaced.

C. DRAINAGE INSPECTION

Roof drains should be inspected every two weeks and any debris, pebbles, leaves, etc., should be removed to keep drains flowing freely.

D. DEBRIS/TRASH REMOVAL

With each visit, any debris or trash should immediately be removed. Similarly, and especially during fall and spring, LiveRoof® plantings should be raked clean of any matted tree leaves which could smother the LiveRoof® plants.

E. PESTICIDES

Pesticide use is discouraged on LiveRoof® systems and should always be considered secondary to cultural and biological control measures. Pesticides can get into runoff water and cause environmental damage. In almost all cases, any infirmities with LiveRoof® plants will be caused by unusual weather events, and be temporary in nature. Pesticide use should only be conducted on an “as needed” basis by qualified and licensed applicators and only after approval from the membrane manufacturer. All applications of pesticides are the sole responsibility of the applicator.

F. MOWING

LiveRoof® suggests that once each year, around April 1st, that the green roof be trimmed to a height of 2 inches or less, to break up any dried seed heads and chaff. The clippings should be allowed to stay on the roof, not be bagged or removed. This regimen has a rejuvenating effect on the plant material, and keeps it looking optimally neat and clean. Foregoing annual mowing may be elected by the owner. **Note: Never mow during summer or when plants are blooming as plants may be severely damaged or weakened. BE SAFE, USE YOUR PROTECTIVE EQUIPMENT**

G. SNOW REMOVAL AND DEICING

During winter, avoid piling excess snow on top of LiveRoof plantings. Sand or cat litter, instead of salt or chemical deicers, should be used for traction on adjacent walkways. Salt and chemical deicers can damage or kill plantings.



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